Compositions, Kits, Methods and Uses for Cleaning, Disinfecting, Sterilizing and/or Treating

[001] This application claims the benefit of priority and is entitled to the filing date pursuant to 35 U.S.C. § 119(e) of U.S. Provisional Patent Application 62/977,095, filed February 14, 2020, the content of which is hereby incorporated by reference in its entirety.

[002] In the United States, approximately 46.5 million surgical procedures and even more invasive medical procedures, including approximately 5 million gastrointestinal endoscopies, are performed each year. Each procedure involves contact by a medical device with a patient's sterile tissue or mucous membranes. A major risk of all such procedures is the introduction of pathogens that can lead to infection. Failure to properly clean, disinfect and/or sterilize a medical device can exposed a patient to body fluids and tissue contaminants from a prior patient can result in person-to-person or environmental transmission of pathogens and infect large numbers of people.

[003] Sterilization of a medical device is preferred because this process destroys or eliminates all forms of microbial life. However, the high temperature and pressures used in sterilization processes are not suitable for heat-sensitive medical device. Such heat-sensitive devices must be cleaned using a disinfection process. However, one problem associated with currently used disinfection processes is that the type and amounts of disinfectants used are destructive to the medical device. This reduces the overall life-time use of a medical device, ultimately resulting in increased medical costs due to the need to replace the medical device sooner with a new one. In addition, given the recent infectious outbreaks due to contaminated medical devices, a better disinfection method better than currently available methods is needed.

[004] The present specification discloses disinfection compositions, methods and uses that provide superior cleaning and disinfection of a hard surfaces of contamination/biofilm and/or a medical device including a heat-sensitive medical device and a device classified as a critical, semi-critical or noncritical item. At the same time, the disclosed disinfection compositions, methods and uses are less harsh than conventional compositions, methods and uses resulting in a longer lifetime use of a hard surface and/or medical device.

[005] In addition, whether through surgical procedures or due to injury, there is an urgent need to clean and disinfect wounds. The present specification further discloses disinfection compositions, methods and uses that provide superior cleaning and disinfection of tissue and body cavities, such as, *e.g.*, in wound care, pre-operative preparation and surgery, to a skin surface in dermatological applications, to an internal or external body cavity including the peritoneum, respiratory airways, vaginal, bladder and nasal cavity cleaning and disinfection applications, and to an eye in ophthalmological applications. The present specification also discloses compositions, methods and uses to treat an individual.

SUMMARY

[006] Aspects of the present specification disclose a composition comprising hypochlorous acid or free available chlorine and one or more metallic particles. A composition disclosed herein can further comprise one or more metal salts and/or a phosphate buffer like calcium phosphate or sodium phosphate.

[007] Other aspects of the present specification disclose a composition comprising hypochlorous acid or free available chlorine and one or more metal salts. A composition disclosed herein can further comprise one or more metallic particles and/or a phosphate buffer like calcium phosphate or sodium phosphate.

[008] Other aspects of the present specification disclose a kit comprising one or more containers including a composition disclosed herein and/or one or more containers including components of a composition disclosed herein. A disclosed kit further comprises one or more delivery or application systems, and/or instructions, and/or a container.

[009] Other aspects of the present specification disclose a method to clean, disinfect and/or sterilize a device. The disclosed method comprising applying a composition disclosed herein to a device, wherein application of the composition cleans, disinfects and/or sterilizes the device. The disclosed method may further comprise rinsing a cleaned, disinfected and/or sterilized device with a rinse solution disclosed herein. In other aspects of the present specification disclose a composition disclosed herein for use in cleaning, disinfecting and/or sterilizing a device. In other aspects of the present specification disclose a use of a disclosed composition clean, disinfect and/or sterilize a device.

[010] Other aspects of the present specification disclose a method to clean, disinfect and/or sterilize a surface area. The disclosed method comprising applying a composition disclosed herein to a surface area, wherein application of the composition cleans, disinfects and/or sterilizes the surface area. The disclosed method may further comprise rinsing a cleaned, disinfected and/or sterilized surface area with a rinse solution disclosed herein. In other aspects of the present specification disclose a composition disclosed herein for use in cleaning, disinfecting and/or sterilizing a surface area. In other aspects of the present specification disclose a use of a disclosed composition clean, disinfect and/or sterilize a surface area.

[011] Other aspects of the present specification disclose a method to clean, disinfect and/or sterilize a wound in an individual. The disclosed method comprising applying a composition disclosed herein to an individual, wherein application of the composition cleans, disinfects and/or sterilizes a wound. In other aspects of the present specification disclose a composition disclosed herein for use in cleaning, disinfecting and/or sterilizing of a wound in an individual. In other aspects of the present specification disclose a use of a disclosed composition clean, disinfect and/or sterilize of a wound in an individual. In other aspects of the present specification disclose a use of a disclosed composition in the manufacture of a medicament to clean, disinfect and/or sterilize of a wound in an individual.

[012] Other aspects of the present specification disclose a method to clean, disinfect and/or sterilize a infection in an individual. The disclosed method comprising applying a composition disclosed herein to an individual, wherein application of the composition cleans, disinfects and/or sterilizes an infection. In other aspects of the present specification disclose a composition disclosed herein for use in cleaning, disinfecting and/or sterilizing of an infection in an individual. In other aspects of the present specification disclose a use of a disclosed composition clean, disinfect and/or sterilize of an infection in an individual. In other aspects of the present specification disclose a use of a disclosed composition in the manufacture of a medicament to clean, disinfect and/or sterilize of an infection in an individual. An infection can be a microbial infection.

[013] Other aspects of the present specification disclose a method to treat a wound in an individual. The disclosed method comprising applying a composition disclosed herein to an individual, wherein application of the composition promotes healing of a wound. In other aspects of the present specification disclose a composition disclosed herein for use in treating a wound in an individual. In other aspects of the present specification disclose a use of a disclosed composition to treat a wound in an individual. In other aspects of the present specification disclose a use of a disclosed composition in the manufacture of a medicament to treat a wound in an individual.

DETAILED DESCRIPTION

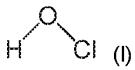
[014] A composition disclosed herein has increased stability and efficacy due to the protection of hypochlorous acid. In part, the composition may protect hypochlorous acid from exposure to harmful agents, including, *e.g.*, organic compounds, reactive compounds, positively charged molecules, or other compounds that promote or facilitate degradation of hypochlorous acid. For example, the disclosed compositions are stable in blood serum and in plastic packaging material. In addition, a synergistic effect in efficacy is observed when hypochlorous acid is protected against this exposure. This significantly improved efficacy allows for lower amounts of hypochlorous acid to be used in the disclosed compositions. As concentrations of hypochlorous acid above 350 ppm, particularly above 500 ppm produces instability, the lower amounts of hypochlorous acid used in the disclosed compositions increases stability of the composition even further. As such, a composition disclosed herein is seen as a replacement to any and all prior hypochlorous acid compositions currently in the market or being developed. Uses include cleaning/disinfecting tissue in wound care and surgery, cleaning/disinfecting skin in dermatological applications, cleaning/disinfecting the eye in ophthalmological applications, cleaning/disinfecting hard surfaces of contamination/biofilm, cleaning/disinfecting medical devices of contamination.

[015] The stability of a composition disclosed herein may be due to the positively charged atoms of a metallic particle, a metal salt and/or a phosphate buffer like calcium phosphate or sodium phosphate disclosed herein. Such compounds appear to form a strong ionic interaction with the negatively charged (OCl-), and the complex thus formed retains its stability over period of time compared to hypochlorous acid alone, which is a weaker complex in solution relative to a composition disclosed herein. For example, in the presence of copper chloride hypochlorous acid forms copper hypochlorite and HCl and in the presence of zinc chloride hypochlorous acid forms zinc hypochlorite and HCl. By replacing sodium hydroxide with

calcium oxide, a less basic solution is formed because in the presence of hypochlorous acid calcium oxide forms calcium hypochlorite and water. The reduced levels of base enhances the stability of copper hypochlorite and zinc hypochlorite because there is less base to react with zinc and copper ions, thereby maintaining the stability of copper hypochlorite and zinc hypochlorite. Further, the use of 500 ppm or lower, an in particular 350 ppm or lower of hypochlorous acid further increases the stability of a composition disclosed herein.

[016] The improved efficacy of a composition disclosed herein may in part be a result of chemical bond formation of a metallic particle, a metal salt and/or a phosphate buffer like calcium phosphate or sodium phosphate disclosed herein with the substrates thereby providing a long-lasting activity combined with the free OCl(-), which has its own antimicrobial activity.

[017] A composition disclosed herein may comprise hypochlorous acid. A weak acid, the chemical formula of hypochlorous acid is HOCl, while its molecular formula is written as HClO. As shown in formula I, hypochlorous acid is a simple molecule with the central oxygen connected to chlorine and hydrogen atoms through single bonds and has molar mass is 52.46 g/mol.



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[018] Hypochlorous acid is a colorless solution, and its exact physical properties are variable, depending on the concentration of hypochlorous in solution. Hypochlorous acid reacts with bases to form salts called hypochlorites. For example, sodium hypochlorite (NaOCl), the active ingredient in bleach, is formed by reacting hypochlorous acid with sodium hydroxide. Hypochlorous acid also readily reacts with a variety of organic molecules and biomolecules.

[019] The hypochlorous acid solution can be produced, e.g., by dissolving chlorine in water, hydrolysis of chlorine gas, electrolysis of a salt solution or acidification of hypochloride. For example, stable hypochlorous salts, such as, *e.g.*, alkali metal hypochlorites like sodium hypochlorite, calcium hypochlorite, potassium hypochlorite, lithium hypochlorite and magnesium hypochlorite, can be obtained by dissolving chlorine gas into an aqueous alkali metal hydroxide solution, like a sodium hydroxide solution, a calcium hydroxide solution, a potassium hydroxide solution, a lithium hydroxide solution, or a magnesium hydroxide solution. Hypochlorous acid can also be prepared by dissolving dichlorine monoxide in water. As another example, hypochlorous acid can also be produced by electrolytically treating a saline solution. In one method, an electrical current is applied to a one-, two-, or three-compartment cell comprising a cathode chamber, an anode chamber, and a central saline solution chamber interposed between the other two chambers where each chamber is separated by a semi-permeable membrane. During electrolysis, sodium chloride (NaCl) dissociates into negatively charged chloride (Cl^-) and positively charged sodium (Na^+). At the same time, water dissociates into hydroxide (OH-) and hydrogen (H^+) ions are formed. The negatively charged chloride (Cl^-) and hydroxide (OH^-) ions move to the anode to lose electrons and form hypochlorous acid (HOCl) as well as hypochlorite ions (OCl^-) and oxygen (O_2) and chlorine (Cl_2) gases. The reductive water comprising the hypochlorous acid is then dispensed into a collection chamber for

subsequent use. Methods to produce hypochlorous acid are described in, *e.g.*, U.S. Patent Nos 3,914,397, 4,190,638, 4,908,215, 5,322,677, 6,426,066, 7,323,118, 8,062,500, 8,945,630, 9,168,318, and 9,486,479, each of which is hereby incorporated by reference in its entirety.

[020] In an embodiment, a composition disclosed herein comprises an amount of hypochlorous acid that provides a desired beneficial effect to a composition disclosed herein. In aspects of this embodiment, a composition disclosed herein comprises hypochlorous acid in an amount of, *e.g.*, 0.05 ppm, 0.10 ppm, 0.15 ppm, 0.20 ppm, 0.25 ppm, 0.30 ppm, 0.35 ppm, 0.40 ppm, 0.45 ppm, 0.50 ppm, 0.55 ppm, 0.60 ppm, 0.65 ppm, 0.70 ppm, 0.75 ppm, 0.80 ppm, 0.85 ppm, 0.90 ppm, 0.95 ppm, 1 ppm, 5 ppm, 10 ppm, 15 ppm, 20 ppm, 25 ppm, 30 ppm, 35 ppm, 40 ppm, 45 ppm, 50 ppm, 55 ppm, 60 ppm, 65 ppm, 70 ppm, 75 ppm, 80 ppm, 85 ppm, 90 ppm, 95 ppm, 100 ppm, 125 ppm, 150 ppm, 175 ppm, 200 ppm, 225 ppm, 250 ppm, 275 ppm, 300 ppm, 325 ppm, 350 ppm, 375 ppm, 400 ppm, 425 ppm, 450 ppm, 475 ppm, 500 ppm, 525 ppm, 550 ppm, 575 ppm, 600 ppm, 625 ppm, 650 ppm, 675 ppm, 700 ppm, 725 ppm, 750 ppm, 775 ppm, 800 ppm, 825 ppm, 850 ppm, 875 ppm, 900 ppm, 925 ppm, 950 ppm, 975 ppm, 1,000 ppm, 1,025 ppm, 1,050 ppm, 1075 ppm, 1,100 ppm, 1,125 ppm, 1,150 ppm, 1,175 ppm, 1,200 ppm, 1,225 ppm, 1,250 ppm, 1,275 ppm, 1,300 ppm, 1,325 ppm, 1,350 ppm, 1,375 ppm, 1,400 ppm, 1,425 ppm, 1,450 ppm, 1,475 ppm, 1,500 ppm, 1,600 ppm, 1,700 ppm, 1,800 ppm, 1,900 ppm, or 2,000 ppm. In other aspects of this embodiment, a composition disclosed herein comprises hypochlorous acid in an amount of, *e.g.*, at least 0.05 ppm, at least 0.10 ppm, at least 0.20 ppm, at least 0.30 ppm, at least 0.40 ppm, at least 0.50 ppm, at least 0.60 ppm, at least 0.70 ppm, at least 0.80 ppm, at least 0.90 ppm, at least 1 ppm, at least 10 ppm, at least 20 ppm, at least 30 ppm, at least 40 ppm, at least 50 ppm, at least 60 ppm, at least 70 ppm, at least 80 ppm, at least 90 ppm, at least 100 ppm, at least 125 ppm, at least 150 ppm, at least 175 ppm, at least 200 ppm, at least 225 ppm, at least 250 ppm, at least 275 ppm, at least 300 ppm, at least 325 ppm, at least 350 ppm, at least 375 ppm, at least 400 ppm, at least 425 ppm, at least 450 ppm, at least 475 ppm, at least 500 ppm, at least 525 ppm, at least 550 ppm, at least 575 ppm, at least 600 ppm, at least 625 ppm, at least 650 ppm, at least 675 ppm, at least 700 ppm, at least 725 ppm, at least 750 ppm, at least 775 ppm, at least 800 ppm, at least 825 ppm, at least 850 ppm, at least 875 ppm, at least 900 ppm, at least 925 ppm, at least 950 ppm, at least 975 ppm, at least 1,000 ppm, at least 1,025 ppm, at least 1,050 ppm, at least 1075 ppm, at least 1,100 ppm, at least 1,125 ppm, at least 1,150 ppm, at least 1,175 ppm, at least 1,200 ppm, at least 1,225 ppm, at least 1,250 ppm, at least 1,275 ppm, at least 1,300 ppm, at least 1,325 ppm, at least 1,350 ppm, at least 1,375 ppm, at least 1,400 ppm, at least 1,425 ppm, at least 1,450 ppm, at least 1,475 ppm, at least 1,500 ppm, at least 1,600 ppm, at least 1,700 ppm, at least 1,800 ppm, at least 1,900 ppm, or at least 2,000 ppm. In yet other aspects of this embodiment, a composition disclosed herein comprises hypochlorous acid in an amount of, *e.g.*, at most 0.05 ppm, at most 0.10 ppm, at most 0.20 ppm, at most 0.30 ppm, at most 0.40 ppm, at most 0.50 ppm, at most 0.60 ppm, at most 0.70 ppm, at most 0.80 ppm, at most 0.90 ppm, at most 1 ppm, at most 10 ppm, at most 20 ppm, at most 30 ppm, at most 40 ppm, at most 50 ppm, at most 60 ppm, at most 70 ppm, at most 80 ppm, at most 90 ppm, at most 100 ppm, at most 125 ppm, at most 150 ppm, at most 175 ppm, at most 200 ppm, at most 225 ppm, at most 250 ppm, at most 275 ppm, at most 300 ppm, at most 325 ppm, at most 350 ppm, at most 375 ppm, at most 400 ppm, at most 425 ppm, at most 450 ppm, at most 475 ppm, at most 500 ppm, at most 525 ppm, at most 550 ppm, at most 575 ppm, at most 600 ppm, at most 625 ppm, at most 650 ppm, at most 675 ppm, at most 700 ppm, at

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[021] In still other aspects of this embodiment, a composition disclosed herein comprises hypochlorous acid in an amount of from, *e.g.*, about 0.5 ppm to about 20 ppm, about 0.5 ppm to about 25 ppm, about 0.5 ppm to about 30 ppm, about 0.5 ppm to about 35 ppm, about 0.5 ppm to about 40 ppm, about 0.5 ppm to about 45 ppm, about 0.5 ppm to about 50 ppm, about 0.5 ppm to about 55 ppm, about 0.5 ppm to about 60 ppm, about 0.5 ppm to about 65 ppm, about 0.5 ppm to about 70 ppm, about 0.5 ppm to about 75 ppm, about 0.5 ppm to about 80 ppm, about 0.5 ppm to about 85 ppm, about 0.5 ppm to about 90 ppm, about 0.5 ppm to about 95 ppm, about 0.5 ppm to about 100 ppm, about 0.75 ppm to about 20 ppm, about 0.75 ppm to about 25 ppm, about 0.75 ppm to about 30 ppm, about 0.75 ppm to about 35 ppm, about 0.75 ppm to about 40 ppm, about 0.75 ppm to about 45 ppm, about 0.75 ppm to about 50 ppm, about 0.75 ppm to about 55 ppm, about 0.75 ppm to about 60 ppm, about 0.75 ppm to about 65 ppm, about 0.75 ppm to about 70 ppm, about 0.75 ppm to about 75 ppm, about 0.75 ppm to about 80 ppm, about 0.75 ppm to about 85 ppm, about 0.75 ppm to about 90 ppm, about 0.75 ppm to about 95 ppm, about 0.75 ppm to about 100 ppm, about 1 ppm to about 20 ppm, about 1 ppm to about 25 ppm, about 1 ppm to about 30 ppm, about 1 ppm to about 35 ppm, about 1 ppm to about 40 ppm, about 1 ppm to about 45 ppm, about 1 ppm to about 50 ppm, about 1 ppm to about 55 ppm, about 1 ppm to about 60 ppm, about 1 ppm to about 65 ppm, about 1 ppm to about 70 ppm, about 1 ppm to about 75 ppm, about 1 ppm to about 80 ppm, about 1 ppm to about 85 ppm, about 1 ppm to about 90 ppm, about 1 ppm to about 95 ppm, about 1 ppm to about 100 ppm, about 5 ppm to about 20 ppm, about 5 ppm to about 25 ppm, about 5 ppm to about 30 ppm, about 5 ppm to about 35 ppm, about 5 ppm to about 40 ppm, about 5 ppm to about 45 ppm, about 5 ppm to about 50 ppm, about 5 ppm to about 55 ppm, about 5 ppm to about 60 ppm, about 5 ppm to about 65 ppm, about 5 ppm to about 70 ppm, about 5 ppm to about 75 ppm, about 5 ppm to about 80 ppm, about 5 ppm to about 85 ppm, about 5 ppm to about 90 ppm, about 5 ppm to about 95 ppm, about 5 ppm to about 100 ppm, about 10 ppm to about 20 ppm, about 10 ppm to about 25 ppm, about 10 ppm to about 30 ppm, about 10 ppm to about 35 ppm, about 10 ppm to about 40 ppm, about 10 ppm to about 45 ppm, about 10 ppm to about 50 ppm, about 10 ppm to about 55 ppm, about 10 ppm to about 60 ppm, about 10 ppm to about 65 ppm, about 10 ppm to about 70 ppm, about 10 ppm to about 75 ppm, about 10 ppm to about 80 ppm, about 10 ppm to about 85 ppm, about 10 ppm to about 90 ppm, about 10 ppm to about 95 ppm, or about 10 ppm to about 100 ppm.

[022] In other aspects of this embodiment, a composition disclosed herein comprises hypochlorous acid in an amount of from, *e.g.*, about 1 ppm to about 25 ppm, about 1 ppm to about 50 ppm, about 1 ppm to about 75 ppm, about 1 ppm to about 100 ppm, about 1 ppm to about 125 ppm, about 1 ppm to about 150 ppm, about 1 ppm to about 175 ppm, about 1 ppm to about 200 ppm, about 1 ppm to about 225 ppm, about

1 ppm to about 250 ppm, about 1 ppm to about 275 ppm, about 1 ppm to about 300 ppm, about 1 ppm to about 325 ppm, about 1 ppm to about 350 ppm, about 1 ppm to about 375 ppm, about 1 ppm to about 400 ppm, about 10 ppm to about 25 ppm, about 10 ppm to about 50 ppm, about 10 ppm to about 75 ppm, about 10 ppm to about 100 ppm, about 10 ppm to about 125 ppm, about 10 ppm to about 150 ppm, about 10 ppm to about 175 ppm, about 10 ppm to about 200 ppm, about 10 ppm to about 225 ppm, about 10 ppm to about 250 ppm, about 10 ppm to about 275 ppm, about 10 ppm to about 300 ppm, about 10 ppm to about 325 ppm, about 10 ppm to about 350 ppm, about 10 ppm to about 375 ppm, about 10 ppm to about 400 ppm, about 25 ppm to about 50 ppm, about 25 ppm to about 75 ppm, about 25 ppm to about 100 ppm, about 25 ppm to about 125 ppm, about 25 ppm to about 150 ppm, about 25 ppm to about 175 ppm, about 25 ppm to about 200 ppm, about 25 ppm to about 225 ppm, about 25 ppm to about 250 ppm, about 25 ppm to about 275 ppm, about 25 ppm to about 300 ppm, about 25 ppm to about 325 ppm, about 25 ppm to about 350 ppm, about 25 ppm to about 375 ppm, about 25 ppm to about 400 ppm, about 50 ppm to about 75 ppm, about 50 ppm to about 100 ppm, about 50 ppm to about 125 ppm, about 50 ppm to about 150 ppm, about 50 ppm to about 175 ppm, about 50 ppm to about 200 ppm, about 50 ppm to about 225 ppm, about 50 ppm to about 250 ppm, about 50 ppm to about 275 ppm, about 50 ppm to about 300 ppm, about 50 ppm to about 325 ppm, about 50 ppm to about 350 ppm, about 50 ppm to about 375 ppm, about 50 ppm to about 400 ppm, about 75 ppm to about 100 ppm, about 75 ppm to about 125 ppm, about 75 ppm to about 150 ppm, about 75 ppm to about 175 ppm, about 75 ppm to about 200 ppm, about 75 ppm to about 225 ppm, about 75 ppm to about 250 ppm, about 75 ppm to about 275 ppm, about 75 ppm to about 300 ppm, about 75 ppm to about 325 ppm, about 75 ppm to about 350 ppm, about 75 ppm to about 375 ppm, about 75 ppm to about 400 ppm, about 100 ppm to about 125 ppm, about 100 ppm to about 150 ppm, about 100 ppm to about 175 ppm, about 100 ppm to about 200 ppm, about 100 ppm to about 225 ppm, about 100 ppm to about 250 ppm, about 100 ppm to about 275 ppm, about 100 ppm to about 300 ppm, about 100 ppm to about 325 ppm, about 100 ppm to about 350 ppm, about 100 ppm to about 375 ppm, about 100 ppm to about 400 ppm, about 150 ppm to about 175 ppm, about 150 ppm to about 200 ppm, about 150 ppm to about 225 ppm, about 150 ppm to about 250 ppm, about 150 ppm to about 275 ppm, about 150 ppm to about 300 ppm, about 150 ppm to about 325 ppm, about 150 ppm to about 350 ppm, about 150 ppm to about 375 ppm, about 150 ppm to about 400 ppm, about 200 ppm to about 225 ppm, about 200 ppm to about 250 ppm, about 200 ppm to about 275 ppm, about 200 ppm to about 300 ppm, about 200 ppm to about 325 ppm, about 200 ppm to about 350 ppm, about 200 ppm to about 375 ppm, about 200 ppm to about 400 ppm, about 250 ppm to about 275 ppm, about 250 ppm to about 300 ppm, about 250 ppm to about 325 ppm, about 250 ppm to about 350 ppm, about 250 ppm to about 375 ppm, about 250 ppm to about 400 ppm, about 300 ppm to about 325 ppm, about 300 ppm to about 350 ppm, about 300 ppm to about 375 ppm, about 300 ppm to about 400 ppm, about 350 ppm to about 375 ppm, about 350 ppm to about 400 ppm, or about 375 ppm to about 400 ppm.

[023] In other aspects of this embodiment, a composition disclosed herein comprises hypochlorous acid in an amount of, *e.g.*, about 400 ppm to about 500 ppm, about 400 ppm to about 600 ppm, about 400 ppm to about 700 ppm, about 400 ppm to about 800 ppm, about 400 ppm to about 900 ppm, about 400 ppm to about 1,000 ppm, about 400 ppm to about 1,100 ppm, about 400 ppm to about 1,200 ppm, about 400 ppm to about 1,300 ppm, about 400 ppm to about 1,400 ppm, about 400 ppm to about 1,500 ppm, about 400

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[024] In aspects of this embodiment, a composition disclosed herein comprises hypochlorous acid in an amount of, *e.g.*, about 0.10%, about 0.11%, about 0.12%, about 0.13%, about 0.14%, about 0.15%, about 0.16%, about 0.17%, about 0.18%, about 0.19%, about 0.2%, about 0.25%, about 0.3%, about 0.35%, about 0.4%, about 0.45%, or about 0.5% by weight of the composition. In other aspects of this embodiment, a composition disclosed herein comprises hypochlorous acid in an amount of, *e.g.*, at least 0.10%, at least 0.11%, at least 0.12%, at least 0.13%, at least 0.14%, at least 0.15%, at least 0.16%, at least 0.17%, at least 0.18%, at least 0.19%, at least 0.2%, at least 0.25%, at least 0.3%, at least 0.35%, at least 0.4%, at least 0.45%, or at least 0.5% by weight of the composition. In yet other aspects of this embodiment, a composition disclosed herein comprises hypochlorous acid in an amount of, *e.g.*, at most 0.10%, at most 0.11%, at most 0.12%, at most 0.13%, at most 0.14%, at most 0.15%, at most 0.16%, at most 0.17%, at most 0.18%, at most 0.19%, at most 0.2%, at most 0.25%, at most 0.3%, at most 0.35%, at most 0.4%, at most 0.45%, or at most 0.5% by weight of the composition. In still other aspects of this embodiment, a composition disclosed herein comprises hypochlorous acid in an amount of, *e.g.*, about 0.10% to about 0.15%, about 0.10% to about 0.20%, about 0.10% to about 0.25%, about 0.10% to about 0.30%, about 0.10% to about 0.35%, about 0.10% to about 0.40%, about 0.10% to about 0.45%, about 0.10% to about 0.50%, about 0.20% to about 0.25%, about 0.20% to about 0.30%, about 0.20% to about 0.35%, about 0.20% to about 0.40%, about 0.20% to about 0.45%, about 0.20% to about 0.50%, about 0.30% to about 0.35%, about 0.30% to about 0.40%, about 0.30% to about 0.45%, about 0.30% to about 0.50%, about 0.40% to about 0.45%, about 0.40% to about 0.50%, or about 0.40% to about 0.50% by weight of the composition.

[025] The concentration of hypochlorous acid in solution may be described as free available chlorine in parts per million. Hypochlorous acid is in equilibrium with hypochlorite ions (OCl^-) and dissolved chlorine gas (Cl_2). The extent of the equilibrium is determined predominately by the salt concentration and pH of the solution. Temperature also impacts the ratio of the free chlorine component. Therefore, both FAC and pH need to be known to understand the amount of chlorine present as hypochlorous acid. In general, when the pH range is about 4.0 to about 5.6, approximately 100% of the available chlorine is present as HOCl. As the pH is lowered below about 4, there is an increase in dissolved chlorine gas (Cl_2). Thus, at a pH of about 3, about 90% of the available chlorine is present as hypochlorous acid, at a pH of about 2, about 75% of the available chlorine is present as hypochlorous acid, at a pH of about 1.5, about 50% of the available chlorine is present as hypochlorous acid, while at a pH of about 1, about 25% of the available chlorine is present as hypochlorous acid. As the pH is increase above about 5.6, there is an increase in hypochlorite ions (OCl^-). Thus, at a pH a pH of about 6.5, about 90% of the available chlorine is present as hypochlorous acid, at a pH of about 7, about 75% of the available chlorine is present as hypochlorous acid, at a pH of about 7.5, about 50% of the available chlorine is present as hypochlorous acid, while at a pH of about 8, about 25% of the available chlorine is present as hypochlorous acid.

[026] The chlorine amount may be measured by methods known in the art, such as a DPD colorimeter method (Lamotte Company, Chestertown, Md.), a UV spectrophotometry method, or other known methods established by the Environmental Protection Agency. In the DPD colorimeter method, a yellow color is formed by the reaction of free chlorine With N,N-diethyl-p-phenylenediamine (DPD) and the intensity is measured With a calibrated calorimeter that provides the output in parts per million. Further addition of potassium iodide turns the solution a pink color to provide the total chlorine value.

[027] In an embodiment, a composition disclosed herein comprises an amount of free available chlorine that provides a desired beneficial effect to a composition disclosed herein. In aspects of this embodiment, a composition disclosed herein comprises free available chlorine in an amount of, *e.g.*, 0.05 ppm, 0.10 ppm, 0.15 ppm, 0.20 ppm, 0.25 ppm, 0.30 ppm, 0.35 ppm, 0.40 ppm, 0.45 ppm, 0.50 ppm, 0.55 ppm, 0.60 ppm, 0.65 ppm, 0.70 ppm, 0.75 ppm, 0.80 ppm, 0.85 ppm, 0.90 ppm, 0.95 ppm, 1 ppm, 5 ppm, 10 ppm, 15 ppm, 20 ppm, 25 ppm, 30 ppm, 35 ppm, 40 ppm, 45 ppm, 50 ppm, 55 ppm, 60 ppm, 65 ppm, 70 ppm, 75 ppm, 80 ppm, 85 ppm, 90 ppm, 95 ppm, 100 ppm, 125 ppm, 150 ppm, 175 ppm, 200 ppm, 225 ppm, 250 ppm, 275 ppm, 300 ppm, 325 ppm, 350 ppm, 375 ppm, 400 ppm, 425 ppm, 450 ppm, 475 ppm, 500 ppm, 525 ppm, 550 ppm, 575 ppm, 600 ppm, 625 ppm, 650 ppm, 675 ppm, 700 ppm, 725 ppm, 750 ppm, 775 ppm, 800 ppm, 825 ppm, 850 ppm, 875 ppm, 900 ppm, 925 ppm, 950 ppm, 975 ppm, 1,000 ppm, 1,025 ppm, 1,050 ppm, 1075 ppm, 1,100 ppm, 1,125 ppm, 1,150 ppm, 1,175 ppm, 1,200 ppm, 1,225 ppm, 1,250 ppm, 1,275 ppm, 1,300 ppm, 1,325 ppm, 1,350 ppm, 1,375 ppm, 1,400 ppm, 1,425 ppm, 1,450 ppm, 1,475 ppm, 1,500 ppm, 1,600 ppm, 1,700 ppm, 1,800 ppm, 1,900 ppm, or 2,000 ppm. In other aspects of this embodiment, a composition disclosed herein comprises free available chlorine in an amount of, *e.g.*, at least 0.05 ppm, at least 0.10 ppm, at least 0.20 ppm, at least 0.30 ppm, at least 0.40 ppm, at least 0.50 ppm, at least 0.60 ppm, at least 0.70 ppm, at least 0.80 ppm, at least 0.90 ppm, at least 1 ppm, at least 10 ppm, at least 20 ppm, at least 30 ppm, at least 40 ppm, at least 50 ppm, at least 60 ppm, at least 70 ppm, at least 80 ppm, at least 90 ppm, at least 100 ppm, at least 125 ppm, at least 150 ppm, at least 175 ppm, at least 200 ppm, at least 225 ppm, at least 250 ppm, at least 275 ppm, at least 300 ppm, at least 325 ppm, at least 350 ppm, at least 375 ppm, at least 400 ppm, at least 425 ppm, at least 450 ppm, at least 475 ppm, at least 500 ppm, at least 525 ppm, at least 550 ppm, at least 575 ppm, at least 600 ppm, at least 625 ppm, at least 650 ppm, at least 675 ppm, at least 700 ppm, at least 725 ppm, at least 750 ppm, at least 775 ppm, at least 800 ppm, at least 825 ppm, at least 850 ppm, at least 875 ppm, at least 900 ppm, at least 925 ppm, at least 950 ppm, at least 975 ppm, at least 1,000 ppm, at least 1,025 ppm, at least 1,050 ppm, at least 1075 ppm, at least 1,100 ppm, at least 1,125 ppm, at least 1,150 ppm, at least 1,175 ppm, at least 1,200 ppm, at least 1,225 ppm, at least 1,250 ppm, at least 1,275 ppm, at least 1,300 ppm, at least 1,325 ppm, at least 1,350 ppm, at least 1,375 ppm, at least 1,400 ppm, at least 1,425 ppm, at least 1,450 ppm, at least 1,475 ppm, at least 1,500 ppm, at least 1,600 ppm, at least 1,700 ppm, at least 1,800 ppm, at least 1,900 ppm, or at least 2,000 ppm. In yet other aspects of this embodiment, a composition disclosed herein comprises free available chlorine in an amount of, *e.g.*, at most 0.05 ppm, at most 0.10 ppm, at most 0.20 ppm, at most 0.30 ppm, at most 0.40 ppm, at most 0.50 ppm, at most 0.60 ppm, at most 0.70 ppm, at most 0.80 ppm, at most 0.90 ppm, at most 1 ppm, at most 10 ppm, at most 20 ppm, at most 30 ppm, at most 40 ppm, at most 50 ppm, at most 60 ppm, at most 70 ppm, at most 80 ppm, at most 90 ppm, at most 100 ppm,

at most 125 ppm, at most 150 ppm, at most 175 ppm, at most 200 ppm, at most 225 ppm, at most 250 ppm, at most 275 ppm, at most 300 ppm, at most 325 ppm, at most 350 ppm, at most 375 ppm, at most 400 ppm, at most 425 ppm, at most 450 ppm, at most 475 ppm, at most 500 ppm, at most 525 ppm, at most 550 ppm, at most 575 ppm, at most 600 ppm, at most 625 ppm, at most 650 ppm, at most 675 ppm, at most 700 ppm, at most 725 ppm, at most 750 ppm, at most 775 ppm, at most 800 ppm, at most 825 ppm, at most 850 ppm, at most 875 ppm, at most 900 ppm, at most 925 ppm, at most 950 ppm, at most 975 ppm, at most 1,000 ppm, at most 1,025 ppm, at most 1,050 ppm, at most 1075 ppm, at most 1,100 ppm, at most 1,125 ppm, at most 1,150 ppm, at most 1,175 ppm, at most 1,200 ppm, at most 1,225 ppm, at most 1,250 ppm, at most 1,275 ppm, at most 1,300 ppm, at most 1,325 ppm, at most 1,350 ppm, at most 1,375 ppm, at most 1,400 ppm, at most 1,425 ppm, at most 1,450 ppm, at most 1,475 ppm, at most 1,500 ppm, at most 1,600 ppm, at most 1,700 ppm, at most 1,800 ppm, at most 1,900 ppm, or at most 2,000 ppm.

[028] In still other aspects of this embodiment, a composition disclosed herein comprises free available chlorine in an amount of from, *e.g.*, about 0.5 ppm to about 20 ppm, about 0.5 ppm to about 25 ppm, about 0.5 ppm to about 30 ppm, about 0.5 ppm to about 35 ppm, about 0.5 ppm to about 40 ppm, about 0.5 ppm to about 45 ppm, about 0.5 ppm to about 50 ppm, about 0.5 ppm to about 55 ppm, about 0.5 ppm to about 60 ppm, about 0.5 ppm to about 65 ppm, about 0.5 ppm to about 70 ppm, about 0.5 ppm to about 75 ppm, about 0.5 ppm to about 80 ppm, about 0.5 ppm to about 85 ppm, about 0.5 ppm to about 90 ppm, about 0.5 ppm to about 95 ppm, about 0.5 ppm to about 100 ppm, about 0.75 ppm to about 20 ppm, about 0.75 ppm to about 25 ppm, about 0.75 ppm to about 30 ppm, about 0.75 ppm to about 35 ppm, about 0.75 ppm to about 40 ppm, about 0.75 ppm to about 45 ppm, about 0.75 ppm to about 50 ppm, about 0.75 ppm to about 55 ppm, about 0.75 ppm to about 60 ppm, about 0.75 ppm to about 65 ppm, about 0.75 ppm to about 70 ppm, about 0.75 ppm to about 75 ppm, about 0.75 ppm to about 80 ppm, about 0.75 ppm to about 85 ppm, about 0.75 ppm to about 90 ppm, about 0.75 ppm to about 95 ppm, about 0.75 ppm to about 100 ppm, about 1 ppm to about 20 ppm, about 1 ppm to about 25 ppm, about 1 ppm to about 30 ppm, about 1 ppm to about 35 ppm, about 1 ppm to about 40 ppm, about 1 ppm to about 45 ppm, about 1 ppm to about 50 ppm, about 1 ppm to about 55 ppm, about 1 ppm to about 60 ppm, about 1 ppm to about 65 ppm, about 1 ppm to about 70 ppm, about 1 ppm to about 75 ppm, about 1 ppm to about 80 ppm, about 1 ppm to about 85 ppm, about 1 ppm to about 90 ppm, about 1 ppm to about 95 ppm, about 1 ppm to about 100 ppm, about 5 ppm to about 20 ppm, about 5 ppm to about 25 ppm, about 5 ppm to about 30 ppm, about 5 ppm to about 35 ppm, about 5 ppm to about 40 ppm, about 5 ppm to about 45 ppm, about 5 ppm to about 50 ppm, about 5 ppm to about 55 ppm, about 5 ppm to about 60 ppm, about 5 ppm to about 65 ppm, about 5 ppm to about 70 ppm, about 5 ppm to about 75 ppm, about 5 ppm to about 80 ppm, about 5 ppm to about 85 ppm, about 5 ppm to about 90 ppm, about 5 ppm to about 95 ppm, about 5 ppm to about 100 ppm, about 10 ppm to about 20 ppm, about 10 ppm to about 25 ppm, about 10 ppm to about 30 ppm, about 10 ppm to about 35 ppm, about 10 ppm to about 40 ppm, about 10 ppm to about 45 ppm, about 10 ppm to about 50 ppm, about 10 ppm to about 55 ppm, about 10 ppm to about 60 ppm, about 10 ppm to about 65 ppm, about 10 ppm to about 70 ppm, about 10 ppm to about 75 ppm, about 10 ppm to about 80 ppm, about 10 ppm to about 85 ppm, about 10 ppm to about 90 ppm, about 10 ppm to about 95 ppm, or about 10 ppm to about 100 ppm.

[029] In other aspects of this embodiment, a composition disclosed herein comprises free available chlorine in an amount of from, *e.g.*, about 1 ppm to about 25 ppm, about 1 ppm to about 50 ppm, about 1 ppm to about 75 ppm, about 1 ppm to about 100 ppm, about 1 ppm to about 125 ppm, about 1 ppm to about 150 ppm, about 1 ppm to about 175 ppm, about 1 ppm to about 200 ppm, about 1 ppm to about 225 ppm, about 1 ppm to about 250 ppm, about 1 ppm to about 275 ppm, about 1 ppm to about 300 ppm, about 1 ppm to about 325 ppm, about 1 ppm to about 350 ppm, about 1 ppm to about 375 ppm, about 1 ppm to about 400 ppm, about 10 ppm to about 25 ppm, about 10 ppm to about 50 ppm, about 10 ppm to about 75 ppm, about 10 ppm to about 100 ppm, about 10 ppm to about 125 ppm, about 10 ppm to about 150 ppm, about 10 ppm to about 175 ppm, about 10 ppm to about 200 ppm, about 10 ppm to about 225 ppm, about 10 ppm to about 250 ppm, about 10 ppm to about 275 ppm, about 10 ppm to about 300 ppm, about 10 ppm to about 325 ppm, about 10 ppm to about 350 ppm, about 10 ppm to about 375 ppm, about 10 ppm to about 400 ppm, about 25 ppm to about 50 ppm, about 25 ppm to about 75 ppm, about 25 ppm to about 100 ppm, about 25 ppm to about 125 ppm, about 25 ppm to about 150 ppm, about 25 ppm to about 175 ppm, about 25 ppm to about 200 ppm, about 25 ppm to about 225 ppm, about 25 ppm to about 250 ppm, about 25 ppm to about 275 ppm, about 25 ppm to about 300 ppm, about 25 ppm to about 325 ppm, about 25 ppm to about 350 ppm, about 25 ppm to about 375 ppm, about 25 ppm to about 400 ppm, about 50 ppm to about 75 ppm, about 50 ppm to about 100 ppm, about 50 ppm to about 125 ppm, about 50 ppm to about 150 ppm, about 50 ppm to about 175 ppm, about 50 ppm to about 200 ppm, about 50 ppm to about 225 ppm, about 50 ppm to about 250 ppm, about 50 ppm to about 275 ppm, about 50 ppm to about 300 ppm, about 50 ppm to about 325 ppm, about 50 ppm to about 350 ppm, about 50 ppm to about 375 ppm, about 50 ppm to about 400 ppm, about 75 ppm to about 100 ppm, about 75 ppm to about 125 ppm, about 75 ppm to about 150 ppm, about 75 ppm to about 175 ppm, about 75 ppm to about 200 ppm, about 75 ppm to about 225 ppm, about 75 ppm to about 250 ppm, about 75 ppm to about 275 ppm, about 75 ppm to about 300 ppm, about 75 ppm to about 325 ppm, about 75 ppm to about 350 ppm, about 75 ppm to about 375 ppm, about 75 ppm to about 400 ppm, about 100 ppm to about 125 ppm, about 100 ppm to about 150 ppm, about 100 ppm to about 175 ppm, about 100 ppm to about 200 ppm, about 100 ppm to about 225 ppm, about 100 ppm to about 250 ppm, about 100 ppm to about 275 ppm, about 100 ppm to about 300 ppm, about 100 ppm to about 325 ppm, about 100 ppm to about 350 ppm, about 100 ppm to about 375 ppm, about 100 ppm to about 400 ppm, about 150 ppm to about 175 ppm, about 150 ppm to about 200 ppm, about 150 ppm to about 225 ppm, about 150 ppm to about 250 ppm, about 150 ppm to about 275 ppm, about 150 ppm to about 300 ppm, about 150 ppm to about 325 ppm, about 150 ppm to about 350 ppm, about 150 ppm to about 375 ppm, about 150 ppm to about 400 ppm, about 200 ppm to about 225 ppm, about 200 ppm to about 250 ppm, about 200 ppm to about 275 ppm, about 200 ppm to about 300 ppm, about 200 ppm to about 325 ppm, about 200 ppm to about 350 ppm, about 200 ppm to about 375 ppm, about 200 ppm to about 400 ppm, about 250 ppm to about 275 ppm, about 250 ppm to about 300 ppm, about 250 ppm to about 325 ppm, about 250 ppm to about 350 ppm, about 250 ppm to about 375 ppm, about 250 ppm to about 400 ppm, about 300 ppm to about 325 ppm, about 300 ppm to about 350 ppm, about 300 ppm to about 375 ppm, about 300 ppm to about 400 ppm, about 350 ppm to about 375 ppm, about 350 ppm to about 400 ppm, or about 375 ppm to about 400 ppm.

[030] In other aspects of this embodiment, a composition disclosed herein comprises free available chlorine in an amount of, *e.g.*, about 400 ppm to about 500 ppm, about 400 ppm to about 600 ppm, about 400 ppm to about 700 ppm, about 400 ppm to about 800 ppm, about 400 ppm to about 900 ppm, about 400 ppm to about 1,000 ppm, about 400 ppm to about 1,100 ppm, about 400 ppm to about 1,200 ppm, about 400 ppm to about 1,300 ppm, about 400 ppm to about 1,400 ppm, about 400 ppm to about 1,500 ppm, about 400 ppm to about 1,600 ppm, about 400 ppm to about 1,700 ppm, about 400 ppm to about 1,800 ppm, about 400 ppm to about 1,900 ppm, about 400 ppm to about 2,000 ppm, about 500 ppm to about 600 ppm, about 500 ppm to about 700 ppm, about 500 ppm to about 800 ppm, about 500 ppm to about 900 ppm, about 500 ppm to about 1,000 ppm, about 500 ppm to about 1,100 ppm, about 500 ppm to about 1,200 ppm, about 500 ppm to about 1,300 ppm, about 500 ppm to about 1,400 ppm, about 500 ppm to about 1,500 ppm, about 500 ppm to about 1,600 ppm, about 500 ppm to about 1,700 ppm, about 500 ppm to about 1,800 ppm, about 500 ppm to about 1,900 ppm, about 500 ppm to about 2,000 ppm, about 600 ppm to about 700 ppm, about 600 ppm to about 800 ppm, about 600 ppm to about 900 ppm, about 600 ppm to about 1,000 ppm, about 600 ppm to about 1,100 ppm, about 600 ppm to about 1,200 ppm, about 600 ppm to about 1,300 ppm, about 600 ppm to about 1,400 ppm, about 600 ppm to about 1,500 ppm, about 600 ppm to about 1,600 ppm, about 600 ppm to about 1,700 ppm, about 600 ppm to about 1,800 ppm, about 600 ppm to about 1,900 ppm, about 600 ppm to about 2,000 ppm, about 700 ppm to about 800 ppm, about 700 ppm to about 900 ppm, about 700 ppm to about 1,000 ppm, about 700 ppm to about 1,100 ppm, about 700 ppm to about 1,200 ppm, about 700 ppm to about 1,300 ppm, about 700 ppm to about 1,400 ppm, about 700 ppm to about 1,500 ppm, about 700 ppm to about 1,600 ppm, about 700 ppm to about 1,700 ppm, about 700 ppm to about 1,800 ppm, about 700 ppm to about 1,900 ppm, about 700 ppm to about 2,000 ppm, about 800 ppm to about 900 ppm, about 800 ppm to about 1,000 ppm, about 800 ppm to about 1,100 ppm, about 800 ppm to about 1,200 ppm, about 800 ppm to about 1,300 ppm, about 800 ppm to about 1,400 ppm, about 800 ppm to about 1,500 ppm, about 800 ppm to about 1,600 ppm, about 800 ppm to about 1,700 ppm, about 800 ppm to about 1,800 ppm, about 800 ppm to about 1,900 ppm, about 800 ppm to about 2,000 ppm, about 900 ppm to about 1,000 ppm, about 900 ppm to about 1,100 ppm, about 900 ppm to about 1,200 ppm, about 900 ppm to about 1,300 ppm, about 900 ppm to about 1,400 ppm, about 900 ppm to about 1,500 ppm, about 900 ppm to about 1,600 ppm, about 900 ppm to about 1,700 ppm, about 900 ppm to about 1,800 ppm, about 900 ppm to about 1,900 ppm, about 900 ppm to about 2,000 ppm, about 1,000 ppm to about 1,100 ppm, about 1,000 ppm to about 1,200 ppm, about 1,000 ppm to about 1,300 ppm, about 1,000 ppm to about 1,400 ppm, about 1,000 ppm to about 1,500 ppm, about 1,000 ppm to about 1,600 ppm, about 1,000 ppm to about 1,700 ppm, about 1,000 ppm to about 1,800 ppm, about 1,000 ppm to about 1,900 ppm, about 1,000 ppm to about 2,000 ppm, about 1,100 ppm to about 1,200 ppm, about 1,100 ppm to about 1,300 ppm, about 1,100 ppm to about 1,400 ppm, about 1,100 ppm to about 1,500 ppm, about 1,100 ppm to about 1,600 ppm, about 1,100 ppm to about 1,700 ppm, about 1,100 ppm to about 1,800 ppm, about 1,100 ppm to about 1,900 ppm, about 1,100 ppm to about 2,000 ppm, about 1,200 ppm to about 1,300 ppm, about 1,200 ppm to about 1,400 ppm, about 1,200 ppm to about 1,500 ppm, about 1,200 ppm to about 1,600 ppm, about 1,200 ppm to about 1,700 ppm, about 1,200 ppm to about 1,800 ppm, about 1,200 ppm to about 1,900 ppm, about 1,200 ppm to about 2,000 ppm, about 1,300 ppm to about 1,400 ppm, about 1,300 ppm to about 1,500 ppm, about 1,300 ppm to about 1,600 ppm, about 1,300 ppm to about 1,700 ppm, about 1,300 ppm to about

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[031] In aspects of this embodiment, a composition disclosed herein comprises free available chlorine in an amount of, *e.g.*, about 0.10%, about 0.11%, about 0.12%, about 0.13%, about 0.14%, about 0.15%, about 0.16%, about 0.17%, about 0.18%, about 0.19%, about 0.2%, about 0.25%, about 0.3%, about 0.35%, about 0.4%, about 0.45%, or about 0.5% by weight of the composition. In other aspects of this embodiment, a composition disclosed herein comprises free available chlorine in an amount of, *e.g.*, at least 0.10%, at least 0.11%, at least 0.12%, at least 0.13%, at least 0.14%, at least 0.15%, at least 0.16%, at least 0.17%, at least 0.18%, at least 0.19%, at least 0.2%, at least 0.25%, at least 0.3%, at least 0.35%, at least 0.4%, at least 0.45%, or at least 0.5% by weight of the composition. In yet other aspects of this embodiment, a composition disclosed herein comprises free available chlorine in an amount of, *e.g.*, at most 0.10%, at most 0.11%, at most 0.12%, at most 0.13%, at most 0.14%, at most 0.15%, at most 0.16%, at most 0.17%, at most 0.18%, at most 0.19%, at most 0.2%, at most 0.25%, at most 0.3%, at most 0.35%, at most 0.4%, at most 0.45%, or at most 0.5% by weight of the composition. In still other aspects of this embodiment, a composition disclosed herein comprises free available chlorine in an amount of, *e.g.*, about 0.10% to about 0.15%, about 0.10% to about 0.20%, about 0.10% to about 0.25%, about 0.10% to about 0.30%, about 0.10% to about 0.35%, about 0.10% to about 0.40%, about 0.10% to about 0.45%, about 0.10% to about 0.50%, about 0.20% to about 0.25%, about 0.20% to about 0.30%, about 0.20% to about 0.35%, about 0.20% to about 0.40%, about 0.20% to about 0.45%, about 0.20% to about 0.50%, about 0.30% to about 0.35%, about 0.30% to about 0.40%, about 0.30% to about 0.45%, about 0.30% to about 0.50%, about 0.40% to about 0.45%, about 0.40% to about 0.50%, or about 0.40% to about 0.50% by weight of the composition.

[032] A composition disclosed herein may comprise metallic particles. A metallic particle can be composed of a single element, such as, *e.g.*, copper, iron, silver, titanium or zinc or be a mixed metallic particle composed of various combinations of different elements, such as, *e.g.*, various combinations of two or more of the following: copper, iron, silver, titanium or zinc. Non-limiting examples of a metallic particle includes a copper particle, an iron particle, a potassium particle, a silver particle, a titanium particle, and a zinc particle. Other non-limiting examples of a metallic particle include a metal acetate particle, a metal chloride particle, a metal nitrate particle, or a metal oxide particle. A metal acetate particle includes, without limitation, copper acetate, iron acetate, *e.g.* iron (II) acetate and iron (III) acetate, silver acetate, titanium acetate, zinc acetate, or any combination thereof. A metal nitrate particle includes, without limitation, copper nitrate, iron nitrate, *e.g.*, iron (II) nitrate, iron (III) nitrate, silver nitrate, titanium nitrate, zinc nitrate,

or any combination thereof. A metal chloride particle includes, without limitation, copper chloride, iron chloride, *e.g.*, iron (II) chloride or iron (III) chloride, silver chloride, titanium chloride, zinc chloride, or any combination thereof. A metal oxide particle includes, without limitation, copper oxide particle, iron oxide particle, *e.g.*, iron (II) oxide particle, iron (III) oxide particle, silver oxide particle, titanium dioxide particle, zinc oxide particle, copper-zinc-calcium oxide particle, or any combination thereof.

[033] A metallic particle includes nanoparticles and microparticles. A nanoparticle has an average diameter of about 1 nm to about 1,000 nm. A microparticle has an average diameter of about 1 μm to about 1,000 μm.

[034] In an embodiment, a composition disclosed herein comprises an amount of metallic particles that provides a desired beneficial effect to a composition disclosed herein. In aspects of this embodiment, a composition disclosed herein comprises metallic particles in an amount of, *e.g.*, 0.05 ppm, 0.10 ppm, 0.15 ppm, 0.20 ppm, 0.25 ppm, 0.30 ppm, 0.35 ppm, 0.40 ppm, 0.45 ppm, 0.50 ppm, 0.55 ppm, 0.60 ppm, 0.65 ppm, 0.70 ppm, 0.75 ppm, 0.80 ppm, 0.85 ppm, 0.90 ppm, 0.95 ppm, 1 ppm, 5 ppm, 10 ppm, 15 ppm, 20 ppm, 25 ppm, 30 ppm, 35 ppm, 40 ppm, 45 ppm, 50 ppm, 55 ppm, 60 ppm, 65 ppm, 70 ppm, 75 ppm, 80 ppm, 85 ppm, 90 ppm, 95 ppm, 100 ppm, 125 ppm, 150 ppm, 175 ppm, 200 ppm, 225 ppm, 250 ppm, 275 ppm, 300 ppm, 325 ppm, 350 ppm, 375 ppm, 400 ppm, 425 ppm, 450 ppm, 475 ppm, 500 ppm, 525 ppm, 550 ppm, 575 ppm, 600 ppm, 625 ppm, 650 ppm, 675 ppm, 700 ppm, 725 ppm, 750 ppm, 775 ppm, 800 ppm, 825 ppm, 850 ppm, 875 ppm, 900 ppm, 925 ppm, 950 ppm, 975 ppm, 1,000 ppm, 1,025 ppm, 1,050 ppm, 1075 ppm, 1,100 ppm, 1,125 ppm, 1,150 ppm, 1,175 ppm, 1,200 ppm, 1,225 ppm, 1,250 ppm, 1,275 ppm, 1,300 ppm, 1,325 ppm, 1,350 ppm, 1,375 ppm, 1,400 ppm, 1,425 ppm, 1,450 ppm, 1,475 ppm, 1,500 ppm, 1,600 ppm, 1,700 ppm, 1,800 ppm, 1,900 ppm, or 2,000 ppm. In other aspects of this embodiment, a composition disclosed herein comprises metallic particles in an amount of, *e.g.*, at least 0.05 ppm, at least 0.10 ppm, at least 0.20 ppm, at least 0.30 ppm, at least 0.40 ppm, at least 0.50 ppm, at least 0.60 ppm, at least 0.70 ppm, at least 0.80 ppm, at least 0.90 ppm, at least 1 ppm, at least 10 ppm, at least 20 ppm, at least 30 ppm, at least 40 ppm, at least 50 ppm, at least 60 ppm, at least 70 ppm, at least 80 ppm, at least 90 ppm, at least 100 ppm, at least 125 ppm, at least 150 ppm, at least 175 ppm, at least 200 ppm, at least 225 ppm, at least 250 ppm, at least 275 ppm, at least 300 ppm, at least 325 ppm, at least 350 ppm, at least 375 ppm, at least 400 ppm, at least 425 ppm, at least 450 ppm, at least 475 ppm, at least 500 ppm, at least 525 ppm, at least 550 ppm, at least 575 ppm, at least 600 ppm, at least 625 ppm, at least 650 ppm, at least 675 ppm, at least 700 ppm, at least 725 ppm, at least 750 ppm, at least 775 ppm, at least 800 ppm, at least 825 ppm, at least 850 ppm, at least 875 ppm, at least 900 ppm, at least 925 ppm, at least 950 ppm, at least 975 ppm, at least 1,000 ppm, at least 1,025 ppm, at least 1,050 ppm, at least 1075 ppm, at least 1,100 ppm, at least 1,125 ppm, at least 1,150 ppm, at least 1,175 ppm, at least 1,200 ppm, at least 1,225 ppm, at least 1,250 ppm, at least 1,275 ppm, at least 1,300 ppm, at least 1,325 ppm, at least 1,350 ppm, at least 1,375 ppm, at least 1,400 ppm, at least 1,425 ppm, at least 1,450 ppm, at least 1,475 ppm, at least 1,500 ppm, at least 1,600 ppm, at least 1,700 ppm, at least 1,800 ppm, at least 1,900 ppm, or at least 2,000 ppm. In yet other aspects of this embodiment, a composition disclosed herein comprises metallic particles in an amount of, *e.g.*, at most 0.05 ppm, at most 0.10 ppm, at most 0.20 ppm, at most 0.30 ppm, at most 0.40 ppm, at most 0.50 ppm, at most 0.60 ppm, at most 0.70 ppm, at most 0.80 ppm, at most 0.90 ppm, at most

1 ppm, at most 10 ppm, at most 20 ppm, at most 30 ppm, at most 40 ppm, at most 50 ppm, at most 60 ppm, at most 70 ppm, at most 80 ppm, at most 90 ppm, at most 100 ppm, at most 125 ppm, at most 150 ppm, at most 175 ppm, at most 200 ppm, at most 225 ppm, at most 250 ppm, at most 275 ppm, at most 300 ppm, at most 325 ppm, at most 350 ppm, at most 375 ppm, at most 400 ppm, at most 425 ppm, at most 450 ppm, at most 475 ppm, at most 500 ppm, at most 525 ppm, at most 550 ppm, at most 575 ppm, at most 600 ppm, at most 625 ppm, at most 650 ppm, at most 675 ppm, at most 700 ppm, at most 725 ppm, at most 750 ppm, at most 775 ppm, at most 800 ppm, at most 825 ppm, at most 850 ppm, at most 875 ppm, at most 900 ppm, at most 925 ppm, at most 950 ppm, at most 975 ppm, at most 1,000 ppm, at most 1,025 ppm, at most 1,050 ppm, at most 1075 ppm, at most 1,100 ppm, at most 1,125 ppm, at most 1,150 ppm, at most 1,175 ppm, at most 1,200 ppm, at most 1,225 ppm, at most 1,250 ppm, at most 1,275 ppm, at most 1,300 ppm, at most 1,325 ppm, at most 1,350 ppm, at most 1,375 ppm, at most 1,400 ppm, at most 1,425 ppm, at most 1,450 ppm, at most 1,475 ppm, at most 1,500 ppm, at most 1,600 ppm, at most 1,700 ppm, at most 1,800 ppm, at most 1,900 ppm, or at most 2,000 ppm.

[035] In still other aspects of this embodiment, a composition disclosed herein comprises metallic particles in an amount of from, *e.g.*, about 0.5 ppm to about 20 ppm, about 0.5 ppm to about 25 ppm, about 0.5 ppm to about 30 ppm, about 0.5 ppm to about 35 ppm, about 0.5 ppm to about 40 ppm, about 0.5 ppm to about 45 ppm, about 0.5 ppm to about 50 ppm, about 0.5 ppm to about 55 ppm, about 0.5 ppm to about 60 ppm, about 0.5 ppm to about 65 ppm, about 0.5 ppm to about 70 ppm, about 0.5 ppm to about 75 ppm, about 0.5 ppm to about 80 ppm, about 0.5 ppm to about 85 ppm, about 0.5 ppm to about 90 ppm, about 0.5 ppm to about 95 ppm, about 0.5 ppm to about 100 ppm, about 0.75 ppm to about 20 ppm, about 0.75 ppm to about 25 ppm, about 0.75 ppm to about 30 ppm, about 0.75 ppm to about 35 ppm, about 0.75 ppm to about 40 ppm, about 0.75 ppm to about 45 ppm, about 0.75 ppm to about 50 ppm, about 0.75 ppm to about 55 ppm, about 0.75 ppm to about 60 ppm, about 0.75 ppm to about 65 ppm, about 0.75 ppm to about 70 ppm, about 0.75 ppm to about 75 ppm, about 0.75 ppm to about 80 ppm, about 0.75 ppm to about 85 ppm, about 0.75 ppm to about 90 ppm, about 0.75 ppm to about 95 ppm, about 0.75 ppm to about 100 ppm, about 1 ppm to about 20 ppm, about 1 ppm to about 25 ppm, about 1 ppm to about 30 ppm, about 1 ppm to about 35 ppm, about 1 ppm to about 40 ppm, about 1 ppm to about 45 ppm, about 1 ppm to about 50 ppm, about 1 ppm to about 55 ppm, about 1 ppm to about 60 ppm, about 1 ppm to about 65 ppm, about 1 ppm to about 70 ppm, about 1 ppm to about 75 ppm, about 1 ppm to about 80 ppm, about 1 ppm to about 85 ppm, about 1 ppm to about 90 ppm, about 1 ppm to about 95 ppm, about 1 ppm to about 100 ppm, about 5 ppm to about 20 ppm, about 5 ppm to about 25 ppm, about 5 ppm to about 30 ppm, about 5 ppm to about 35 ppm, about 5 ppm to about 40 ppm, about 5 ppm to about 45 ppm, about 5 ppm to about 50 ppm, about 5 ppm to about 55 ppm, about 5 ppm to about 60 ppm, about 5 ppm to about 65 ppm, about 5 ppm to about 70 ppm, about 5 ppm to about 75 ppm, about 5 ppm to about 80 ppm, about 5 ppm to about 85 ppm, about 5 ppm to about 90 ppm, about 5 ppm to about 95 ppm, about 5 ppm to about 100 ppm, about 10 ppm to about 20 ppm, about 10 ppm to about 25 ppm, about 10 ppm to about 30 ppm, about 10 ppm to about 35 ppm, about 10 ppm to about 40 ppm, about 10 ppm to about 45 ppm, about 10 ppm to about 50 ppm, about 10 ppm to about 55 ppm, about 10 ppm to about 60 ppm, about 10 ppm to about 65 ppm, about 10 ppm to about 70 ppm, about 10 ppm to about 75 ppm, about 10 ppm to about 80 ppm, about

10 ppm to about 85 ppm, about 10 ppm to about 90 ppm, about 10 ppm to about 95 ppm, or about 10 ppm to about 100 ppm.

[036] In other aspects of this embodiment, a composition disclosed herein comprises metallic particles in an amount of from, *e.g.*, about 1 ppm to about 25 ppm, about 1 ppm to about 50 ppm, about 1 ppm to about 75 ppm, about 1 ppm to about 100 ppm, about 1 ppm to about 125 ppm, about 1 ppm to about 150 ppm, about 1 ppm to about 175 ppm, about 1 ppm to about 200 ppm, about 1 ppm to about 225 ppm, about 1 ppm to about 250 ppm, about 1 ppm to about 275 ppm, about 1 ppm to about 300 ppm, about 1 ppm to about 325 ppm, about 1 ppm to about 350 ppm, about 1 ppm to about 375 ppm, about 1 ppm to about 400 ppm, about 1 ppm to about 425 ppm, about 1 ppm to about 450 ppm, about 1 ppm to about 475 ppm, about 1 ppm to about 500 ppm, about 5 ppm to about 25 ppm, about 5 ppm to about 50 ppm, about 5 ppm to about 75 ppm, about 5 ppm to about 100 ppm, about 5 ppm to about 125 ppm, about 5 ppm to about 150 ppm, about 5 ppm to about 175 ppm, about 5 ppm to about 200 ppm, about 5 ppm to about 225 ppm, about 5 ppm to about 250 ppm, about 5 ppm to about 275 ppm, about 1 ppm to about 300 ppm, about 5 ppm to about 325 ppm, about 5 ppm to about 350 ppm, about 5 ppm to about 375 ppm, about 5 ppm to about 400 ppm, about 5 ppm to about 425 ppm, about 5 ppm to about 450 ppm, about 5 ppm to about 475 ppm, about 5 ppm to about 500 ppm, about 10 ppm to about 25 ppm, about 10 ppm to about 50 ppm, about 10 ppm to about 75 ppm, about 10 ppm to about 100 ppm, about 10 ppm to about 125 ppm, about 10 ppm to about 150 ppm, about 10 ppm to about 175 ppm, about 10 ppm to about 200 ppm, about 10 ppm to about 225 ppm, about 10 ppm to about 250 ppm, about 10 ppm to about 275 ppm, about 10 ppm to about 300 ppm, about 10 ppm to about 325 ppm, about 10 ppm to about 350 ppm, about 10 ppm to about 375 ppm, about 10 ppm to about 400 ppm, about 10 ppm to about 425 ppm, about 10 ppm to about 450 ppm, about 10 ppm to about 475 ppm, about 10 ppm to about 500 ppm, about 25 ppm to about 50 ppm, about 25 ppm to about 75 ppm, about 25 ppm to about 100 ppm, about 25 ppm to about 125 ppm, about 25 ppm to about 150 ppm, about 25 ppm to about 175 ppm, about 25 ppm to about 200 ppm, about 25 ppm to about 225 ppm, about 25 ppm to about 250 ppm, about 25 ppm to about 275 ppm, about 25 ppm to about 300 ppm, about 25 ppm to about 325 ppm, about 25 ppm to about 350 ppm, about 25 ppm to about 375 ppm, about 25 ppm to about 400 ppm, about 25 ppm to about 425 ppm, about 25 ppm to about 450 ppm, about 25 ppm to about 475 ppm, about 25 ppm to about 500 ppm, about 50 ppm to about 75 ppm, about 50 ppm to about 100 ppm, about 50 ppm to about 125 ppm, about 50 ppm to about 150 ppm, about 50 ppm to about 175 ppm, about 50 ppm to about 200 ppm, about 50 ppm to about 225 ppm, about 50 ppm to about 250 ppm, about 50 ppm to about 275 ppm, about 50 ppm to about 300 ppm, about 50 ppm to about 325 ppm, about 50 ppm to about 350 ppm, about 50 ppm to about 375 ppm, about 50 ppm to about 400 ppm, about 50 ppm to about 425 ppm, about 50 ppm to about 450 ppm, about 50 ppm to about 475 ppm, about 50 ppm to about 500 ppm, about 75 ppm to about 100 ppm, about 75 ppm to about 125 ppm, about 75 ppm to about 150 ppm, about 75 ppm to about 175 ppm, about 75 ppm to about 200 ppm, about 75 ppm to about 225 ppm, about 75 ppm to about 250 ppm, about 75 ppm to about 275 ppm, about 75 ppm to about 300 ppm, about 75 ppm to about 325 ppm, about 75 ppm to about 350 ppm, about 75 ppm to about 375 ppm, about 75 ppm to about 400 ppm, about 75 ppm to about 425 ppm, about 75 ppm to about 450 ppm, about 75 ppm to about 475 ppm, about 75 ppm to about 500 ppm, about 100 ppm to about 125 ppm, about 100 ppm to about 150 ppm, about 100 ppm to about 175 ppm, about 100 ppm to about 200 ppm, about 100 ppm to

about 225 ppm, about 100 ppm to about 250 ppm, about 100 ppm to about 275 ppm, about 100 ppm to about 300 ppm, about 100 ppm to about 325 ppm, about 100 ppm to about 350 ppm, about 100 ppm to about 375 ppm, about 100 ppm to about 400 ppm, about 100 ppm to about 425 ppm, about 100 ppm to about 450 ppm, about 100 ppm to about 475 ppm, about 100 ppm to about 500 ppm, about 150 ppm to about 175 ppm, about 150 ppm to about 200 ppm, about 150 ppm to about 225 ppm, about 150 ppm to about 250 ppm, about 150 ppm to about 275 ppm, about 150 ppm to about 300 ppm, about 150 ppm to about 325 ppm, about 150 ppm to about 350 ppm, about 150 ppm to about 375 ppm, about 150 ppm to about 400 ppm, about 150 ppm to about 425 ppm, about 150 ppm to about 450 ppm, about 150 ppm to about 475 ppm, about 150 ppm to about 500 ppm, about 200 ppm to about 225 ppm, about 200 ppm to about 250 ppm, about 200 ppm to about 275 ppm, about 200 ppm to about 300 ppm, about 200 ppm to about 325 ppm, about 200 ppm to about 350 ppm, about 200 ppm to about 375 ppm, about 200 ppm to about 400 ppm, about 200 ppm to about 425 ppm, about 200 ppm to about 450 ppm, about 200 ppm to about 475 ppm, about 200 ppm to about 500 ppm, about 250 ppm to about 275 ppm, about 250 ppm to about 300 ppm, about 250 ppm to about 325 ppm, about 250 ppm to about 350 ppm, about 250 ppm to about 375 ppm, about 250 ppm to about 400 ppm, about 250 ppm to about 425 ppm, about 250 ppm to about 450 ppm, about 250 ppm to about 475 ppm, about 250 ppm to about 500 ppm, about 300 ppm to about 325 ppm, about 300 ppm to about 350 ppm, about 300 ppm to about 375 ppm, about 300 ppm to about 400 ppm, about 300 ppm to about 425 ppm, about 300 ppm to about 450 ppm, about 300 ppm to about 475 ppm, about 300 ppm to about 500 ppm, about 350 ppm to about 375 ppm, about 350 ppm to about 400 ppm, about 350 ppm to about 425 ppm, about 350 ppm to about 450 ppm, about 350 ppm to about 475 ppm, about 350 ppm to about 500 ppm, about 400 ppm to about 425 ppm, about 400 ppm to about 450 ppm, about 400 ppm to about 475 ppm, about 400 ppm to about 500 ppm, about 450 ppm to about 475 ppm, or about 450 ppm to about 500 ppm.

[037] In other aspects of this embodiment, a composition disclosed herein comprises metallic particles in an amount of, *e.g.*, about 400 ppm to about 500 ppm, about 400 ppm to about 600 ppm, about 400 ppm to about 700 ppm, about 400 ppm to about 800 ppm, about 400 ppm to about 900 ppm, about 400 ppm to about 1,000 ppm, about 400 ppm to about 1,100 ppm, about 400 ppm to about 1,200 ppm, about 400 ppm to about 1,300 ppm, about 400 ppm to about 1,400 ppm, about 400 ppm to about 1,500 ppm, about 400 ppm to about 1,600 ppm, about 400 ppm to about 1,700 ppm, about 400 ppm to about 1,800 ppm, about 400 ppm to about 1,900 ppm, about 400 ppm to about 2,000 ppm, about 500 ppm to about 600 ppm, about 500 ppm to about 700 ppm, about 500 ppm to about 800 ppm, about 500 ppm to about 900 ppm, about 500 ppm to about 1,000 ppm, about 500 ppm to about 1,100 ppm, about 500 ppm to about 1,200 ppm, about 500 ppm to about 1,300 ppm, about 500 ppm to about 1,400 ppm, about 500 ppm to about 1,500 ppm, about 500 ppm to about 1,600 ppm, about 500 ppm to about 1,700 ppm, about 500 ppm to about 1,800 ppm, about 500 ppm to about 1,900 ppm, about 500 ppm to about 2,000 ppm, about 600 ppm to about 700 ppm, about 600 ppm to about 800 ppm, about 600 ppm to about 900 ppm, about 600 ppm to about 1,000 ppm, about 600 ppm to about 1,100 ppm, about 600 ppm to about 1,200 ppm, about 600 ppm to about 1,300 ppm, about 600 ppm to about 1,400 ppm, about 600 ppm to about 1,500 ppm, about 600 ppm to about 1,600 ppm, about 600 ppm to about 1,700 ppm, about 600 ppm to about 1,800 ppm, about 600 ppm to about 1,900 ppm, about 600 ppm to about 2,000 ppm, about 700 ppm to about 800 ppm, about

700 ppm to about 900 ppm, about 700 ppm to about 1,000 ppm, about 700 ppm to about 1,100 ppm, about 700 ppm to about 1,200 ppm, about 700 ppm to about 1,300 ppm, about 700 ppm to about 1,400 ppm, about 700 ppm to about 1,500 ppm, about 700 ppm to about 1,600 ppm, about 700 ppm to about 1,700 ppm, about 700 ppm to about 1,800 ppm, about 700 ppm to about 1,900 ppm, about 700 ppm to about 2,000 ppm, about 800 ppm to about 900 ppm, about 800 ppm to about 1,000 ppm, about 800 ppm to about 1,100 ppm, about 800 ppm to about 1,200 ppm, about 800 ppm to about 1,300 ppm, about 800 ppm to about 1,400 ppm, about 800 ppm to about 1,500 ppm, about 800 ppm to about 1,600 ppm, about 800 ppm to about 1,700 ppm, about 800 ppm to about 1,800 ppm, about 800 ppm to about 1,900 ppm, about 800 ppm to about 2,000 ppm, about 900 ppm to about 1,000 ppm, about 900 ppm to about 1,100 ppm, about 900 ppm to about 1,200 ppm, about 900 ppm to about 1,300 ppm, about 900 ppm to about 1,400 ppm, about 900 ppm to about 1,500 ppm, about 900 ppm to about 1,600 ppm, about 900 ppm to about 1,700 ppm, about 900 ppm to about 1,800 ppm, about 900 ppm to about 1,900 ppm, about 900 ppm to about 2,000 ppm, about 1,000 ppm to about 1,100 ppm, about 1,000 ppm to about 1,200 ppm, about 1,000 ppm to about 1,300 ppm, about 1,000 ppm to about 1,400 ppm, about 1,000 ppm to about 1,500 ppm, about 1,000 ppm to about 1,600 ppm, about 1,000 ppm to about 1,700 ppm, about 1,000 ppm to about 1,800 ppm, about 1,000 ppm to about 1,900 ppm, about 1,000 ppm to about 2,000 ppm, about 1,100 ppm to about 1,200 ppm, about 1,100 ppm to about 1,300 ppm, about 1,100 ppm to about 1,400 ppm, about 1,100 ppm to about 1,500 ppm, about 1,100 ppm to about 1,600 ppm, about 1,100 ppm to about 1,700 ppm, about 1,100 ppm to about 1,800 ppm, about 1,100 ppm to about 1,900 ppm, about 1,100 ppm to about 2,000 ppm, about 1,200 ppm to about 1,300 ppm, about 1,200 ppm to about 1,400 ppm, about 1,200 ppm to about 1,500 ppm, about 1,200 ppm to about 1,600 ppm, about 1,200 ppm to about 1,700 ppm, about 1,200 ppm to about 1,800 ppm, about 1,200 ppm to about 1,900 ppm, about 1,200 ppm to about 2,000 ppm, about 1,300 ppm to about 1,400 ppm, about 1,300 ppm to about 1,500 ppm, about 1,300 ppm to about 1,600 ppm, about 1,300 ppm to about 1,700 ppm, about 1,300 ppm to about 1,800 ppm, about 1,300 ppm to about 1,900 ppm, about 1,300 ppm to about 2,000 ppm, about 1,400 ppm to about 1,500 ppm, about 1,400 ppm to about 1,600 ppm, about 1,400 ppm to about 1,700 ppm, about 1,400 ppm to about 1,800 ppm, about 1,400 ppm to about 1,900 ppm, about 1,400 ppm to about 2,000 ppm, about 1,500 ppm to about 1,600 ppm, about 1,500 ppm to about 1,700 ppm, about 1,500 ppm to about 1,800 ppm, about 1,500 ppm to about 1,900 ppm, about 1,500 ppm to about 2,000 ppm, about 1,600 ppm to about 1,700 ppm, about 1,600 ppm to about 1,800 ppm, about 1,600 ppm to about 1,900 ppm, about 1,600 ppm to about 2,000 ppm, about 1,700 ppm to about 1,800 ppm, about 1,700 ppm to about 1,900 ppm, about 1,700 ppm to about 2,000 ppm, about 1,800 ppm to about 1,900 ppm, about 1,800 ppm to about 2,000 ppm, or about 1,900 ppm to about 2,000 ppm.

[038] In aspects of this embodiment, a composition disclosed herein comprises metallic particles in an amount of, *e.g.*, 0.05 mg/L, 0.10 mg/L, 0.15 mg/L, 0.20 mg/L, 0.25 mg/L, 0.30 mg/L, 0.35 mg/L, 0.40 mg/L, 0.45 mg/L, 0.50 mg/L, 0.55 mg/L, 0.60 mg/L, 0.65 mg/L, 0.70 mg/L, 0.75 mg/L, 0.80 mg/L, 0.85 mg/L, 0.90 mg/L, 0.95 mg/L, 1 mg/L, 5 mg/L, 10 mg/L, 15 mg/L, 20 mg/L, 25 mg/L, 30 mg/L, 35 mg/L, 40 mg/L, 45 mg/L, 50 mg/L, 55 mg/L, 60 mg/L, 65 mg/L, 70 mg/L, 75 mg/L, 80 mg/L, 85 mg/L, 90 mg/L, 95 mg/L, 100 mg/L, 125 mg/L, 150 mg/L, 175 mg/L, 200 mg/L, 225 mg/L, 250 mg/L, 275 mg/L, 300 mg/L, 325 mg/L, 350 mg/L, 375 mg/L, 400 mg/L, 425 mg/L, 450 mg/L, 475 mg/L, 500 mg/L, 525 mg/L, 550 mg/L, 575 mg/L, 600

mg/L, 625 mg/L, 650 mg/L, 675 mg/L, 700 mg/L, 725 mg/L, 750 mg/L, 775 mg/L, 800 mg/L, 825 mg/L, 850 mg/L, 875 mg/L, 900 mg/L, 925 mg/L, 950 mg/L, 975 mg/L, 1,000 mg/L, 1,025 mg/L, 1,050 mg/L, 1075 mg/L, 1,100 mg/L, 1,125 mg/L, 1,150 mg/L, 1,175 mg/L, 1,200 mg/L, 1,225 mg/L, 1,250 mg/L, 1,275 mg/L, 1,300 mg/L, 1,325 mg/L, 1,350 mg/L, 1,375 mg/L, 1,400 mg/L, 1,425 mg/L, 1,450 mg/L, 1,475 mg/L, 1,500 mg/L, 1,600 mg/L, 1,700 mg/L, 1,800 mg/L, 1,900 mg/L, or 2,000 mg/L. In other aspects of this embodiment, a composition disclosed herein comprises metallic particles in an amount of, *e.g.*, at least 0.05 mg/L, at least 0.10 mg/L, at least 0.20 mg/L, at least 0.30 mg/L, at least 0.40 mg/L, at least 0.50 mg/L, at least 0.60 mg/L, at least 0.70 mg/L, at least 0.80 mg/L, at least 0.90 mg/L, at least 1 mg/L, at least 10 mg/L, at least 20 mg/L, at least 30 mg/L, at least 40 mg/L, at least 50 mg/L, at least 60 mg/L, at least 70 mg/L, at least 80 mg/L, at least 90 mg/L, at least 100 mg/L, at least 125 mg/L, at least 150 mg/L, at least 175 mg/L, at least 200 mg/L, at least 225 mg/L, at least 250 mg/L, at least 275 mg/L, at least 300 mg/L, at least 325 mg/L, at least 350 mg/L, at least 375 mg/L, at least 400 mg/L, at least 425 mg/L, at least 450 mg/L, at least 475 mg/L, at least 500 mg/L, at least 525 mg/L, at least 550 mg/L, at least 575 mg/L, at least 600 mg/L, at least 625 mg/L, at least 650 mg/L, at least 675 mg/L, at least 700 mg/L, at least 725 mg/L, at least 750 mg/L, at least 775 mg/L, at least 800 mg/L, at least 825 mg/L, at least 850 mg/L, at least 875 mg/L, at least 900 mg/L, at least 925 mg/L, at least 950 mg/L, at least 975 mg/L, at least 1,000 mg/L, at least 1,025 mg/L, at least 1,050 mg/L, at least 1075 mg/L, at least 1,100 mg/L, at least 1,125 mg/L, at least 1,150 mg/L, at least 1,175 mg/L, at least 1,200 mg/L, at least 1,225 mg/L, at least 1,250 mg/L, at least 1,275 mg/L, at least 1,300 mg/L, at least 1,325 mg/L, at least 1,350 mg/L, at least 1,375 mg/L, at least 1,400 mg/L, at least 1,425 mg/L, at least 1,450 mg/L, at least 1,475 mg/L, at least 1,500 mg/L, at least 1,600 mg/L, at least 1,700 mg/L, at least 1,800 mg/L, at least 1,900 mg/L, or at least 2,000 mg/L. In yet other aspects of this embodiment, a composition disclosed herein comprises metallic particles in an amount of, *e.g.*, at most 0.05 mg/L, at most 0.10 mg/L, at most 0.20 mg/L, at most 0.30 mg/L, at most 0.40 mg/L, at most 0.50 mg/L, at most 0.60 mg/L, at most 0.70 mg/L, at most 0.80 mg/L, at most 0.90 mg/L, at most 1 mg/L, at most 10 mg/L, at most 20 mg/L, at most 30 mg/L, at most 40 mg/L, at most 50 mg/L, at most 60 mg/L, at most 70 mg/L, at most 80 mg/L, at most 90 mg/L, at most 100 mg/L, at most 125 mg/L, at most 150 mg/L, at most 175 mg/L, at most 200 mg/L, at most 225 mg/L, at most 250 mg/L, at most 275 mg/L, at most 300 mg/L, at most 325 mg/L, at most 350 mg/L, at most 375 mg/L, at most 400 mg/L, at most 425 mg/L, at most 450 mg/L, at most 475 mg/L, at most 500 mg/L, at most 525 mg/L, at most 550 mg/L, at most 575 mg/L, at most 600 mg/L, at most 625 mg/L, at most 650 mg/L, at most 675 mg/L, at most 700 mg/L, at most 725 mg/L, at most 750 mg/L, at most 775 mg/L, at most 800 mg/L, at most 825 mg/L, at most 850 mg/L, at most 875 mg/L, at most 900 mg/L, at most 925 mg/L, at most 950 mg/L, at most 975 mg/L, at most 1,000 mg/L, at most 1,025 mg/L, at most 1,050 mg/L, at most 1075 mg/L, at most 1,100 mg/L, at most 1,125 mg/L, at most 1,150 mg/L, at most 1,175 mg/L, at most 1,200 mg/L, at most 1,225 mg/L, at most 1,250 mg/L, at most 1,275 mg/L, at most 1,300 mg/L, at most 1,325 mg/L, at most 1,350 mg/L, at most 1,375 mg/L, at most 1,400 mg/L, at most 1,425 mg/L, at most 1,450 mg/L, at most 1,475 mg/L, at most 1,500 mg/L, at most 1,600 mg/L, at most 1,700 mg/L, at most 1,800 mg/L, at most 1,900 mg/L, or at most 2,000 mg/L.

[039] In still other aspects of this embodiment, a composition disclosed herein comprises metallic particles in an amount of from, *e.g.*, about 0.5 mg/L to about 20 mg/L, about 0.5 mg/L to about 25 mg/L,

about 0.5 mg/L to about 30 mg/L, about 0.5 mg/L to about 35 mg/L, about 0.5 mg/L to about 40 mg/L, about 0.5 mg/L to about 45 mg/L, about 0.5 mg/L to about 50 mg/L, about 0.5 mg/L to about 55 mg/L, about 0.5 mg/L to about 60 mg/L, about 0.5 mg/L to about 65 mg/L, about 0.5 mg/L to about 70 mg/L, about 0.5 mg/L to about 75 mg/L, about 0.5 mg/L to about 80 mg/L, about 0.5 mg/L to about 85 mg/L, about 0.5 mg/L to about 90 mg/L, about 0.5 mg/L to about 95 mg/L, about 0.5 mg/L to about 100 mg/L, about 0.75 mg/L to about 20 mg/L, about 0.75 mg/L to about 25 mg/L, about 0.75 mg/L to about 30 mg/L, about 0.75 mg/L to about 35 mg/L, about 0.75 mg/L to about 40 mg/L, about 0.75 mg/L to about 45 mg/L, about 0.75 mg/L to about 50 mg/L, about 0.75 mg/L to about 55 mg/L, about 0.75 mg/L to about 60 mg/L, about 0.75 mg/L to about 65 mg/L, about 0.75 mg/L to about 70 mg/L, about 0.75 mg/L to about 75 mg/L, about 0.75 mg/L to about 80 mg/L, about 0.75 mg/L to about 85 mg/L, about 0.75 mg/L to about 90 mg/L, about 0.75 mg/L to about 95 mg/L, about 0.75 mg/L to about 100 mg/L, about 1 mg/L to about 20 mg/L, about 1 mg/L to about 25 mg/L, about 1 mg/L to about 30 mg/L, about 1 mg/L to about 35 mg/L, about 1 mg/L to about 40 mg/L, about 1 mg/L to about 45 mg/L, about 1 mg/L to about 50 mg/L, about 1 mg/L to about 55 mg/L, about 1 mg/L to about 60 mg/L, about 1 mg/L to about 65 mg/L, about 1 mg/L to about 70 mg/L, about 1 mg/L to about 75 mg/L, about 1 mg/L to about 80 mg/L, about 1 mg/L to about 85 mg/L, about 1 mg/L to about 90 mg/L, about 1 mg/L to about 95 mg/L, about 1 mg/L to about 100 mg/L, about 5 mg/L to about 20 mg/L, about 5 mg/L to about 25 mg/L, about 5 mg/L to about 30 mg/L, about 5 mg/L to about 35 mg/L, about 5 mg/L to about 40 mg/L, about 5 mg/L to about 45 mg/L, about 5 mg/L to about 50 mg/L, about 5 mg/L to about 55 mg/L, about 5 mg/L to about 60 mg/L, about 5 mg/L to about 65 mg/L, about 5 mg/L to about 70 mg/L, about 5 mg/L to about 75 mg/L, about 5 mg/L to about 80 mg/L, about 5 mg/L to about 85 mg/L, about 5 mg/L to about 90 mg/L, about 5 mg/L to about 95 mg/L, about 5 mg/L to about 100 mg/L, about 10 mg/L to about 20 mg/L, about 10 mg/L to about 25 mg/L, about 10 mg/L to about 30 mg/L, about 10 mg/L to about 35 mg/L, about 10 mg/L to about 40 mg/L, about 10 mg/L to about 45 mg/L, about 10 mg/L to about 50 mg/L, about 10 mg/L to about 55 mg/L, about 10 mg/L to about 60 mg/L, about 10 mg/L to about 65 mg/L, about 10 mg/L to about 70 mg/L, about 10 mg/L to about 75 mg/L, about 10 mg/L to about 80 mg/L, about 10 mg/L to about 85 mg/L, about 10 mg/L to about 90 mg/L, about 10 mg/L to about 95 mg/L, or about 10 mg/L to about 100 mg/L.

[040] In other aspects of this embodiment, a composition disclosed herein comprises metallic particles in an amount of from, *e.g.*, about 1 mg/L to about 25 mg/L, about 1 mg/L to about 50 mg/L, about 1 mg/L to about 75 mg/L, about 1 mg/L to about 100 mg/L, about 1 mg/L to about 125 mg/L, about 1 mg/L to about 150 mg/L, about 1 mg/L to about 175 mg/L, about 1 mg/L to about 200 mg/L, about 1 mg/L to about 225 mg/L, about 1 mg/L to about 250 mg/L, about 1 mg/L to about 275 mg/L, about 1 mg/L to about 300 mg/L, about 1 mg/L to about 325 mg/L, about 1 mg/L to about 350 mg/L, about 1 mg/L to about 375 mg/L, about 1 mg/L to about 400 mg/L, about 10 mg/L to about 25 mg/L, about 10 mg/L to about 50 mg/L, about 10 mg/L to about 75 mg/L, about 10 mg/L to about 100 mg/L, about 10 mg/L to about 125 mg/L, about 10 mg/L to about 150 mg/L, about 10 mg/L to about 175 mg/L, about 10 mg/L to about 200 mg/L, about 10 mg/L to about 225 mg/L, about 10 mg/L to about 250 mg/L, about 10 mg/L to about 275 mg/L, about 10 mg/L to about 300 mg/L, about 10 mg/L to about 325 mg/L, about 10 mg/L to about 350 mg/L, about 10 mg/L to about 375 mg/L, about 10 mg/L to about 400 mg/L, about 25 mg/L to about 50 mg/L, about 25 mg/L to about 75 mg/L, about 25 mg/L to about 100 mg/L, about 25 mg/L to about 125 mg/L, about 25 mg/L to

about 150 mg/L, about 25 mg/L to about 175 mg/L, about 25 mg/L to about 200 mg/L, about 25 mg/L to about 225 mg/L, about 25 mg/L to about 250 mg/L, about 25 mg/L to about 275 mg/L, about 25 mg/L to about 300 mg/L, about 25 mg/L to about 325 mg/L, about 25 mg/L to about 350 mg/L, about 25 mg/L to about 375 mg/L, about 25 mg/L to about 400 mg/L, about 50 mg/L to about 75 mg/L, about 50 mg/L to about 100 mg/L, about 50 mg/L to about 125 mg/L, about 50 mg/L to about 150 mg/L, about 50 mg/L to about 175 mg/L, about 50 mg/L to about 200 mg/L, about 50 mg/L to about 225 mg/L, about 50 mg/L to about 250 mg/L, about 50 mg/L to about 275 mg/L, about 50 mg/L to about 300 mg/L, about 50 mg/L to about 325 mg/L, about 50 mg/L to about 350 mg/L, about 50 mg/L to about 375 mg/L, about 50 mg/L to about 400 mg/L, about 75 mg/L to about 100 mg/L, about 75 mg/L to about 125 mg/L, about 75 mg/L to about 150 mg/L, about 75 mg/L to about 175 mg/L, about 75 mg/L to about 200 mg/L, about 75 mg/L to about 225 mg/L, about 75 mg/L to about 250 mg/L, about 75 mg/L to about 275 mg/L, about 75 mg/L to about 300 mg/L, about 75 mg/L to about 325 mg/L, about 75 mg/L to about 350 mg/L, about 75 mg/L to about 375 mg/L, about 75 mg/L to about 400 mg/L, about 100 mg/L to about 125 mg/L, about 100 mg/L to about 150 mg/L, about 100 mg/L to about 175 mg/L, about 100 mg/L to about 200 mg/L, about 100 mg/L to about 225 mg/L, about 100 mg/L to about 250 mg/L, about 100 mg/L to about 275 mg/L, about 100 mg/L to about 300 mg/L, about 100 mg/L to about 325 mg/L, about 100 mg/L to about 350 mg/L, about 100 mg/L to about 375 mg/L, about 100 mg/L to about 400 mg/L, about 150 mg/L to about 175 mg/L, about 150 mg/L to about 200 mg/L, about 150 mg/L to about 225 mg/L, about 150 mg/L to about 250 mg/L, about 150 mg/L to about 275 mg/L, about 150 mg/L to about 300 mg/L, about 150 mg/L to about 325 mg/L, about 150 mg/L to about 350 mg/L, about 150 mg/L to about 375 mg/L, about 150 mg/L to about 400 mg/L, about 200 mg/L to about 225 mg/L, about 200 mg/L to about 250 mg/L, about 200 mg/L to about 275 mg/L, about 200 mg/L to about 300 mg/L, about 200 mg/L to about 325 mg/L, about 200 mg/L to about 350 mg/L, about 200 mg/L to about 375 mg/L, about 200 mg/L to about 400 mg/L, about 250 mg/L to about 275 mg/L, about 250 mg/L to about 300 mg/L, about 250 mg/L to about 325 mg/L, about 250 mg/L to about 350 mg/L, about 250 mg/L to about 375 mg/L, about 250 mg/L to about 400 mg/L, about 300 mg/L to about 325 mg/L, about 300 mg/L to about 350 mg/L, about 300 mg/L to about 375 mg/L, about 300 mg/L to about 400 mg/L, about 350 mg/L to about 375 mg/L, about 350 mg/L to about 400 mg/L, or about 375 mg/L to about 400 mg/L.

[041] In other aspects of this embodiment, a composition disclosed herein comprises metallic particles in an amount of, *e.g.*, about 400 mg/L to about 500 mg/L, about 400 mg/L to about 600 mg/L, about 400 mg/L to about 700 mg/L, about 400 mg/L to about 800 mg/L, about 400 mg/L to about 900 mg/L, about 400 mg/L to about 1,000 mg/L, about 400 mg/L to about 1,100 mg/L, about 400 mg/L to about 1,200 mg/L, about 400 mg/L to about 1,300 mg/L, about 400 mg/L to about 1,400 mg/L, about 400 mg/L to about 1,500 mg/L, about 400 mg/L to about 1,600 mg/L, about 400 mg/L to about 1,700 mg/L, about 400 mg/L to about 1,800 mg/L, about 400 mg/L to about 1,900 mg/L, about 400 mg/L to about 2,000 mg/L, about 500 mg/L to about 600 mg/L, about 500 mg/L to about 700 mg/L, about 500 mg/L to about 800 mg/L, about 500 mg/L to about 900 mg/L, about 500 mg/L to about 1,000 mg/L, about 500 mg/L to about 1,100 mg/L, about 500 mg/L to about 1,200 mg/L, about 500 mg/L to about 1,300 mg/L, about 500 mg/L to about 1,400 mg/L, about 500 mg/L to about 1,500 mg/L, about 500 mg/L to about 1,600 mg/L, about 500 mg/L to about 1,700 mg/L, about 500 mg/L to about 1,800 mg/L, about 500 mg/L to about 1,900 mg/L, about 500 mg/L to about 2,000 mg/L, about 600 mg/L to about 700 mg/L, about 600 mg/L to about 800 mg/L, about 600 mg/L to

about 900 mg/L, about 600 mg/L to about 1,000 mg/L, about 600 mg/L to about 1,100 mg/L, about 600 mg/L to about 1,200 mg/L, about 600 mg/L to about 1,300 mg/L, about 600 mg/L to about 1,400 mg/L, about 600 mg/L to about 1,500 mg/L, about 600 mg/L to about 1,600 mg/L, about 600 mg/L to about 1,700 mg/L, about 600 mg/L to about 1,800 mg/L, about 600 mg/L to about 1,900 mg/L, about 600 mg/L to about 2,000 mg/L, about 700 mg/L to about 800 mg/L, about 700 mg/L to about 900 mg/L, about 700 mg/L to about 1,000 mg/L, about 700 mg/L to about 1,100 mg/L, about 700 mg/L to about 1,200 mg/L, about 700 mg/L to about 1,300 mg/L, about 700 mg/L to about 1,400 mg/L, about 700 mg/L to about 1,500 mg/L, about 700 mg/L to about 1,600 mg/L, about 700 mg/L to about 1,700 mg/L, about 700 mg/L to about 1,800 mg/L, about 700 mg/L to about 1,900 mg/L, about 700 mg/L to about 2,000 mg/L, about 800 mg/L to about 900 mg/L, about 800 mg/L to about 1,000 mg/L, about 800 mg/L to about 1,100 mg/L, about 800 mg/L to about 1,200 mg/L, about 800 mg/L to about 1,300 mg/L, about 800 mg/L to about 1,400 mg/L, about 800 mg/L to about 1,500 mg/L, about 800 mg/L to about 1,600 mg/L, about 800 mg/L to about 1,700 mg/L, about 800 mg/L to about 1,800 mg/L, about 800 mg/L to about 1,900 mg/L, about 800 mg/L to about 2,000 mg/L, about 900 mg/L to about 1,000 mg/L, about 900 mg/L to about 1,100 mg/L, about 900 mg/L to about 1,200 mg/L, about 900 mg/L to about 1,300 mg/L, about 900 mg/L to about 1,400 mg/L, about 900 mg/L to about 1,500 mg/L, about 900 mg/L to about 1,600 mg/L, about 900 mg/L to about 1,700 mg/L, about 900 mg/L to about 1,800 mg/L, about 900 mg/L to about 1,900 mg/L, about 900 mg/L to about 2,000 mg/L, about 1,000 mg/L to about 1,100 mg/L, about 1,000 mg/L to about 1,200 mg/L, about 1,000 mg/L to about 1,300 mg/L, about 1,000 mg/L to about 1,400 mg/L, about 1,000 mg/L to about 1,500 mg/L, about 1,000 mg/L to about 1,600 mg/L, about 1,000 mg/L to about 1,700 mg/L, about 1,000 mg/L to about 1,800 mg/L, about 1,000 mg/L to about 1,900 mg/L, about 1,000 mg/L to about 2,000 mg/L, about 1,100 mg/L to about 1,200 mg/L, about 1,100 mg/L to about 1,300 mg/L, about 1,100 mg/L to about 1,400 mg/L, about 1,100 mg/L to about 1,500 mg/L, about 1,100 mg/L to about 1,600 mg/L, about 1,100 mg/L to about 1,700 mg/L, about 1,100 mg/L to about 1,800 mg/L, about 1,100 mg/L to about 1,900 mg/L, about 1,100 mg/L to about 2,000 mg/L, about 1,200 mg/L to about 1,300 mg/L, about 1,200 mg/L to about 1,400 mg/L, about 1,200 mg/L to about 1,500 mg/L, about 1,200 mg/L to about 1,600 mg/L, about 1,200 mg/L to about 1,700 mg/L, about 1,200 mg/L to about 1,800 mg/L, about 1,200 mg/L to about 1,900 mg/L, about 1,200 mg/L to about 2,000 mg/L, about 1,300 mg/L to about 1,400 mg/L, about 1,300 mg/L to about 1,500 mg/L, about 1,300 mg/L to about 1,600 mg/L, about 1,300 mg/L to about 1,700 mg/L, about 1,300 mg/L to about 1,800 mg/L, about 1,300 mg/L to about 1,900 mg/L, about 1,300 mg/L to about 2,000 mg/L, about 1,400 mg/L to about 1,500 mg/L, about 1,400 mg/L to about 1,600 mg/L, about 1,400 mg/L to about 1,700 mg/L, about 1,400 mg/L to about 1,800 mg/L, about 1,400 mg/L to about 1,900 mg/L, about 1,400 mg/L to about 2,000 mg/L, about 1,500 mg/L to about 1,600 mg/L, about 1,500 mg/L to about 1,700 mg/L, about 1,500 mg/L to about 1,800 mg/L, about 1,500 mg/L to about 1,900 mg/L, about 1,500 mg/L to about 2,000 mg/L, about 1,600 mg/L to about 1,700 mg/L, about 1,600 mg/L to about 1,800 mg/L, about 1,600 mg/L to about 1,900 mg/L, about 1,600 mg/L to about 2,000 mg/L, about 1,700 mg/L to about 1,800 mg/L, about 1,700 mg/L to about 1,900 mg/L, about 1,700 mg/L to about 2,000 mg/L, about 1,800 mg/L to about 1,900 mg/L, about 1,800 mg/L to about 2,000 mg/L, or about 1,900 mg/L to about 2,000 mg/L.

[042] In aspects of this embodiment, a composition disclosed herein comprises metallic particles in an amount of, *e.g.*, about 0.10%, about 0.11%, about 0.12%, about 0.13%, about 0.14%, about 0.15%, about

0.16%, about 0.17%, about 0.18%, about 0.19%, about 0.2%, about 0.25%, about 0.3%, about 0.35%, about 0.4%, about 0.45%, or about 0.5% by weight of the composition. In other aspects of this embodiment, a composition disclosed herein comprises metallic particles in an amount of, *e.g.*, at least 0.10%, at least 0.11%, at least 0.12%, at least 0.13%, at least 0.14%, at least 0.15%, at least 0.16%, at least 0.17%, at least 0.18%, at least 0.19%, at least 0.2%, at least 0.25%, at least 0.3%, at least 0.35%, at least 0.4%, at least 0.45%, or at least 0.5% by weight of the composition. In yet other aspects of this embodiment, a composition disclosed herein comprises metallic particles in an amount of, *e.g.*, at most 0.10%, at most 0.11%, at most 0.12%, at most 0.13%, at most 0.14%, at most 0.15%, at most 0.16%, at most 0.17%, at most 0.18%, at most 0.19%, at most 0.2%, at most 0.25%, at most 0.3%, at most 0.35%, at most 0.4%, at most 0.45%, or at most 0.5% by weight of the composition. In still other aspects of this embodiment, a composition disclosed herein comprises metallic particles in an amount of, *e.g.*, about 0.10% to about 0.15%, about 0.10% to about 0.20%, about 0.10% to about 0.25%, about 0.10% to about 0.30%, about 0.10% to about 0.35%, about 0.10% to about 0.40%, about 0.10% to about 0.45%, about 0.10% to about 0.50%, about 0.20% to about 0.25%, about 0.20% to about 0.30%, about 0.20% to about 0.35%, about 0.20% to about 0.40%, about 0.20% to about 0.45%, about 0.20% to about 0.50%, about 0.30% to about 0.35%, about 0.30% to about 0.40%, about 0.30% to about 0.45%, about 0.30% to about 0.50%, about 0.40% to about 0.45%, about 0.40% to about 0.50%, or about 0.40% to about 0.50% by weight of the composition.

[043] In an embodiment, metallic particles can be of any size that provides a desired beneficial effect to a composition disclosed herein. In aspects of this embodiment, metallic particles disclosed herein have a mean diameter of, *e.g.*, about 10 nm, about 20 nm, about 30 nm, about 40 nm, about 50 nm, about 60 nm, about 70 nm, about 80 nm, about 90 nm, about 100 nm. In other aspects of this embodiment, metallic particles disclosed herein have a mean diameter of, *e.g.*, at least 10 nm, at least 20 nm, at least 30 nm, at least 40 nm, at least 50 nm, at least 60 nm, at least 70 nm, at least 80 nm, at least 90 nm, at least 100 nm. In yet other aspects of this embodiment, metallic particles disclosed herein have a mean diameter of, *e.g.*, at most 10 nm, at most 20 nm, at most 30 nm, at most 40 nm, at most 50 nm, at most 60 nm, at most 70 nm, at most 80 nm, at most 90 nm, at most 100 nm. In yet other aspects of this embodiment, metallic particles disclosed herein have a mean diameter of, *e.g.*, about 10 nm to about 20 nm, about 10 nm to about 30 nm, about 10 nm to about 40 nm, about 10 nm to about 50 nm, about 10 nm to about 60 nm, about 10 nm to about 70 nm, about 10 nm to about 80 nm, about 10 nm to about 90 nm, about 10 nm to about 100 nm, about 20 nm to about 30 nm, about 20 nm to about 40 nm, about 20 nm to about 50 nm, about 20 nm to about 60 nm, about 20 nm to about 70 nm, about 20 nm to about 80 nm, about 20 nm to about 90 nm, about 20 nm to about 100 nm, about 30 nm to about 40 nm, about 30 nm to about 50 nm, about 30 nm to about 60 nm, about 30 nm to about 70 nm, about 30 nm to about 80 nm, about 30 nm to about 90 nm, about 30 nm to about 100 nm, about 40 nm to about 50 nm, about 40 nm to about 60 nm, about 40 nm to about 70 nm, about 40 nm to about 80 nm, about 40 nm to about 90 nm, about 40 nm to about 100 nm, about 50 nm to about 60 nm, about 50 nm to about 70 nm, about 50 nm to about 80 nm, about 50 nm to about 90 nm, about 50 nm to about 100 nm, about 60 nm to about 70 nm, about 60 nm to about 80 nm, about 60 nm to about 90 nm, about 60 nm to about 100 nm, about 70 nm to about 80 nm,

about 70 nm to about 90 nm, about 70 nm to about 100 nm, about 80 nm to about 90 nm, about 80 nm to about 100 nm, or about 90 nm to about 100 nm.

[044] In an embodiment, a composition disclosed herein does not comprise metallic particles.

[045] A composition disclosed herein may comprise a metal salt. A metal salt disclosed herein can be an alkali metal salt, an alkaline earth metal salt, a base metal salt, or a transition metal salt. An alkali metal salt includes a lithium salt, a sodium salt, a potassium salt, a rubidium salt, a cesium salt, and a francium salt. An alkaline earth metal salt includes a beryllium salt, a magnesium salt, a calcium salt, a strontium salt, a barium salt, and a radium salt. A basic metal salt includes an aluminum salt, a gallium salt, an indium salt, a tin salt, a thallium salt, a lead salt, and a bismuth salt. A transition metal salt includes a scandium salt, a titanium salt, a vanadium salt, a chromium salt, a manganese salt, an iron salt, a cobalt salt, a palladium salt, a silver salt, m a nickel salt, a copper salt, a zinc salt, a yttrium salt, Non-limiting examples of a metal salt includes a calcium salt, a copper salt, iron salt, a potassium salt, silver salt, titanium salt, and zinc salt.

[046] Other non-limiting examples of a metal salt includes a metal acetate salt, a metal chloride salt, a metal nitrate salt, a metal oxide salt, and a metal sulfate salt. A metal acetate salt includes, without limitation, calcium acetate, copper acetate, iron acetate, *e.g.*, iron (II) acetate and iron (III) acetate, potassium acetate, silver acetate, titanium acetate, and zinc acetate. A metal chloride salt includes, without limitation, calcium chloride, copper chloride, iron chloride, *e.g.*, iron (II) chloride or iron (III) chloride, potassium chloride, silver chloride, titanium chloride, and zinc chloride. A metal nitrate salt includes, without limitation, calcium oxide salt, copper nitrate, iron nitrate, *e.g.*, iron (II) nitrate, iron (III) nitrate, potassium nitrate, silver nitrate, titanium nitrate, and zinc nitrate. A metal oxide salt includes, without limitation, calcium oxide salt, copper oxide salt, iron oxide salt, *e.g.*, iron (II) oxide salt, iron (III) oxide salt, potassium oxide salt, silver oxide salt, titanium oxide salt, and zinc oxide salt. A metal sulfate salt includes, without limitation, calcium sulfate, copper sulfate, iron sulfate, *e.g.*, iron (II) sulfate, iron (III) sulfate, potassium sulfate, silver sulfate, titanium sulfate, and zinc sulfate.

[047] In some embodiments, a composition may include calcium oxide obtained from an organic source like shells from oceanic organisms. In some embodiment, a composition may include calcium oxide obtain from an inorganic source like by a synthetic chemical process.

[048] In an embodiment, a composition disclosed herein comprises an amount of a metal salt that provides a desired beneficial effect to a composition disclosed herein. In aspects of this embodiment, a composition disclosed herein comprises a metal salt in an amount of, *e.g.*, 0.05 ppm, 0.10 ppm, 0.15 ppm, 0.20 ppm, 0.25 ppm, 0.30 ppm, 0.35 ppm, 0.40 ppm, 0.45 ppm, 0.50 ppm, 0.55 ppm, 0.60 ppm, 0.65 ppm, 0.70 ppm, 0.75 ppm, 0.80 ppm, 0.85 ppm, 0.90 ppm, 0.95 ppm, 1 ppm, 5 ppm, 10 ppm, 15 ppm, 20 ppm, 25 ppm, 30 ppm, 35 ppm, 40 ppm, 45 ppm, 50 ppm, 55 ppm, 60 ppm, 65 ppm, 70 ppm, 75 ppm, 80 ppm, 85 ppm, 90 ppm, 95 ppm, 100 ppm, 125 ppm, 150 ppm, 175 ppm, 200 ppm, 225 ppm, 250 ppm, 275 ppm, 300 ppm, 325 ppm, 350 ppm, 375 ppm, 400 ppm, 425 ppm, 450 ppm, 475 ppm, 500 ppm, 525 ppm, 550

ppm, 575 ppm, 600 ppm, 625 ppm, 650 ppm, 675 ppm, 700 ppm, 725 ppm, 750 ppm, 775 ppm, 800 ppm, 825 ppm, 850 ppm, 875 ppm, 900 ppm, 925 ppm, 950 ppm, 975 ppm, 1,000 ppm, 1,025 ppm, 1,050 ppm, 1075 ppm, 1,100 ppm, 1,125 ppm, 1,150 ppm, 1,175 ppm, 1,200 ppm, 1,225 ppm, 1,250 ppm, 1,275 ppm, 1,300 ppm, 1,325 ppm, 1,350 ppm, 1,375 ppm, 1,400 ppm, 1,425 ppm, 1,450 ppm, 1,475 ppm, 1,500 ppm, 1,600 ppm, 1,700 ppm, 1,800 ppm, 1,900 ppm, or 2,000 ppm. In other aspects of this embodiment, a composition disclosed herein comprises a metal salt in an amount of, *e.g.*, at least 0.05 ppm, at least 0.10 ppm, at least 0.20 ppm, at least 0.30 ppm, at least 0.40 ppm, at least 0.50 ppm, at least 0.60 ppm, at least 0.70 ppm, at least 0.80 ppm, at least 0.90 ppm, at least 1 ppm, at least 10 ppm, at least 20 ppm, at least 30 ppm, at least 40 ppm, at least 50 ppm, at least 60 ppm, at least 70 ppm, at least 80 ppm, at least 90 ppm, at least 100 ppm, at least 125 ppm, at least 150 ppm, at least 175 ppm, at least 200 ppm, at least 225 ppm, at least 250 ppm, at least 275 ppm, at least 300 ppm, at least 325 ppm, at least 350 ppm, at least 375 ppm, at least 400 ppm, at least 425 ppm, at least 450 ppm, at least 475 ppm, at least 500 ppm, at least 525 ppm, at least 550 ppm, at least 575 ppm, at least 600 ppm, at least 625 ppm, at least 650 ppm, at least 675 ppm, at least 700 ppm, at least 725 ppm, at least 750 ppm, at least 775 ppm, at least 800 ppm, at least 825 ppm, at least 850 ppm, at least 875 ppm, at least 900 ppm, at least 925 ppm, at least 950 ppm, at least 975 ppm, at least 1,000 ppm, at least 1,025 ppm, at least 1,050 ppm, at least 1075 ppm, at least 1,100 ppm, at least 1,125 ppm, at least 1,150 ppm, at least 1,175 ppm, at least 1,200 ppm, at least 1,225 ppm, at least 1,250 ppm, at least 1,275 ppm, at least 1,300 ppm, at least 1,325 ppm, at least 1,350 ppm, at least 1,375 ppm, at least 1,400 ppm, at least 1,425 ppm, at least 1,450 ppm, at least 1,475 ppm, at least 1,500 ppm, at least 1,600 ppm, at least 1,700 ppm, at least 1,800 ppm, at least 1,900 ppm, or at least 2,000 ppm. In yet other aspects of this embodiment, a composition disclosed herein comprises a metal salt in an amount of, *e.g.*, at most 0.05 ppm, at most 0.10 ppm, at most 0.20 ppm, at most 0.30 ppm, at most 0.40 ppm, at most 0.50 ppm, at most 0.60 ppm, at most 0.70 ppm, at most 0.80 ppm, at most 0.90 ppm, at most 1 ppm, at most 10 ppm, at most 20 ppm, at most 30 ppm, at most 40 ppm, at most 50 ppm, at most 60 ppm, at most 70 ppm, at most 80 ppm, at most 90 ppm, at most 100 ppm, at most 125 ppm, at most 150 ppm, at most 175 ppm, at most 200 ppm, at most 225 ppm, at most 250 ppm, at most 275 ppm, at most 300 ppm, at most 325 ppm, at most 350 ppm, at most 375 ppm, at most 400 ppm, at most 425 ppm, at most 450 ppm, at most 475 ppm, at most 500 ppm, at most 525 ppm, at most 550 ppm, at most 575 ppm, at most 600 ppm, at most 625 ppm, at most 650 ppm, at most 675 ppm, at most 700 ppm, at most 725 ppm, at most 750 ppm, at most 775 ppm, at most 800 ppm, at most 825 ppm, at most 850 ppm, at most 875 ppm, at most 900 ppm, at most 925 ppm, at most 950 ppm, at most 975 ppm, at most 1,000 ppm, at most 1,025 ppm, at most 1,050 ppm, at most 1075 ppm, at most 1,100 ppm, at most 1,125 ppm, at most 1,150 ppm, at most 1,175 ppm, at most 1,200 ppm, at most 1,225 ppm, at most 1,250 ppm, at most 1,275 ppm, at most 1,300 ppm, at most 1,325 ppm, at most 1,350 ppm, at most 1,375 ppm, at most 1,400 ppm, at most 1,425 ppm, at most 1,450 ppm, at most 1,475 ppm, at most 1,500 ppm, at most 1,600 ppm, at most 1,700 ppm, at most 1,800 ppm, at most 1,900 ppm, or at most 2,000 ppm.

[049] In still other aspects of this embodiment, a composition disclosed herein comprises a metal salt in an amount of from, *e.g.*, about 0.5 ppm to about 20 ppm, about 0.5 ppm to about 25 ppm, about 0.5 ppm to about 30 ppm, about 0.5 ppm to about 35 ppm, about 0.5 ppm to about 40 ppm, about 0.5 ppm to about 45 ppm, about 0.5 ppm to about 50 ppm, about 0.5 ppm to about 55 ppm, about 0.5 ppm to about 60 ppm,

about 0.5 ppm to about 65 ppm, about 0.5 ppm to about 70 ppm, about 0.5 ppm to about 75 ppm, about 0.5 ppm to about 80 ppm, about 0.5 ppm to about 85 ppm, about 0.5 ppm to about 90 ppm, about 0.5 ppm to about 95 ppm, about 0.5 ppm to about 100 ppm, about 0.75 ppm to about 20 ppm, about 0.75 ppm to about 25 ppm, about 0.75 ppm to about 30 ppm, about 0.75 ppm to about 35 ppm, about 0.75 ppm to about 40 ppm, about 0.75 ppm to about 45 ppm, about 0.75 ppm to about 50 ppm, about 0.75 ppm to about 55 ppm, about 0.75 ppm to about 60 ppm, about 0.75 ppm to about 65 ppm, about 0.75 ppm to about 70 ppm, about 0.75 ppm to about 75 ppm, about 0.75 ppm to about 80 ppm, about 0.75 ppm to about 85 ppm, about 0.75 ppm to about 90 ppm, about 0.75 ppm to about 95 ppm, about 0.75 ppm to about 100 ppm, about 1 ppm to about 20 ppm, about 1 ppm to about 25 ppm, about 1 ppm to about 30 ppm, about 1 ppm to about 35 ppm, about 1 ppm to about 40 ppm, about 1 ppm to about 45 ppm, about 1 ppm to about 50 ppm, about 1 ppm to about 55 ppm, about 1 ppm to about 60 ppm, about 1 ppm to about 65 ppm, about 1 ppm to about 70 ppm, about 1 ppm to about 75 ppm, about 1 ppm to about 80 ppm, about 1 ppm to about 85 ppm, about 1 ppm to about 90 ppm, about 1 ppm to about 95 ppm, about 1 ppm to about 100 ppm, about 5 ppm to about 20 ppm, about 5 ppm to about 25 ppm, about 5 ppm to about 30 ppm, about 5 ppm to about 35 ppm, about 5 ppm to about 40 ppm, about 5 ppm to about 45 ppm, about 5 ppm to about 50 ppm, about 5 ppm to about 55 ppm, about 5 ppm to about 60 ppm, about 5 ppm to about 65 ppm, about 5 ppm to about 70 ppm, about 5 ppm to about 75 ppm, about 5 ppm to about 80 ppm, about 5 ppm to about 85 ppm, about 5 ppm to about 90 ppm, about 5 ppm to about 95 ppm, about 5 ppm to about 100 ppm, about 10 ppm to about 20 ppm, about 10 ppm to about 25 ppm, about 10 ppm to about 30 ppm, about 10 ppm to about 35 ppm, about 10 ppm to about 40 ppm, about 10 ppm to about 45 ppm, about 10 ppm to about 50 ppm, about 10 ppm to about 55 ppm, about 10 ppm to about 60 ppm, about 10 ppm to about 65 ppm, about 10 ppm to about 70 ppm, about 10 ppm to about 75 ppm, about 10 ppm to about 80 ppm, about 10 ppm to about 85 ppm, about 10 ppm to about 90 ppm, about 10 ppm to about 95 ppm, or about 10 ppm to about 100 ppm.

[050] In other aspects of this embodiment, a composition disclosed herein comprises a metal salt in an amount of from, *e.g.*, about 1 ppm to about 25 ppm, about 1 ppm to about 50 ppm, about 1 ppm to about 75 ppm, about 1 ppm to about 100 ppm, about 1 ppm to about 125 ppm, about 1 ppm to about 150 ppm, about 1 ppm to about 175 ppm, about 1 ppm to about 200 ppm, about 1 ppm to about 225 ppm, about 1 ppm to about 250 ppm, about 1 ppm to about 275 ppm, about 1 ppm to about 300 ppm, about 1 ppm to about 325 ppm, about 1 ppm to about 350 ppm, about 1 ppm to about 375 ppm, about 1 ppm to about 400 ppm, about 1 ppm to about 425 ppm, about 1 ppm to about 450 ppm, about 1 ppm to about 475 ppm, about 1 ppm to about 500 ppm, about 5 ppm to about 25 ppm, about 5 ppm to about 50 ppm, about 5 ppm to about 75 ppm, about 5 ppm to about 100 ppm, about 5 ppm to about 125 ppm, about 5 ppm to about 150 ppm, about 5 ppm to about 175 ppm, about 5 ppm to about 200 ppm, about 5 ppm to about 225 ppm, about 5 ppm to about 250 ppm, about 5 ppm to about 275 ppm, about 1 ppm to about 300 ppm, about 5 ppm to about 325 ppm, about 5 ppm to about 350 ppm, about 5 ppm to about 375 ppm, about 5 ppm to about 400 ppm, about 5 ppm to about 425 ppm, about 5 ppm to about 450 ppm, about 5 ppm to about 475 ppm, about 5 ppm to about 500 ppm, about 10 ppm to about 25 ppm, about 10 ppm to about 50 ppm, about 10 ppm to about 75 ppm, about 10 ppm to about 100 ppm, about 10 ppm to about 125 ppm, about 10 ppm to about 150 ppm, about 10 ppm to about 175 ppm, about 10 ppm to about 200 ppm, about 10 ppm to about 225 ppm, about 10 ppm to about 250 ppm, about 10 ppm to about 275 ppm, about 10 ppm to about 300 ppm,

about 10 ppm to about 325 ppm, about 10 ppm to about 350 ppm, about 10 ppm to about 375 ppm, about 10 ppm to about 400 ppm, about 10 ppm to about 425 ppm, about 10 ppm to about 450 ppm, about 10 ppm to about 475 ppm, about 10 ppm to about 500 ppm, about 25 ppm to about 50 ppm, about 25 ppm to about 75 ppm, about 25 ppm to about 100 ppm, about 25 ppm to about 125 ppm, about 25 ppm to about 150 ppm, about 25 ppm to about 175 ppm, about 25 ppm to about 200 ppm, about 25 ppm to about 225 ppm, about 25 ppm to about 250 ppm, about 25 ppm to about 275 ppm, about 25 ppm to about 300 ppm, about 25 ppm to about 325 ppm, about 25 ppm to about 350 ppm, about 25 ppm to about 375 ppm, about 25 ppm to about 400 ppm, about 25 ppm to about 425 ppm, about 25 ppm to about 450 ppm, about 25 ppm to about 475 ppm, about 25 ppm to about 500 ppm, about 50 ppm to about 75 ppm, about 50 ppm to about 100 ppm, about 50 ppm to about 125 ppm, about 50 ppm to about 150 ppm, about 50 ppm to about 175 ppm, about 50 ppm to about 200 ppm, about 50 ppm to about 225 ppm, about 50 ppm to about 250 ppm, about 50 ppm to about 275 ppm, about 50 ppm to about 300 ppm, about 50 ppm to about 325 ppm, about 50 ppm to about 350 ppm, about 50 ppm to about 375 ppm, about 50 ppm to about 400 ppm, about 50 ppm to about 425 ppm, about 50 ppm to about 450 ppm, about 50 ppm to about 475 ppm, about 50 ppm to about 500 ppm, about 75 ppm to about 100 ppm, about 75 ppm to about 125 ppm, about 75 ppm to about 150 ppm, about 75 ppm to about 175 ppm, about 75 ppm to about 200 ppm, about 75 ppm to about 225 ppm, about 75 ppm to about 250 ppm, about 75 ppm to about 275 ppm, about 75 ppm to about 300 ppm, about 75 ppm to about 325 ppm, about 75 ppm to about 350 ppm, about 75 ppm to about 375 ppm, about 75 ppm to about 400 ppm, about 75 ppm to about 425 ppm, about 75 ppm to about 450 ppm, about 75 ppm to about 475 ppm, about 75 ppm to about 500 ppm, about 100 ppm to about 125 ppm, about 100 ppm to about 150 ppm, about 100 ppm to about 175 ppm, about 100 ppm to about 200 ppm, about 100 ppm to about 225 ppm, about 100 ppm to about 250 ppm, about 100 ppm to about 275 ppm, about 100 ppm to about 300 ppm, about 100 ppm to about 325 ppm, about 100 ppm to about 350 ppm, about 100 ppm to about 375 ppm, about 100 ppm to about 400 ppm, about 100 ppm to about 425 ppm, about 100 ppm to about 450 ppm, about 100 ppm to about 475 ppm, about 100 ppm to about 500 ppm, about 150 ppm to about 175 ppm, about 150 ppm to about 200 ppm, about 150 ppm to about 225 ppm, about 150 ppm to about 250 ppm, about 150 ppm to about 275 ppm, about 150 ppm to about 300 ppm, about 150 ppm to about 325 ppm, about 150 ppm to about 350 ppm, about 150 ppm to about 375 ppm, about 150 ppm to about 400 ppm, about 150 ppm to about 425 ppm, about 150 ppm to about 450 ppm, about 150 ppm to about 475 ppm, about 150 ppm to about 500 ppm, about 200 ppm to about 225 ppm, about 200 ppm to about 250 ppm, about 200 ppm to about 275 ppm, about 200 ppm to about 300 ppm, about 200 ppm to about 325 ppm, about 200 ppm to about 350 ppm, about 200 ppm to about 375 ppm, about 200 ppm to about 400 ppm, about 200 ppm to about 425 ppm, about 200 ppm to about 450 ppm, about 200 ppm to about 475 ppm, about 200 ppm to about 500 ppm, about 250 ppm to about 275 ppm, about 250 ppm to about 300 ppm, about 250 ppm to about 325 ppm, about 250 ppm to about 350 ppm, about 250 ppm to about 375 ppm, about 250 ppm to about 400 ppm, about 250 ppm to about 425 ppm, about 250 ppm to about 450 ppm, about 250 ppm to about 475 ppm, about 250 ppm to about 500 ppm, about 300 ppm to about 325 ppm, about 300 ppm to about 350 ppm, about 300 ppm to about 375 ppm, about 300 ppm to about 400 ppm, about 300 ppm to about 425 ppm, about 300 ppm to about 450 ppm, about 300 ppm to about 475 ppm, about 300 ppm to about 500 ppm, about 350 ppm to about 375 ppm, about 350 ppm to about 400 ppm, about 350 ppm to about 425 ppm, about 350 ppm to about 450 ppm, about 350 ppm to

about 475 ppm, about 350 ppm to about 500 ppm, about 400 ppm to about 425 ppm, about 400 ppm to about 450 ppm, about 400 ppm to about 475 ppm, about 400 ppm to about 500 ppm, about 450 ppm to about 475 ppm, or about 450 ppm to about 500 ppm.

[051] In other aspects of this embodiment, a composition disclosed herein comprises a metal salt in an amount of, *e.g.*, about 400 ppm to about 500 ppm, about 400 ppm to about 600 ppm, about 400 ppm to about 700 ppm, about 400 ppm to about 800 ppm, about 400 ppm to about 900 ppm, about 400 ppm to about 1,000 ppm, about 400 ppm to about 1,100 ppm, about 400 ppm to about 1,200 ppm, about 400 ppm to about 1,300 ppm, about 400 ppm to about 1,400 ppm, about 400 ppm to about 1,500 ppm, about 400 ppm to about 1,600 ppm, about 400 ppm to about 1,700 ppm, about 400 ppm to about 1,800 ppm, about 400 ppm to about 1,900 ppm, about 400 ppm to about 2,000 ppm, about 500 ppm to about 600 ppm, about 500 ppm to about 700 ppm, about 500 ppm to about 800 ppm, about 500 ppm to about 900 ppm, about 500 ppm to about 1,000 ppm, about 500 ppm to about 1,100 ppm, about 500 ppm to about 1,200 ppm, about 500 ppm to about 1,300 ppm, about 500 ppm to about 1,400 ppm, about 500 ppm to about 1,500 ppm, about 500 ppm to about 1,600 ppm, about 500 ppm to about 1,700 ppm, about 500 ppm to about 1,800 ppm, about 500 ppm to about 1,900 ppm, about 500 ppm to about 2,000 ppm, about 600 ppm to about 700 ppm, about 600 ppm to about 800 ppm, about 600 ppm to about 900 ppm, about 600 ppm to about 1,000 ppm, about 600 ppm to about 1,100 ppm, about 600 ppm to about 1,200 ppm, about 600 ppm to about 1,300 ppm, about 600 ppm to about 1,400 ppm, about 600 ppm to about 1,500 ppm, about 600 ppm to about 1,600 ppm, about 600 ppm to about 1,700 ppm, about 600 ppm to about 1,800 ppm, about 600 ppm to about 1,900 ppm, about 600 ppm to about 2,000 ppm, about 700 ppm to about 800 ppm, about 700 ppm to about 900 ppm, about 700 ppm to about 1,000 ppm, about 700 ppm to about 1,100 ppm, about 700 ppm to about 1,200 ppm, about 700 ppm to about 1,300 ppm, about 700 ppm to about 1,400 ppm, about 700 ppm to about 1,500 ppm, about 700 ppm to about 1,600 ppm, about 700 ppm to about 1,700 ppm, about 700 ppm to about 1,800 ppm, about 700 ppm to about 1,900 ppm, about 700 ppm to about 2,000 ppm, about 800 ppm to about 900 ppm, about 800 ppm to about 1,000 ppm, about 800 ppm to about 1,100 ppm, about 800 ppm to about 1,200 ppm, about 800 ppm to about 1,300 ppm, about 800 ppm to about 1,400 ppm, about 800 ppm to about 1,500 ppm, about 800 ppm to about 1,600 ppm, about 800 ppm to about 1,700 ppm, about 800 ppm to about 1,800 ppm, about 800 ppm to about 1,900 ppm, about 800 ppm to about 2,000 ppm, about 900 ppm to about 1,000 ppm, about 900 ppm to about 1,100 ppm, about 900 ppm to about 1,200 ppm, about 900 ppm to about 1,300 ppm, about 900 ppm to about 1,400 ppm, about 900 ppm to about 1,500 ppm, about 900 ppm to about 1,600 ppm, about 900 ppm to about 1,700 ppm, about 900 ppm to about 1,800 ppm, about 900 ppm to about 1,900 ppm, about 900 ppm to about 2,000 ppm, about 1,000 ppm to about 1,100 ppm, about 1,000 ppm to about 1,200 ppm, about 1,000 ppm to about 1,300 ppm, about 1,000 ppm to about 1,400 ppm, about 1,000 ppm to about 1,500 ppm, about 1,000 ppm to about 1,600 ppm, about 1,000 ppm to about 1,700 ppm, about 1,000 ppm to about 1,800 ppm, about 1,000 ppm to about 1,900 ppm, about 1,000 ppm to about 2,000 ppm, about 1,100 ppm to about 1,200 ppm, about 1,100 ppm to about 1,300 ppm, about 1,100 ppm to about 1,400 ppm, about 1,100 ppm to about 1,500 ppm, about 1,100 ppm to about 1,600 ppm, about 1,100 ppm to about 1,700 ppm, about 1,100 ppm to about 1,800 ppm, about 1,100 ppm to about 1,900 ppm, about 1,100 ppm to about 2,000 ppm, about 1,200 ppm to about 1,300 ppm, about 1,200 ppm to about 1,400 ppm, about 1,200 ppm

to about 1,500 ppm, about 1,200 ppm to about 1,600 ppm, about 1,200 ppm to about 1,700 ppm, about 1,200 ppm to about 1,800 ppm, about 1,200 ppm to about 1,900 ppm, about 1,200 ppm to about 2,000 ppm, about 1,300 ppm to about 1,400 ppm, about 1,300 ppm to about 1,500 ppm, about 1,300 ppm to about 1,600 ppm, about 1,300 ppm to about 1,700 ppm, about 1,300 ppm to about 1,800 ppm, about 1,300 ppm to about 1,900 ppm, about 1,300 ppm to about 2,000 ppm, about 1,400 ppm to about 1,500 ppm, about 1,400 ppm to about 1,600 ppm, about 1,400 ppm to about 1,700 ppm, about 1,400 ppm to about 1,800 ppm, about 1,400 ppm to about 1,900 ppm, about 1,400 ppm to about 2,000 ppm, about 1,500 ppm to about 1,600 ppm, about 1,500 ppm to about 1,700 ppm, about 1,500 ppm to about 1,800 ppm, about 1,500 ppm to about 1,900 ppm, about 1,500 ppm to about 2,000 ppm, about 1,600 ppm to about 1,700 ppm, about 1,600 ppm to about 1,800 ppm, about 1,600 ppm to about 1,900 ppm, about 1,600 ppm to about 2,000 ppm, about 1,700 ppm to about 1,800 ppm, about 1,700 ppm to about 1,900 ppm, about 1,700 ppm to about 2,000 ppm, about 1,800 ppm to about 1,900 ppm, about 1,800 ppm to about 2,000 ppm, or about 1,900 ppm to about 2,000 ppm.

[052] In aspects of this embodiment, a composition disclosed herein comprises a metal salt in an amount of, *e.g.*, about 0.10%, about 0.11%, about 0.12%, about 0.13%, about 0.14%, about 0.15%, about 0.16%, about 0.17%, about 0.18%, about 0.19%, about 0.2%, about 0.25%, about 0.3%, about 0.35%, about 0.4%, about 0.45%, or about 0.5% by weight of the composition. In other aspects of this embodiment, a composition disclosed herein comprises a metal salt in an amount of, *e.g.*, at least 0.10%, at least 0.11%, at least 0.12%, at least 0.13%, at least 0.14%, at least 0.15%, at least 0.16%, at least 0.17%, at least 0.18%, at least 0.19%, at least 0.2%, at least 0.25%, at least 0.3%, at least 0.35%, at least 0.4%, at least 0.45%, or at least 0.5% by weight of the composition. In yet other aspects of this embodiment, a composition disclosed herein comprises a metal salt in an amount of, *e.g.*, at most 0.10%, at most 0.11%, at most 0.12%, at most 0.13%, at most 0.14%, at most 0.15%, at most 0.16%, at most 0.17%, at most 0.18%, at most 0.19%, at most 0.2%, at most 0.25%, at most 0.3%, at most 0.35%, at most 0.4%, at most 0.45%, or at most 0.5% by weight of the composition. In still other aspects of this embodiment, a composition disclosed herein comprises a metal salt in an amount of, *e.g.*, about 0.10% to about 0.15%, about 0.10% to about 0.20%, about 0.10% to about 0.25%, about 0.10% to about 0.30%, about 0.10% to about 0.35%, about 0.10% to about 0.40%, about 0.10% to about 0.45%, about 0.10% to about 0.50%, about 0.20% to about 0.25%, about 0.20% to about 0.30%, about 0.20% to about 0.35%, about 0.20% to about 0.40%, about 0.20% to about 0.45%, about 0.20% to about 0.50%, about 0.30% to about 0.35%, about 0.30% to about 0.40%, about 0.30% to about 0.45%, about 0.30% to about 0.50%, about 0.40% to about 0.45%, about 0.40% to about 0.50%, or about 0.40% to about 0.50% by weight of the composition.

[053] In an embodiment, a composition disclosed herein does not comprise metal salts.

[054] A composition disclosed herein may comprise a phosphate buffer. A phosphate buffer or phosphate buffer solution) is especially sensitive to pH changes, and thus is useful for biological applications. A phosphate buffer can be adapted to a variety of pH levels, including isotonic. This wide range is due to phosphoric acid having 3 dissociation constants (pKa) allowing for formulation of buffers near each of the pH levels of 2.15, 7.21, or 12.32. Monosodium phosphate and its conjugate base,

disodium phosphate, are usually used to generate buffers of pH values around 7. Non-limiting examples of a phosphate buffer include a calcium phosphate buffer and a sodium phosphate buffer.

[055] In an embodiment, a composition disclosed herein comprises an amount of a phosphate buffer that provides a desired beneficial effect to a composition disclosed herein. In aspects of this embodiment, a composition disclosed herein comprises a phosphate buffer in an amount of, *e.g.*, 0.05 ppm, 0.10 ppm, 0.15 ppm, 0.20 ppm, 0.25 ppm, 0.30 ppm, 0.35 ppm, 0.40 ppm, 0.45 ppm, 0.50 ppm, 0.55 ppm, 0.60 ppm, 0.65 ppm, 0.70 ppm, 0.75 ppm, 0.80 ppm, 0.85 ppm, 0.90 ppm, 0.95 ppm, 1 ppm, 5 ppm, 10 ppm, 15 ppm, 20 ppm, 25 ppm, 30 ppm, 35 ppm, 40 ppm, 45 ppm, 50 ppm, 55 ppm, 60 ppm, 65 ppm, 70 ppm, 75 ppm, 80 ppm, 85 ppm, 90 ppm, 95 ppm, 100 ppm, 125 ppm, 150 ppm, 175 ppm, 200 ppm, 225 ppm, 250 ppm, 275 ppm, 300 ppm, 325 ppm, 350 ppm, 375 ppm, 400 ppm, 425 ppm, 450 ppm, 475 ppm, 500 ppm, 525 ppm, 550 ppm, 575 ppm, 600 ppm, 625 ppm, 650 ppm, 675 ppm, 700 ppm, 725 ppm, 750 ppm, 775 ppm, 800 ppm, 825 ppm, 850 ppm, 875 ppm, 900 ppm, 925 ppm, 950 ppm, 975 ppm, 1,000 ppm, 1,025 ppm, 1,050 ppm, 1075 ppm, 1,100 ppm, 1,125 ppm, 1,150 ppm, 1,175 ppm, 1,200 ppm, 1,225 ppm, 1,250 ppm, 1,275 ppm, 1,300 ppm, 1,325 ppm, 1,350 ppm, 1,375 ppm, 1,400 ppm, 1,425 ppm, 1,450 ppm, 1,475 ppm, 1,500 ppm, 1,600 ppm, 1,700 ppm, 1,800 ppm, 1,900 ppm, or 2,000 ppm. In other aspects of this embodiment, a composition disclosed herein comprises a phosphate buffer in an amount of, *e.g.*, at least 0.05 ppm, at least 0.10 ppm, at least 0.20 ppm, at least 0.30 ppm, at least 0.40 ppm, at least 0.50 ppm, at least 0.60 ppm, at least 0.70 ppm, at least 0.80 ppm, at least 0.90 ppm, at least 1 ppm, at least 10 ppm, at least 20 ppm, at least 30 ppm, at least 40 ppm, at least 50 ppm, at least 60 ppm, at least 70 ppm, at least 80 ppm, at least 90 ppm, at least 100 ppm, at least 125 ppm, at least 150 ppm, at least 175 ppm, at least 200 ppm, at least 225 ppm, at least 250 ppm, at least 275 ppm, at least 300 ppm, at least 325 ppm, at least 350 ppm, at least 375 ppm, at least 400 ppm, at least 425 ppm, at least 450 ppm, at least 475 ppm, at least 500 ppm, at least 525 ppm, at least 550 ppm, at least 575 ppm, at least 600 ppm, at least 625 ppm, at least 650 ppm, at least 675 ppm, at least 700 ppm, at least 725 ppm, at least 750 ppm, at least 775 ppm, at least 800 ppm, at least 825 ppm, at least 850 ppm, at least 875 ppm, at least 900 ppm, at least 925 ppm, at least 950 ppm, at least 975 ppm, at least 1,000 ppm, at least 1,025 ppm, at least 1,050 ppm, at least 1075 ppm, at least 1,100 ppm, at least 1,125 ppm, at least 1,150 ppm, at least 1,175 ppm, at least 1,200 ppm, at least 1,225 ppm, at least 1,250 ppm, at least 1,275 ppm, at least 1,300 ppm, at least 1,325 ppm, at least 1,350 ppm, at least 1,375 ppm, at least 1,400 ppm, at least 1,425 ppm, at least 1,450 ppm, at least 1,475 ppm, at least 1,500 ppm, at least 1,600 ppm, at least 1,700 ppm, at least 1,800 ppm, at least 1,900 ppm, or at least 2,000 ppm. In yet other aspects of this embodiment, a composition disclosed herein comprises a phosphate buffer in an amount of, *e.g.*, at most 0.05 ppm, at most 0.10 ppm, at most 0.20 ppm, at most 0.30 ppm, at most 0.40 ppm, at most 0.50 ppm, at most 0.60 ppm, at most 0.70 ppm, at most 0.80 ppm, at most 0.90 ppm, at most 1 ppm, at most 10 ppm, at most 20 ppm, at most 30 ppm, at most 40 ppm, at most 50 ppm, at most 60 ppm, at most 70 ppm, at most 80 ppm, at most 90 ppm, at most 100 ppm, at most 125 ppm, at most 150 ppm, at most 175 ppm, at most 200 ppm, at most 225 ppm, at most 250 ppm, at most 275 ppm, at most 300 ppm, at most 325 ppm, at most 350 ppm, at most 375 ppm, at most 400 ppm, at most 425 ppm, at most 450 ppm, at most 475 ppm, at most 500 ppm, at most 525 ppm, at most 550 ppm, at most 575 ppm, at most 600 ppm, at most 625 ppm, at most 650 ppm, at most 675 ppm, at most 700 ppm, at most 725 ppm, at most 750 ppm, at most 775 ppm, at most 800 ppm, at most 825 ppm, at most

850 ppm, at most 875 ppm, at most 900 ppm, at most 925 ppm, at most 950 ppm, at most 975 ppm, at most 1,000 ppm, at most 1,025 ppm, at most 1,050 ppm, at most 1075 ppm, at most 1,100 ppm, at most 1,125 ppm, at most 1,150 ppm, at most 1,175 ppm, at most 1,200 ppm, at most 1,225 ppm, at most 1,250 ppm, at most 1,275 ppm, at most 1,300 ppm, at most 1,325 ppm, at most 1,350 ppm, at most 1,375 ppm, at most 1,400 ppm, at most 1,425 ppm, at most 1,450 ppm, at most 1,475 ppm, at most 1,500 ppm, at most 1,600 ppm, at most 1,700 ppm, at most 1,800 ppm, at most 1,900 ppm, or at most 2,000 ppm.

[056] In still other aspects of this embodiment, a composition disclosed herein comprises a phosphate buffer in an amount of from, *e.g.*, about 0.5 ppm to about 20 ppm, about 0.5 ppm to about 25 ppm, about 0.5 ppm to about 30 ppm, about 0.5 ppm to about 35 ppm, about 0.5 ppm to about 40 ppm, about 0.5 ppm to about 45 ppm, about 0.5 ppm to about 50 ppm, about 0.5 ppm to about 55 ppm, about 0.5 ppm to about 60 ppm, about 0.5 ppm to about 65 ppm, about 0.5 ppm to about 70 ppm, about 0.5 ppm to about 75 ppm, about 0.5 ppm to about 80 ppm, about 0.5 ppm to about 85 ppm, about 0.5 ppm to about 90 ppm, about 0.5 ppm to about 95 ppm, about 0.5 ppm to about 100 ppm, about 0.75 ppm to about 20 ppm, about 0.75 ppm to about 25 ppm, about 0.75 ppm to about 30 ppm, about 0.75 ppm to about 35 ppm, about 0.75 ppm to about 40 ppm, about 0.75 ppm to about 45 ppm, about 0.75 ppm to about 50 ppm, about 0.75 ppm to about 55 ppm, about 0.75 ppm to about 60 ppm, about 0.75 ppm to about 65 ppm, about 0.75 ppm to about 70 ppm, about 0.75 ppm to about 75 ppm, about 0.75 ppm to about 80 ppm, about 0.75 ppm to about 85 ppm, about 0.75 ppm to about 90 ppm, about 0.75 ppm to about 95 ppm, about 0.75 ppm to about 100 ppm, about 1 ppm to about 20 ppm, about 1 ppm to about 25 ppm, about 1 ppm to about 30 ppm, about 1 ppm to about 35 ppm, about 1 ppm to about 40 ppm, about 1 ppm to about 45 ppm, about 1 ppm to about 50 ppm, about 1 ppm to about 55 ppm, about 1 ppm to about 60 ppm, about 1 ppm to about 65 ppm, about 1 ppm to about 70 ppm, about 1 ppm to about 75 ppm, about 1 ppm to about 80 ppm, about 1 ppm to about 85 ppm, about 1 ppm to about 90 ppm, about 1 ppm to about 95 ppm, about 1 ppm to about 100 ppm, about 5 ppm to about 20 ppm, about 5 ppm to about 25 ppm, about 5 ppm to about 30 ppm, about 5 ppm to about 35 ppm, about 5 ppm to about 40 ppm, about 5 ppm to about 45 ppm, about 5 ppm to about 50 ppm, about 5 ppm to about 55 ppm, about 5 ppm to about 60 ppm, about 5 ppm to about 65 ppm, about 5 ppm to about 70 ppm, about 5 ppm to about 75 ppm, about 5 ppm to about 80 ppm, about 5 ppm to about 85 ppm, about 5 ppm to about 90 ppm, about 5 ppm to about 95 ppm, about 5 ppm to about 100 ppm, about 10 ppm to about 20 ppm, about 10 ppm to about 25 ppm, about 10 ppm to about 30 ppm, about 10 ppm to about 35 ppm, about 10 ppm to about 40 ppm, about 10 ppm to about 45 ppm, about 10 ppm to about 50 ppm, about 10 ppm to about 55 ppm, about 10 ppm to about 60 ppm, about 10 ppm to about 65 ppm, about 10 ppm to about 70 ppm, about 10 ppm to about 75 ppm, about 10 ppm to about 80 ppm, about 10 ppm to about 85 ppm, about 10 ppm to about 90 ppm, about 10 ppm to about 95 ppm, or about 10 ppm to about 100 ppm.

[057] In other aspects of this embodiment, a composition disclosed herein comprises a phosphate buffer in an amount of from, *e.g.*, about 1 ppm to about 25 ppm, about 1 ppm to about 50 ppm, about 1 ppm to about 75 ppm, about 1 ppm to about 100 ppm, about 1 ppm to about 125 ppm, about 1 ppm to about 150 ppm, about 1 ppm to about 175 ppm, about 1 ppm to about 200 ppm, about 1 ppm to about 225 ppm, about 1 ppm to about 250 ppm, about 1 ppm to about 275 ppm, about 1 ppm to about 300 ppm, about 1 ppm to

about 325 ppm, about 1 ppm to about 350 ppm, about 1 ppm to about 375 ppm, about 1 ppm to about 400 ppm, about 10 ppm to about 25 ppm, about 10 ppm to about 50 ppm, about 10 ppm to about 75 ppm, about 10 ppm to about 100 ppm, about 10 ppm to about 125 ppm, about 10 ppm to about 150 ppm, about 10 ppm to about 175 ppm, about 10 ppm to about 200 ppm, about 10 ppm to about 225 ppm, about 10 ppm to about 250 ppm, about 10 ppm to about 275 ppm, about 10 ppm to about 300 ppm, about 10 ppm to about 325 ppm, about 10 ppm to about 350 ppm, about 10 ppm to about 375 ppm, about 10 ppm to about 400 ppm, about 25 ppm to about 50 ppm, about 25 ppm to about 75 ppm, about 25 ppm to about 100 ppm, about 25 ppm to about 125 ppm, about 25 ppm to about 150 ppm, about 25 ppm to about 175 ppm, about 25 ppm to about 200 ppm, about 25 ppm to about 225 ppm, about 25 ppm to about 250 ppm, about 25 ppm to about 275 ppm, about 25 ppm to about 300 ppm, about 25 ppm to about 325 ppm, about 25 ppm to about 350 ppm, about 25 ppm to about 375 ppm, about 25 ppm to about 400 ppm, about 50 ppm to about 75 ppm, about 50 ppm to about 100 ppm, about 50 ppm to about 125 ppm, about 50 ppm to about 150 ppm, about 50 ppm to about 175 ppm, about 50 ppm to about 200 ppm, about 50 ppm to about 225 ppm, about 50 ppm to about 250 ppm, about 50 ppm to about 275 ppm, about 50 ppm to about 300 ppm, about 50 ppm to about 325 ppm, about 50 ppm to about 350 ppm, about 50 ppm to about 375 ppm, about 50 ppm to about 400 ppm, about 75 ppm to about 100 ppm, about 75 ppm to about 125 ppm, about 75 ppm to about 150 ppm, about 75 ppm to about 175 ppm, about 75 ppm to about 200 ppm, about 75 ppm to about 225 ppm, about 75 ppm to about 250 ppm, about 75 ppm to about 275 ppm, about 75 ppm to about 300 ppm, about 75 ppm to about 325 ppm, about 75 ppm to about 350 ppm, about 75 ppm to about 375 ppm, about 75 ppm to about 400 ppm, about 100 ppm to about 125 ppm, about 100 ppm to about 150 ppm, about 100 ppm to about 175 ppm, about 100 ppm to about 200 ppm, about 100 ppm to about 225 ppm, about 100 ppm to about 250 ppm, about 100 ppm to about 275 ppm, about 100 ppm to about 300 ppm, about 100 ppm to about 325 ppm, about 100 ppm to about 350 ppm, about 100 ppm to about 375 ppm, about 100 ppm to about 400 ppm, about 150 ppm to about 175 ppm, about 150 ppm to about 200 ppm, about 150 ppm to about 225 ppm, about 150 ppm to about 250 ppm, about 150 ppm to about 275 ppm, about 150 ppm to about 300 ppm, about 150 ppm to about 325 ppm, about 150 ppm to about 350 ppm, about 150 ppm to about 375 ppm, about 150 ppm to about 400 ppm, about 200 ppm to about 225 ppm, about 200 ppm to about 250 ppm, about 200 ppm to about 275 ppm, about 200 ppm to about 300 ppm, about 200 ppm to about 325 ppm, about 200 ppm to about 350 ppm, about 200 ppm to about 375 ppm, about 200 ppm to about 400 ppm, about 250 ppm to about 275 ppm, about 250 ppm to about 300 ppm, about 250 ppm to about 325 ppm, about 250 ppm to about 350 ppm, about 250 ppm to about 375 ppm, about 250 ppm to about 400 ppm, about 300 ppm to about 325 ppm, about 300 ppm to about 350 ppm, about 300 ppm to about 375 ppm, about 300 ppm to about 400 ppm, about 350 ppm to about 375 ppm, about 350 ppm to about 400 ppm, or about 375 ppm to about 400 ppm.

[058] In an embodiment, a composition disclosed herein does not comprise a phosphate buffer. In an embodiment, a composition disclosed herein does not comprise a calcium phosphate buffer. In an embodiment, a composition disclosed herein does not comprise a sodium phosphate buffer.

[059] In one embodiment, a composition disclosed herein does not comprise ozone. In another embodiment, a composition disclosed herein can comprise ozone.

[060] In one embodiment, a composition disclosed herein does not comprise hydrogen peroxide. In another embodiment, a composition disclosed herein can comprise hydrogen peroxide.

[061] In one embodiment, a composition disclosed herein does not comprise a quaternary compound. In an embodiment, a composition disclosed herein does not comprise a silicon quaternary compound. In an embodiment, a composition disclosed herein does not comprise a quaternary compound or a silicon quaternary compound.

[062] In one embodiment, a composition disclosed herein does not comprise a guanide-containing compound. In another embodiment, a composition disclosed herein does not comprise biguanide. In another embodiment, a composition disclosed herein does not comprise a biguanide-containing compound. In another embodiment, a composition disclosed herein does not comprise biguanidine. In another embodiment, a composition disclosed herein does not comprise a biguanidine-containing compound. In another embodiment, a composition disclosed herein does not comprise triguanide. In another embodiment, a composition disclosed herein does not comprise a triguanide-containing compound.

[063] In one embodiment, a composition disclosed herein does not comprise an alcohol.

[064] A composition disclosed herein may comprise a carrier. A carrier, also known as a vehicle, can be any material typically known in the skin care, cosmetic and medical arts that is used as a base to formulate a composition disclosed herein. A carrier may be an aqueous carrier, a semi-solid carrier or a solid carrier. A carrier can also provide a skin care benefit as disclosed herein. A carrier includes, without limitation, water, a vegetable oil, a mineral oil, an ester oil, an ether, an alcohol, a fatty alcohol, an isoparaffin, a hydrocarbon oil, a polyol, and a wax. Non-limiting examples of an ester oil include octal palmitate, isopropyl myristate and isopropyl palmitate. Non-limiting examples of an ether includes dicapryl ether and dimethyl isosorbide. Non-limiting examples of an alcohol includes ethanol and isopropanol. Non-limiting examples of a fatty alcohol include cetyl alcohol, cetearyl alcohol, stearyl alcohol and behenyl alcohol. Non-limiting examples of an isoparaffin include isooctane, isododecane (IDD) and isohexadecane. Non-limiting examples of a hydrocarbon oil include mineral oil, petrolatum, isoeicosane and a polyolefin, including (hydrogenated) polyisobutene. Non-limiting examples of a polyol include propylene glycol, glycerin, butylene glycol, pentylene glycol, hexylene glycol, caprylyl glycol. Non-limiting examples of a wax include beeswax, carnauba, ozokerite, microcrystalline wax, polyethylene wax, and a botanical wax.

[065] In one embodiment, a single carrier is present in a composition disclosed herein. In another embodiment, a plurality of carriers is present in a composition disclosed herein. In aspects of this embodiment, a composition disclosed herein comprises, *e.g.*, one or more carriers, two or more carriers, three or more carriers, four or more carriers or five or more carriers. In other aspects of this embodiment, a composition disclosed herein comprises, *e.g.*, only one carrier, at most two carriers, at most three carriers, at most four carriers, or at most five carriers. In yet other aspects of this embodiment, a composition

disclosed herein comprises from, *e.g.*, 1 to 2 carriers, 1 to 3 carriers, 1 to 4 carriers, 1 to 5 carriers, 2 to 3 carriers, 2 to 4 carriers, 2 to 5 carriers, 3 to 4 carriers, 3 to 5 carriers or 4 to 5 carriers.

[066] In another embodiment, a composition disclosed herein comprises an amount of carrier that provides a desired formulative or beneficial effect to a composition disclosed herein. In aspects of this embodiment, a composition disclosed herein comprises a carrier in an amount of, *e.g.*, at least 5%, at least 10%, at least 15%, at least 20%, at least 25%, at least 30%, at least 35%, at least 40%, at least 45%, at least 50%, at least 55%, at least 60%, at least 65%, at least 70%, at least 75%, at least 80%, at least 85%, at least 90%, at least 95%, at least 96%, at least 97%, at least 98% or at least 99% by weight of the composition. In other aspects of this embodiment, a composition disclosed herein comprises a carrier in an amount of, *e.g.*, at most 5%, at most 10%, at most 15%, at most 20%, at most 25%, at most 30%, at most 35%, at most 40%, at most 45%, at most 50%, at most 55%, at most 60%, at most 65%, at most 70%, at most 75%, at most 80%, at most 85%, at most 90%, at most 95%, at most 96%, at most 97%, at most 98% or at most 99% by weight of the composition. In yet other aspects of this embodiment, a composition disclosed herein comprises a carrier in an amount of from, *e.g.*, about 5% to about 25%, about 5% to about 50%, about 5% to about 75%, about 5% to about 90%, about 5% to about 95%, about 5% to about 96%, about 5% to about 97%, about 5% to about 98%, about 5% to about 99%, about 25% to about 50%, about 25% to about 75%, about 25% to about 90%, about 25% to about 95%, about 25% to about 96%, about 25% to about 97%, about 25% to about 98%, about 25% to about 99%, about 50% to about 75%, about 50% to about 90%, about 50% to about 95%, about 50% to about 96%, about 50% to about 97%, about 50% to about 98%, about 50% to about 99%, about 75% to about 80%, about 75% to about 85%, about 75% to about 90%, about 75% to about 95%, about 75% to about 96%, about 75% to about 97%, about 75% to about 98%, about 75% to about 99%, about 80% to about 85%, about 80% to about 90%, about 80% to about 95%, about 80% to about 96%, about 80% to about 97%, about 80% to about 98%, about 80% to about 99%, about 85% to about 90%, about 85% to about 95%, about 85% to about 96%, about 85% to about 97%, about 85% to about 98%, about 85% to about 99%, about 90% to about 95%, about 90% to about 96%, about 90% to about 97%, about 90% to about 98%, about 90% to about 99%, or about 95% to about 99%, by weight of the composition.

[067] In another embodiment, a composition disclosed herein comprises a carrier which is not an alcohol. In aspects of this embodiment, when a composition disclosed herein comprises hypochlorous acid or free available chlorine, then the composition may comprise a carrier where the carrier is not an alcohol.

[068] A composition disclosed herein may further optionally include additional ingredients. An additional ingredient is one known to be useful in finishing a composition disclosed herein. An additional ingredient includes, without limitation, a hydrophilic clay, a disinfectant, an antiseptic, a surfactant, a preservative, or a chelating agent. An additional ingredient disclosed herein is known in the art.

[069] A hydrophilic clay is a synthetic or naturally occurring smectic clay that forms three-dimensional collodal structures when hydrated leading to increased viscosity and improved suspension control components in a composition. A hydrophilic clay includes hydrous phyllosilicate clays. A hydrophilic clay

can have thixotrophic properties. Non-limiting examples of a hydrophilic clay include a bentonite clay, a hectorite clay, a kaolinite clay, and a silicate clay. A bentonite clay is a phyllosilicate clay and includes, without limitation, a potassium bentonite clay, a sodium bentonite clay, a calcium bentonite clay, and an aluminum bentonite clay. A hectorite clay is a phyllosilicate clay and includes those commercially sold as the BENTONE® product line, including hectorite clay (BENTONE® EW), hectorite clay (BENTONE® MA), and hectorite clay and hydroxy ethyl cellulose (BENTONE® LT). A kaolinite clay is a phyllosilicate clay. A silicate clay is a synthetic layered silicate clay and includes those commercially sold as the LAPONITE® product line, including lithium magnesium sodium silicate (LAPONITE® XLG), lithium magnesium sodium silicate and tetrasodium pyrophosphate (LAPONITE® XLS), sodium magnesium fluorosilicate (LAPONITE® XL), and sodium magnesium fluorosilicate (LAPONITE® XL21).

[070] In one embodiment, a single hydrophilic clay is present in a composition disclosed herein. In another embodiment, a plurality of hydrophilic clays is present in a composition disclosed herein. In aspects of this embodiment, a composition disclosed herein comprises, *e.g.*, one or more hydrophilic clays, two or more hydrophilic clays, three or more hydrophilic clays, four or more hydrophilic clays or five or more hydrophilic clays. In other aspects of this embodiment, a composition disclosed herein comprises, *e.g.*, only one hydrophilic clay, at most two hydrophilic clays, at most three hydrophilic clays, at most four hydrophilic clays, or at most five hydrophilic clays. In yet other aspects of this embodiment, a composition disclosed herein comprises from, *e.g.*, 1 to 2 hydrophilic clays, 1 to 3 hydrophilic clays, 1 to 4 hydrophilic clays, 1 to 5 hydrophilic clays, 2 to 3 hydrophilic clays, 2 to 4 hydrophilic clays, 2 to 5 hydrophilic clays, 3 to 4 hydrophilic clays, 3 to 5 hydrophilic clays or 4 to 5 hydrophilic clays.

[071] In another embodiment, a composition disclosed herein comprises an amount of a hydrophilic clay that provides a desired beneficial effect to a composition disclosed herein. In aspects of this embodiment, a composition disclosed herein comprises a hydrophilic clay in an amount of, *e.g.*, 0.01%, 0.025%, 0.05%, 0.075%, 0.1%, 0.2%, 0.25%, 0.3%, 0.4%, 0.5%, 0.6%, 0.7%, 0.75%, 0.8%, 0.9%, 1%, 2%, 3%, 4%, 5%, 6%, 7%, 8%. 9%, or 10% by weight of the composition. In other aspects of this embodiment, a composition disclosed herein comprises a hydrophilic clay in an amount of, *e.g.*, at least 0.01%, at least 0.025%, at least 0.05%, at least 0.075%, at least 0.1%, at least 0.25%, at least 0.5%, at least 0.75%, at least 1%, at least 2%, at least 3%, at least 4%, at least 5%, at least 6%, at least 7%, at least 8%, at least 9%, or at least 10% by weight of the composition. In yet other aspects of this embodiment, a composition disclosed herein comprises a hydrophilic clay in an amount of, *e.g.*, at most 0.01%, at most 0.025%, at most 0.05%, at most 0.075%, at most 0.1%, at most 0.25%, at most 0.5%, at most 0.75%, at most 1%, at most 2%, at most 3%, at most 4%, at most 5%, at most 6%, at most 7%, at most 8%, at most 9%, or at most 10% by weight of the composition.

[072] In still other aspects of this embodiment, a composition disclosed herein comprises a hydrophilic clay in an amount of from, *e.g.*, about 0.01% to about 0.05%, 0.01% to about 0.075%, about 0.01% to about 0.1%, about 0.1% to about 0.5%, about 0.1% to about 0.75%, about 0.1% to about 1%, about 0.1% to about 2%, about 0.1% to about 3%, about 0.1% to about 4%, about 0.1% to about 5%, about 0.1% to about 6%, about 0.1% to about 7%, about 0.1% to about 8%, about 0.1% to about 9%, about 0.1% to about 10%,

about 0.25% to about 0.5%, about 0.25% to about 0.75%, about 0.25% to about 1%, about 0.25% to about 2%, about 0.25% to about 3%, about 0.25% to about 4%, about 0.25% to about 5%, about 0.25% to about 6%, about 0.25% to about 7%, about 0.25% to about 8%, about 0.25% to about 9%, about 0.25% to about 10%, about 0.5% to about 0.75%, about 0.5% to about 1%, about 0.5% to about 2%, about 0.5% to about 3%, about 0.5% to about 4%, about 0.5% to about 5%, about 0.5% to about 6%, about 0.5% to about 7%, about 0.5% to about 8%, about 0.5% to about 9%, about 0.5% to about 10%, about 0.75% to about 1%, about 0.75% to about 2%, about 0.75% to about 3%, about 0.75% to about 4%, about 0.75% to about 5%, about 0.75% to about 6%, about 0.75% to about 7%, about 0.75% to about 8%, about 0.75% to about 9%, about 0.75% to about 10%, about 1% to about 2%, about 1% to about 3%, about 1% to about 4%, about 1% to about 5%, about 1% to about 6%, about 1% to about 7%, about 1% to about 8%, about 1% to about 9%, about 1% to about 10%, about 2% to about 3%, about 2% to about 4%, about 2% to about 5%, about 2% to about 6%, about 2% to about 7%, about 2% to about 8%, about 2% to about 9%, about 2% to about 10%, about 3% to about 4%, about 3% to about 5%, about 3% to about 6%, about 3% to about 7%, about 3% to about 8%, about 3% to about 9%, about 3% to about 10%, about 4% to about 5%, about 4% to about 6%, about 4% to about 7%, about 4% to about 8%, about 4% to about 9%, about 4% to about 10%, about 5% to about 6%, about 5% to about 7%, about 5% to about 8%, about 5% to about 9%, about 5% to about 10%, about 6% to about 7%, about 6% to about 8%, about 6% to about 9%, about 6% to about 10%, about 7% to about 8%, about 7% to about 9%, about 7% to about 10%, about 8% to about 9%, about 8% to about 10% or about 9% to about 10% by weight of the composition.

[073] In another embodiment, a composition disclosed herein comprises an amount of a silicate clay that provides a desired beneficial effect to a composition disclosed herein. In aspects of this embodiment, a composition disclosed herein comprises a silicate clay in an amount of, *e.g.*, 0.001%, 0.0025%, 0.005%, 0.0075%, 0.01%, 0.025%, 0.05%, 0.075%, 0.1%, 0.2%, 0.25%, 0.3%, 0.4%, 0.5%, 0.6%, 0.7%, 0.75%, 0.8%, 0.9%, 1%, 2%, 3%, 4%, 5%, 6%, 7%, 8%. 9%, or 10% by weight of the composition. In other aspects of this embodiment, a composition disclosed herein comprises a silicate clay in an amount of, *e.g.*, at least 0.001%, at least 0.0025%, at least 0.005%, at least 0.0075%, at least 0.01%, at least 0.025%, at least 0.05%, at least 0.075%, at least 0.1%, at least 0.25%, at least 0.5%, at least 0.75%, at least 1%, at least 2%, at least 3%, at least 4%, at least 5%, at least 6%, at least 7%, at least 8%, at least 9%, or at least 10% by weight of the composition. In yet other aspects of this embodiment, a composition disclosed herein comprises a silicate clay in an amount of, *e.g.*, at most 0.001%, at most 0.0025%, at most 0.005%, at most 0.0075%, at most 0.01%, at most 0.025%, at most 0.05%, at most 0.075%, at most 0.1%, at most 0.25%, at most 0.5%, at most 0.75%, at most 1%, at most 2%, at most 3%, at most 4%, at most 5%, at most 6%, at most 7%, at most 8%, at most 9%, or at most 10% by weight of the composition.

[074] In still other aspects of this embodiment, a composition disclosed herein comprises a silicate clay in an amount of from, *e.g.*, about 0.001% to about 0.005%, 0.001% to about 0.0075%, about 0.001% to about 0.01%, about 0.001% to about 0.05%, about 0.001% to about 0.075%, about 0.001% to about 0.1%, about 0.001% to about 0.25%, about 0.001% to about 0.5%, about 0.001% to about 0.75%, about 0.005% to about 0.0075%, about 0.005% to about 0.01%, about 0.005% to about 0.05%, about 0.005% to about 0.075%, about 0.005% to about 0.1%, about 0.005% to about 0.25%, about 0.005% to about 0.5%, about

0.005% to about 0.75%, about 0.01% to about 0.05%, 0.01% to about 0.075%, about 0.01% to about 0.1%, about 0.1% to about 0.5%, about 0.1% to about 0.75%, about 0.1% to about 1%, about 0.1% to about 2%, about 0.1% to about 3%, about 0.1% to about 4%, about 0.1% to about 5%, about 0.1% to about 6%, about 0.1% to about 7%, about 0.1% to about 8%, about 0.1% to about 9%, about 0.1% to about 10%, about 0.25% to about 0.5%, about 0.25% to about 0.75%, about 0.25% to about 1%, about 0.25% to about 2%, about 0.25% to about 3%, about 0.25% to about 4%, about 0.25% to about 5%, about 0.25% to about 6%, about 0.25% to about 7%, about 0.25% to about 8%, about 0.25% to about 9%, about 0.25% to about 10%, about 0.5% to about 0.75%, about 0.5% to about 1%, about 0.5% to about 2%, about 0.5% to about 3%, about 0.5% to about 4%, about 0.5% to about 5%, about 0.5% to about 6%, about 0.5% to about 7%, about 0.5% to about 8%, about 0.5% to about 9%, about 0.5% to about 10%, about 0.75% to about 1%, about 0.75% to about 2%, about 0.75% to about 3%, about 0.75% to about 4%, about 0.75% to about 5%, about 0.75% to about 6%, about 0.75% to about 7%, about 0.75% to about 8%, about 0.75% to about 9%, about 0.75% to about 10%, about 1% to about 2%, about 1% to about 3%, about 1% to about 4%, about 1% to about 5%, about 1% to about 6%, about 1% to about 7%, about 1% to about 8%, about 1% to about 9%, about 1% to about 10%, about 2% to about 3%, about 2% to about 4%, about 2% to about 5%, about 2% to about 6%, about 2% to about 7%, about 2% to about 8%, about 2% to about 9%, about 2% to about 10%, about 3% to about 4%, about 3% to about 5%, about 3% to about 6%, about 3% to about 7%, about 3% to about 8%, about 3% to about 9%, about 3% to about 10%, about 4% to about 5%, about 4% to about 6%, about 4% to about 7%, about 4% to about 8%, about 4% to about 9%, about 4% to about 10%, about 5% to about 6%, about 5% to about 7%, about 5% to about 8%, about 5% to about 9%, about 5% to about 10%, about 6% to about 7%, about 6% to about 8%, about 6% to about 9%, about 6% to about 10%, about 7% to about 8%, about 7% to about 9%, about 7% to about 10%, about 8% to about 9%, about 8% to about 10% or about 9% to about 10% by weight of the composition.

[075] A preservative preserves the stability of a composition disclosed herein. A preservative can also prevent the growth of microbial organisms in a composition disclosed herein. Non-limiting examples of a preservative include methylparaben, phenoxyethanol, capryl glycol, glyceryl caprylate, benzoic acid, sorbic acid, gallic acid, and propylparaben.

[076] A composition disclosed herein may be adjusted to any pH that enables a composition disclosed herein to achieve a desired beneficial effect. In aspects of this embodiment, the pH of a composition disclosed herein is, *e.g.*, at least 2, at least 3, at least 4, at least 5, at least 6, at least 7, at least 8, at least 9, at least 10, or at least 11. In other aspects of this embodiment, the pH of a composition disclosed herein is, *e.g.*, at most 2, at most 3, at most 4, at most 5, at most 6, at most 7, at most 8, at most 9, at most 10, or at most 11.

[077] In yet other aspects of this embodiment, the pH of a composition disclosed herein is between, *e.g.*, about 2 to about 5, about 2 to about 5.5, about 2 to about 6, about 2 to about 6.5, about 2 to about 7, about 2 to about 7.5, about 2 to about 8, about 2 to about 8.5, about 2 to about 9, about 2.5 to about 5, about 2.5 to about 5.5, about 2.5 to about 6, about 2.5 to about 6.5, about 2.5 to about 7, about 2.5 to about 7.5, about 2.5 to about 8, about 2.5 to about 8.5, about 2.5 to about 9, about 3 to about 5, about 3 to about 5.5,

about 3 to about 6, about 3 to about 6.5, about 3 to about 7, about 3 to about 7.5, about 3 to about 8, about 3 to about 8.5, about 3 to about 9, about 3.5 to about 5, about 3.5 to about 5.5, about 3.5 to about 6, about 3.5 to about 6.5, about 3.5 to about 7, about 3.5 to about 7.5, about 3.5 to about 8, about 3.5 to about 8.5, about 3.5 to about 9, about 4 to about 5, about 4 to about 5.5, about 4 to about 6, about 4 to about 6.5, about 4 to about 7, about 4 to about 7.5, about 4 to about 8, about 4 to about 8.5, about 4 to about 9, about 4.5 to about 5, about 4.5 to about 5.5, about 4.5 to about 6, about 4.5 to about 6.5, about 4.5 to about 7, about 4.5 to about 7.5, about 4.5 to about 8, about 4.5 to about 8.5, about 4.5 to about 9, about 5 to about 5.5, about 5 to about 6, about 5 to about 6.5, about 5 to about 7, about 5 to about 7.5, about 5 to about 8, about 5 to about 8.5, about 5 to about 9, about 5.5 to about 6, about 5.5 to about 6.5, about 5.5 to about 7, about 5.5 to about 7.5, about 5.5 to about 8, about 5.5 to about 8.5, about 5.5 to about 9, about 6 to about 6.5, about 6 to about 7, about 6 to about 7.5, about 6 to about 8, about 6 to about 8.5, about 6 to about 9, about 6.5 to about 7, about 6.5 to about 7.5, about 6.5 to about 8, about 6.5 to about 8.5, about 6.5 to about 9, about 7 to about 7.5, about 7 to about 8, about 7 to about 8.5, about 7 to about 9, about 7.5 to about 8, about 7.5 to about 8.5, about 7.5 to about 9, about 8 to about 8.5, about 8 to about 9, or about 8.5 to about 9.

[078] In another embodiment, a calcium oxide powder is used to pH a composition disclosed herein. In some embodiments, a calcium oxide powder obtained from an organic source like shells from oceanic organisms. In some embodiment, a calcium oxide powder obtain from an inorganic source like by a synthetic chemical process. In some embodiments, about 160 ppm of a calcium oxide powder results in a composition having a pH of about 5.0 to about 5.2. In some embodiments, about 240 ppm of a calcium oxide powder results in a composition having a pH of about 7.5 to about 7,8. In aspects of this embodiment, a calcium oxide powder is used to pH a composition disclosed herein to, *e.g.*, at least 2, at least 3, at least 4, at least 5, at least 6, at least 7, at least 8, at least 9, at least 10, or at least 11. In other aspects of this embodiment, a calcium oxide powder is used to pH a composition disclosed herein to, *e.g.*, at most 2, at most 3, at most 4, at most 5, at most 6, at most 7, at most 8, at most 9, at most 10, or at most 11.

[079] In yet other aspects of this embodiment, a calcium oxide powder is used to pH a composition disclosed herein to, *e.g.*, about 2 to about 5, about 2 to about 5.5, about 2 to about 6, about 2 to about 6.5, about 2 to about 7, about 2 to about 7.5, about 2 to about 8, about 2 to about 8.5, about 2 to about 9, about 2.5 to about 5, about 2.5 to about 5.5, about 2.5 to about 6, about 2.5 to about 6.5, about 2.5 to about 7, about 2.5 to about 7.5, about 2.5 to about 8, about 2.5 to about 8.5, about 2.5 to about 9, about 3 to about 5, about 3 to about 5.5, about 3 to about 6, about 3 to about 6.5, about 3 to about 7, about 3 to about 7.5, about 3 to about 8, about 3 to about 8.5, about 3 to about 9, about 3.5 to about 5, about 3.5 to about 5.5, about 3.5 to about 6, about 3.5 to about 6.5, about 3.5 to about 7, about 3.5 to about 7.5, about 3.5 to about 8, about 3.5 to about 8.5, about 3.5 to about 9, about 4 to about 5, about 4 to about 5.5, about 4 to about 6, about 4 to about 6.5, about 4 to about 7, about 4 to about 7.5, about 4 to about 8, about 4 to about 8.5, about 4 to about 9, about 4.5 to about 5, about 4.5 to about 5.5, about 4.5 to about 6, about 4.5 to about 6.5, about 4.5 to about 7, about 4.5 to about 7.5, about 4.5 to about 8, about 4.5 to about 8.5, about 4.5 to about 9, about 5 to about 5.5, about 5 to about 6, about 5 to about 6.5, about 5 to about 7, about 5 to about 7.5, about 5 to about 8, about 5 to about 8.5, about 5 to about 9, about 5.5 to about 6, about 5.5 to about

6.5, about 5.5 to about 7, about 5.5 to about 7.5, about 5.5 to about 8, about 5.5 to about 8.5, about 5.5 to about 9, about 6 to about 6.5, about 6 to about 7, about 6 to about 7.5, about 6 to about 8, about 6 to about 8.5, about 6 to about 9, about 6.5 to about 7, about 6.5 to about 7.5, about 6.5 to about 8, about 6.5 to about 8.5, about 6.5 to about 9, about 7 to about 7.5, about 7 to about 8, about 7 to about 8.5, about 7 to about 9, about 7.5 to about 8, about 7.5 to about 8.5, about 7.5 to about 9, about 8 to about 8.5, about 8 to about 9, or about 8.5 to about 9.

[080] A composition disclosed herein is resistant to inactivation when exposed to a bodily fluid. A bodily fluid is one containing charged molecules and includes, without limitation, blood, and a blood byproduct like plasma and serum. In one embodiment, a composition disclosed herein is resistant to inactivation when it shows, *e.g.*, at most 1% inactivation, at most 2% inactivation, at most 3% inactivation, at most 4% inactivation, at most 5% inactivation, at most 6% inactivation, at most 7% inactivation, at most 8% inactivation, at most 9% inactivation, or at most 10% inactivation upon exposure to a bodily fluid. In another embodiment, a composition disclosed herein is resistant to inactivation when it shows, *e.g.*, at most 10% inactivation, at most 15% inactivation, at most 20% inactivation, at most 25% inactivation, at most 30% inactivation, at most 35% inactivation, at most 40% inactivation, at most 45% inactivation, at most 50% inactivation upon exposure to a bodily fluid. In another embodiment, a composition disclosed herein is resistant to inactivation when it shows, *e.g.*, about 1% to about 10% inactivation, about 1% to about 20% inactivation, about 1% to about 30% inactivation, about 1% to about 40% inactivation, about 1% to about 50% inactivation, about 5% to about 10% inactivation, about 5% to about 20% inactivation, about 5% to about 30% inactivation, about 5% to about 40% inactivation, about 5% to about 50% inactivation, about 10% to about 20% inactivation, about 10% to about 30% inactivation, about 10% to about 40% inactivation, about 10% to about 50% inactivation, 20% to about 30% inactivation, about 20% to about 40% inactivation, about 20% to about 50% inactivation, about 30% to about 40% inactivation, about 30% to about 50% inactivation, or about 40% to about 50% inactivation upon exposure to a bodily fluid.

[081] In one embodiment, a composition disclosed herein is resistant to inactivation when it shows, *e.g.*, at most 1% degradation, at most 2% degradation, at most 3% degradation, at most 4% degradation, at most 5% degradation, at most 6% degradation, at most 7% degradation, at most 8% degradation, at most 9% degradation, or at most 10% degradation of hypochlorous acid upon exposure to a bodily fluid. In another embodiment, a composition disclosed herein is resistant to inactivation when it shows, *e.g.*, at most 10% degradation, at most 15% degradation, at most 20% degradation, at most 25% degradation, at most 30% degradation, at most 35% degradation, at most 40% degradation, at most 45% degradation, at most 50% degradation of hypochlorous acid upon exposure to a bodily fluid. In another embodiment, a composition disclosed herein is resistant to inactivation when it shows, *e.g.*, about 1% to about 10% degradation, about 1% to about 20% degradation, about 1% to about 30% degradation, about 1% to about 40% degradation, about 1% to about 50% degradation, about 5% to about 10% degradation, about 5% to about 20% degradation, about 5% to about 30% degradation, about 5% to about 40% degradation, about 5% to about 50% degradation, about 10% to about 20% degradation, about 10% to about 30% degradation, about 10% to about 40% degradation, about 10% to about 50% degradation, 20% to about 30% degradation, about 20% to about 40% degradation, about 20% to about 50% degradation, about 30% to

about 40% degradation, about 30% to about 50% degradation, or about 40% to about 50% degradation of hypochlorous acid upon exposure to a bodily fluid.

[082] A composition disclosed herein is stable. In one embodiment, a composition disclosed herein is stable when it shows, *e.g.*, at most 1% degradation, at most 2% degradation, at most 3% degradation, at most 4% degradation, at most 5% degradation, at most 6% degradation, at most 7% degradation, at most 8% degradation, at most 9% degradation, or at most 10% degradation of hypochlorous acid. In another embodiment, a composition disclosed herein is stable when it shows, *e.g.*, at most 10% degradation, at most 15% degradation, at most 20% degradation, at most 25% degradation, at most 30% degradation, at most 35% degradation, at most 40% degradation, at most 45% degradation, at most 50% degradation, at most 55% degradation, at most 60% degradation, at most 65% degradation, at most 70% degradation, at most 75% degradation, at most 80% degradation, at most 85% degradation, at most 90% degradation, or at most 95% degradation of hypochlorous acid. In another embodiment, a composition disclosed herein is stable when it shows, *e.g.*, about 1% to about 10% degradation, about 1% to about 20% degradation, about 1% to about 30% degradation, about 1% to about 40% degradation, about 1% to about 50% degradation, about 1% to about 60% degradation, about 1% to about 70% degradation, about 1% to about 80% degradation, about 1% to about 90% degradation, about 1% to about 95% degradation, about 5% to about 10% degradation, about 5% to about 20% degradation, about 5% to about 30% degradation, about 5% to about 40% degradation, about 5% to about 50% degradation, about 5% to about 60% degradation, about 5% to about 70% degradation, about 5% to about 80% degradation, about 5% to about 90% degradation, about 5% to about 95% degradation, about 10% to about 20% degradation, about 10% to about 30% degradation, about 10% to about 40% degradation, about 10% to about 50% degradation, about 10% to about 60% degradation, about 10% to about 70% degradation, about 10% to about 80% degradation, about 10% to about 90% degradation, about 10% to about 95% degradation, 20% to about 30% degradation, about 20% to about 40% degradation, about 20% to about 50% degradation, about 20% to about 60% degradation, about 20% to about 70% degradation, about 20% to about 80% degradation, about 20% to about 90% degradation, about 20% to about 95% degradation, about 30% to about 40% degradation, about 30% to about 50% degradation, about 30% to about 60% degradation, about 30% to about 70% degradation, about 30% to about 80% degradation, about 30% to about 90% degradation, about 30% to about 95% degradation, about 40% to about 50% degradation, about 40% to about 60% degradation, about 40% to about 70% degradation, about 40% to about 80% degradation, about 40% to about 90% degradation, about 40% to about 95% degradation, about 50% to about 60% degradation, about 50% to about 70% degradation, about 50% to about 80% degradation, about 50% to about 90% degradation, about 50% to about 95% degradation, about 60% to about 70% degradation, about 60% to about 80% degradation, about 60% to about 90% degradation, about 60% to about 95% degradation, about 70% to about 80% degradation, about 70% to about 90% degradation, about 70% to about 95% degradation, about 80% to about 90% degradation, about 80% to about 95% degradation, or about 90% to about 95% degradation of hypochlorous acid.

[083] In one embodiment, a composition disclosed herein is stable when it shows, *e.g.*, at most 1% degradation, at most 2% degradation, at most 3% degradation, at most 4% degradation, at most 5%

degradation, at most 6% degradation, at most 7% degradation, at most 8% degradation, at most 9% degradation, or at most 10% degradation of free available chlorine. In another embodiment, a composition disclosed herein is stable when it shows, *e.g.*, at most 10% degradation, at most 15% degradation, at most 20% degradation, at most 25% degradation, at most 30% degradation, at most 35% degradation, at most 40% degradation, at most 45% degradation, at most 50% degradation, at most 55% degradation, at most 60% degradation, at most 65% degradation, at most 70% degradation, at most 75% degradation, at most 80% degradation, at most 85% degradation, at most 90% degradation, or at most 95% degradation of free available chlorine. In another embodiment, a composition disclosed herein is stable when it shows, *e.g.*, about 1% to about 10% degradation, about 1% to about 20% degradation, about 1% to about 30% degradation, about 1% to about 40% degradation, about 1% to about 50% degradation, about 1% to about 60% degradation, about 1% to about 70% degradation, about 1% to about 80% degradation, about 1% to about 90% degradation, about 1% to about 95% degradation, about 5% to about 10% degradation, about 5% to about 20% degradation, about 5% to about 30% degradation, about 5% to about 40% degradation, about 5% to about 50% degradation, about 5% to about 60% degradation, about 5% to about 70% degradation, about 5% to about 80% degradation, about 5% to about 90% degradation, about 5% to about 95% degradation, about 10% to about 20% degradation, about 10% to about 30% degradation, about 10% to about 40% degradation, about 10% to about 50% degradation, about 10% to about 60% degradation, about 10% to about 70% degradation, about 10% to about 80% degradation, about 10% to about 90% degradation, about 10% to about 95% degradation, 20% to about 30% degradation, about 20% to about 40% degradation, about 20% to about 50% degradation, about 20% to about 60% degradation, about 20% to about 70% degradation, about 20% to about 80% degradation, about 20% to about 90% degradation, about 20% to about 95% degradation, about 30% to about 40% degradation, about 30% to about 50% degradation, about 30% to about 60% degradation, about 30% to about 70% degradation, about 30% to about 80% degradation, about 30% to about 90% degradation, about 30% to about 95% degradation, about 40% to about 50% degradation, about 40% to about 60% degradation, about 40% to about 70% degradation, about 40% to about 80% degradation, about 40% to about 90% degradation, about 40% to about 95% degradation, about 50% to about 60% degradation, about 50% to about 70% degradation, about 50% to about 80% degradation, about 50% to about 90% degradation, about 50% to about 95% degradation, about 60% to about 70% degradation, about 60% to about 80% degradation, about 60% to about 90% degradation, about 60% to about 95% degradation, about 70% to about 80% degradation, about 70% to about 90% degradation, about 70% to about 95% degradation, about 80% to about 90% degradation, about 80% to about 95% degradation, or about 90% to about 95% degradation of free available chlorine.

[084] In aspects of this embodiment, a composition disclosed herein is stable for, *e.g.*, about 1 day, about 2 days, 3 days, 4 days, 5 days, 6, days, 7 days, 8 days, 9 days, 10 days, 11 days, 12 days, 13 days, 14 days or 15 days. In other aspects of this embodiment, a composition disclosed herein is stable for, *e.g.*, at least 1 day, at least 2 days, at least 3 days, at least 4 days, at least 5 days, at least 6, days, at least 7 days, at least 8 days, at least 9 days, at least 10 days, at least 11 days, at least 12 days, at least 13 days, at least 14 days or at least 15 days. In yet other aspects of this embodiment, a composition disclosed herein is stable for, *e.g.*, at most 1 day, at most 2 days, at most 3 days, at most 4 days, at most 5 days, at most 6,

days, at most 7 days, at most 8 days, at most 9 days, at most 10 days, at most 11 days, at most 12 days, at most 13 days, at most 14 days or at most 15 days.

[085] In still aspects of this embodiment, a composition disclosed herein is stable for, *e.g.*, about 1 day to about 2 days, about 1 day to about 3 days, about 1 day to about 4 days, about 1 day to about 5 days, about 1 day to about 6 days, about 1 day to about 7 days, about 1 day to about 8 days, about 1 day to about 9 days, about 1 day to about 10 days, about 1 day to about 11 days, about 1 day to about 12 days, about 1 day to about 13 days, about 1 day to about 14 days, about 1 day to about 15 days, about 2 days to about 3 days, about 2 days to about 4 days, about 2 days to about 5 days, about 2 days to about 6 days, about 2 days to about 7 days, about 2 days to about 8 days, about 2 days to about 9 days, about 2 days to about 10 days, about 2 days to about 11 days, about 2 days to about 12 days, about 2 days to about 13 days, about 2 days to about 14 days, about 2 days to about 15 days, about 3 days to about 4 days, about 3 days to about 5 days, about 3 days to about 6 days, about 3 days to about 7 days, about 3 days to about 8 days, about 3 days to about 9 days, about 3 days to about 10 days, about 3 days to about 11 days, about 3 days to about 12 days, about 3 days to about 13 days, about 3 days to about 14 days, about 3 days to about 15 days, about 4 days to about 5 days, about 4 days to about 6 days, about 4 days to about 7 days, about 4 days to about 8 days, about 4 days to about 9 days, about 4 days to about 10 days, about 4 days to about 11 days, about 4 days to about 12 days, about 4 days to about 13 days, about 4 days to about 14 days, about 4 days to about 15 days, about 5 days to about 6 days, about 5 days to about 7 days, about 5 days to about 8 days, about 5 days to about 9 days, about 5 days to about 10 days, about 5 days to about 11 days, about 5 days to about 12 days, about 5 days to about 13 days, about 5 days to about 14 days, about 5 days to about 15 days, about 6 days to about 7 days, about 6 days to about 8 days, about 6 days to about 9 days, about 6 days to about 10 days, about 6 days to about 11 days, about 6 days to about 12 days, about 6 days to about 13 days, about 6 days to about 14 days, about 6 days to about 15 days, about 7 days to about 8 days, about 7 days to about 9 days, about 7 days to about 10 days, about 7 days to about 11 days, about 7 days to about 12 days, about 7 days to about 13 days, about 7 days to about 14 days, about 7 days to about 15 days, about 8 days to about 9 days, about 8 days to about 10 days, about 8 days to about 11 days, about 8 days to about 12 days, about 8 days to about 13 days, about 8 days to about 14 days, about 8 days to about 15 days, about 9 days to about 10 days, about 9 days to about 11 days, about 9 days to about 12 days, about 9 days to about 13 days, about 9 days to about 14 days, about 9 days to about 15 days, about 10 days to about 11 days, about 10 days to about 12 days, about 10 days to about 13 days, about 10 days to about 14 days, about 10 days to about 15 days, about 11 days to about 12 days, about 11 days to about 13 days, about 11 days to about 14 days, about 11 days to about 15 days, about 12 days to about 13 days, about 12 days to about 14 days, about 12 days to about 15 days, about 13 days to about 14 days, about 13 days to about 15 days, or about 14 days to about 15 days.

[086] In other aspects of this embodiment, a composition disclosed herein is stable for, *e.g.*, about 1 week, about 2 weeks, 3 weeks, 4 weeks, 5 weeks, 6, weeks, 7 weeks, 8 weeks, 9 weeks, 10 weeks, 11 weeks, 12 weeks, 13 weeks, 14 weeks or 15 weeks. In yet other aspects of this embodiment, a composition disclosed herein is stable for, *e.g.*, at least 1 week, at least 2 weeks, at least 3 weeks, at least 4 weeks, at least 5 weeks, at least 6, weeks, at least 7 weeks, at least 8 weeks, at least 9 weeks, at least 10 weeks, at

least 11 weeks, at least 12 weeks, at least 13 weeks, at least 14 weeks or at least 15 weeks. In still other aspects of this embodiment, a composition disclosed herein is stable for, *e.g.*, at most 1 week, at most 2 weeks, at most 3 weeks, at most 4 weeks, at most 5 weeks, at most 6, weeks, at most 7 weeks, at most 8 weeks, at most 9 weeks, at most 10 weeks, at most 11 weeks, at most 12 weeks, at most 13 weeks, at most 14 weeks or at most 15 weeks.

[087] In aspects of this embodiment, a composition disclosed herein is stable for, *e.g.*, about 1 week to about 2 weeks, about 1 week to about 3 weeks, about 1 week to about 4 weeks, about 1 week to about 5 weeks, about 1 week to about 6 weeks, about 1 week to about 7 weeks, about 1 week to about 8 weeks, about 1 week to about 9 weeks, about 1 week to about 10 weeks, about 1 week to about 11 weeks, about 1 week to about 12 weeks, about 1 week to about 13 weeks, about 1 week to about 14 weeks, about 1 week to about 15 weeks, about 2 weeks to about 3 weeks, about 2 weeks to about 4 weeks, about 2 weeks to about 5 weeks, about 2 weeks to about 6 weeks, about 2 weeks to about 7 weeks, about 2 weeks to about 8 weeks, about 2 weeks to about 9 weeks, about 2 weeks to about 10 weeks, about 2 weeks to about 11 weeks, about 2 weeks to about 12 weeks, about 2 weeks to about 13 weeks, about 2 weeks to about 14 weeks, about 2 weeks to about 15 weeks, about 3 weeks to about 4 weeks, about 3 weeks to about 5 weeks, about 3 weeks to about 6 weeks, about 3 weeks to about 7 weeks, about 3 weeks to about 8 weeks, about 3 weeks to about 9 weeks, about 3 weeks to about 10 weeks, about 3 weeks to about 11 weeks, about 3 weeks to about 12 weeks, about 3 weeks to about 13 weeks, about 3 weeks to about 14 weeks, about 3 weeks to about 15 weeks, about 4 weeks to about 5 weeks, about 4 weeks to about 6 weeks, about 4 weeks to about 7 weeks, about 4 weeks to about 8 weeks, about 4 weeks to about 9 weeks, about 4 weeks to about 10 weeks, about 4 weeks to about 11 weeks, about 4 weeks to about 12 weeks, about 4 weeks to about 13 weeks, about 4 weeks to about 14 weeks, about 4 weeks to about 15 weeks, about 5 weeks to about 6 weeks, about 5 weeks to about 7 weeks, about 5 weeks to about 8 weeks, about 5 weeks to about 9 weeks, about 5 weeks to about 10 weeks, about 5 weeks to about 11 weeks, about 5 weeks to about 12 weeks, about 5 weeks to about 13 weeks, about 5 weeks to about 14 weeks, about 5 weeks to about 15 weeks, about 6 weeks to about 7 weeks, about 6 weeks to about 8 weeks, about 6 weeks to about 9 weeks, about 6 weeks to about 10 weeks, about 6 weeks to about 11 weeks, about 6 weeks to about 12 weeks, about 6 weeks to about 13 weeks, about 6 weeks to about 14 weeks, about 6 weeks to about 15 weeks, about 7 weeks to about 8 weeks, about 7 weeks to about 9 weeks, about 7 weeks to about 10 weeks, about 7 weeks to about 11 weeks, about 7 weeks to about 12 weeks, about 7 weeks to about 13 weeks, about 7 weeks to about 14 weeks, about 7 weeks to about 15 weeks, about 8 weeks to about 9 weeks, about 8 weeks to about 10 weeks, about 8 weeks to about 11 weeks, about 8 weeks to about 12 weeks, about 8 weeks to about 13 weeks, about 8 weeks to about 14 weeks, about 8 weeks to about 15 weeks, about 9 weeks to about 10 weeks, about 9 weeks to about 11 weeks, about 9 weeks to about 12 weeks, about 9 weeks to about 13 weeks, about 9 weeks to about 14 weeks, about 9 weeks to about 15 weeks, about 10 weeks to about 11 weeks, about 10 weeks to about 12 weeks, about 10 weeks to about 13 weeks, about 10 weeks to about 14 weeks, about 10 weeks to about 15 weeks, about 11 weeks to about 12 weeks, about 11 weeks to about 13 weeks, about 11 weeks to about 14 weeks, about 11 weeks to about 15 weeks, about 12 weeks to about 13 weeks, about 12 weeks to about 14 weeks, about 12 weeks to about

15 weeks, about 13 weeks to about 14 weeks, about 13 weeks to about 15 weeks, or about 14 weeks to about 15 weeks.

[088] In other aspects of this embodiment, a composition disclosed herein is stable for, *e.g.*, about 1 month, about 2 months, 3 months, 4 months, 5 months, 6, months, 7 months, 8 months, 9 months, 10 months, 11 months, 12 months, 13 months, 14 months, 15 months, 16 months, 17 months, or 18 months. In yet other aspects of this embodiment, a composition disclosed herein is stable for, *e.g.*, at least 1 month, at least 2 months, at least 3 months, at least 4 months, at least 5 months, at least 6, months, at least 7 months, at least 8 months, at least 9 months, at least 10 months, at least 11 months, at least 12 months, at least 13 months, at least 14 months, at least 15 months, at least 16 months, at least 17 months, or at least 18 months. In still other aspects of this embodiment, a composition disclosed herein is stable for, *e.g.*, at most 1 month, at most 2 months, at most 3 months, at most 4 months, at most 5 months, at most 6, months, at most 7 months, at most 8 months, at most 9 months, at most 10 months, at most 11 months, at most 12 months, at most 13 months, at most 14 months, at most 15 months, at le most ast 16 months, at most 17 months, or at most 18 months.

[089] In aspects of this embodiment, a composition disclosed herein is stable for, *e.g.*, about 1 month to about 2 months, about 1 month to about 3 months, about 1 month to about 4 months, about 1 month to about 5 months, about 1 month to about 6 months, about 1 month to about 7 months, about 1 month to about 8 months, about 1 month to about 9 months, about 1 month to about 10 months, about 1 month to about 11 months, about 1 month to about 12 months, about 1 month to about 13 months, about 1 month to about 14 months, about 1 month to about 15 months, about 1 month to about 16 months, about 1 month to about 17 months, about 1 month to about 18 months, about 2 months to about 3 months, about 2 months to about 4 months, about 2 months to about 5 months, about 2 months to about 6 months, about 2 months to about 7 months, about 2 months to about 8 months, about 2 months to about 9 months, about 2 months to about 10 months, about 2 months to about 11 months, about 2 months to about 12 months, about 2 months to about 13 months, about 2 months to about 14 months, about 2 months to about 15 months, about 2 months to about 16 months, about 2 months to about 17 months, about 2 months to about 18 months, about 3 months to about 4 months, about 3 months to about 5 months, about 3 months to about 6 months, about 3 months to about 7 months, about 3 months to about 8 months, about 3 months to about 9 months, about 3 months to about 10 months, about 3 months to about 11 months, about 3 months to about 12 months, about 3 months to about 13 months, about 3 months to about 14 months, about 3 months to about 15 months, about 3 months to about 16 months, about 3 months to about 17 months, about 3 months to about 18 months, about 4 months to about 5 months, about 4 months to about 6 months, about 4 months to about 7 months, about 4 months to about 8 months, about 4 months to about 9 months, about 4 months to about 10 months, about 4 months to about 11 months, about 4 months to about 12 months, about 4 months to about 13 months, about 4 months to about 14 months, about 4 months to about 15 months, about 4 months to about 16 months, about 4 months to about 17 months, about 4 months to about 18 months, about 5 months to about 6 months, about 5 months to about 7 months, about 5 months to about 8 months, about 5 months to about 9 months, about 5 months to about 10 months, about 5 months to about 11 months, about 5 months to about 12 months, about 5 months to about 13 months, about 5 months to

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[090] In other aspects of this embodiment, a composition disclosed herein is stable for, *e.g.*, about 1 year, about 2 years, about 3 years, about 4 years, or about 5 years. In yet other aspects of this embodiment, a composition disclosed herein is stable for, *e.g.*, at least 1 year, at least 2 years, at least 3 years, at least 4 years, or at least 5 years. In still other aspects of this embodiment, a composition disclosed herein is stable for, *e.g.*, at most 1 year, at most 2 years, at most 3 years, at most 4 years, or at most 5 years. In other aspects of this embodiment, a composition disclosed herein is stable for, *e.g.*, about 1 year to about 2 years, about 1 year to about 3 years, about 1 year to about 4 years, about 1 year to about 5 years, about 2 years to about 3 years, about 2 years to about 4 years, about 2 years to about 5 years, about 3 years to about 4 years, about 3 years to about 5 years, or about 4 years to about 5 years.

[091] A composition disclosed herein can be formulated into any form that enables application of a composition disclosed herein in a manner that achieves a desired beneficial effect. In one embodiment, a composition disclosed herein can be formulated into, *e.g.*, a single-phase formulation or a biphasic formulation comprising a medium phase and a dispersed phase. In another embodiment, a composition disclosed herein can be formulated into, *e.g.*, a liquid composition, a colloidal composition, a semi-solid composition, or a solid composition. In another embodiment, a composition disclosed herein can be formulated into, *e.g.*, a liquid aerosol, a foam, an emulsion, a gel, a sol, or a solid sol. In another embodiment, a composition disclosed herein can be formulated into, *e.g.*, a spray, a liquid aerosol, a soap, or a suspension.

[092] In an embodiment, a composition disclosed herein comprises hypochlorous acid or free available chlorine, and metal particles and/or metal salts. In an embodiment, a composition disclosed herein comprises 200 ppm to 1,000 ppm hypochlorous acid or free available chlorine, and 50 ppm to 500 ppm metal particles and/or metal salts.

[093] In an embodiment, a composition disclosed herein comprises hypochlorous acid or free available chlorine, and a copper particle, a zinc particle, a calcium particle or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises hypochlorous acid or free available chlorine, and a copper oxide particle, a zinc oxide particle, an calcium oxide particle, or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises hypochlorous acid or free available chlorine, and a copper-zinc-calcium oxide particle.

[094] In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 1,000 ppm hypochlorous acid or free available chlorine, and 50 ppm to 500 ppm of a copper particle, 50 ppm to 500 ppm of a zinc particle, 50 ppm to 500 ppm of a calcium particle or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 1,000 ppm hypochlorous acid or free available chlorine, and 50 ppm to 500 ppm of a copper oxide particle, 50 ppm to 500 ppm of a zinc oxide particle, 50 ppm to 500 ppm of a calcium oxide particle, or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 1,000 ppm hypochlorous acid or free available chlorine, and 50 ppm to 500 ppm of a copper-zinc-calcium oxide particle.

[095] In an aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 200 ppm hypochlorous acid or free available chlorine, and 50 ppm to 500 ppm of a copper particle, 50 ppm to 500 ppm of a zinc particle, 50 ppm to 500 ppm of a calcium particle or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 200 ppm hypochlorous acid or free available chlorine, and 50 ppm to 500 ppm of a copper oxide particle, 50 ppm to 500 ppm of a zinc oxide particle, 50 ppm to 500 ppm of a calcium oxide particle, or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 200 ppm hypochlorous acid or free available chlorine, and 50 ppm to 500 ppm of a copper-zinc-calcium oxide particle.

[096] In an aspect of this embodiment, a composition disclosed herein comprises 400 ppm to 600 ppm hypochlorous acid or free available chlorine and 1 ppm to 400 ppm copper-zinc-calcium oxide particles. In another aspect of this embodiment, a composition disclosed herein comprises 400 ppm to 600 ppm hypochlorous acid or free available chlorine and 25 ppm to 300 ppm copper-zinc-calcium oxide particles.

[097] In an aspect of this embodiment, a composition disclosed herein comprises 400 ppm to 600 ppm hypochlorous acid or free available chlorine, and 1 ppm to 50 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 420 ppm to 580 ppm hypochlorous acid or free available chlorine, and 5 ppm to 45 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 440 ppm to 560 ppm hypochlorous acid or free available chlorine, and 10 ppm to 40 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 460 ppm to 540 ppm hypochlorous acid or free available chlorine, and 15 ppm to 35 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 480 ppm to 520 ppm hypochlorous acid or free available chlorine, and 20 ppm to 30 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 500 ppm hypochlorous acid or free available chlorine, and 25 ppm copper-zinc-calcium oxide particles.

[098] In an aspect of this embodiment, a composition disclosed herein comprises 400 ppm to 600 ppm hypochlorous acid or free available chlorine, and 1 ppm to 100 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 420 ppm to 580 ppm hypochlorous acid or free available chlorine, and 10 ppm to 90 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 440 ppm to 560 ppm hypochlorous acid or free available chlorine, and 20 ppm to 80 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 460 ppm to 540 ppm hypochlorous acid or free available chlorine, and 30 ppm to 70 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 480 ppm to 520 ppm hypochlorous acid or free available chlorine, and 40 ppm to 60 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 500 ppm hypochlorous acid or free available chlorine, and 50 ppm copper-zinc-calcium oxide particles.

[099] In an aspect of this embodiment, a composition disclosed herein comprises 400 ppm to 600 ppm hypochlorous acid or free available chlorine, and 50 ppm to 150 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 420 ppm to 580 ppm hypochlorous acid or free available chlorine, and 60 ppm to 140 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 440 ppm to 560 ppm hypochlorous acid or free available chlorine, and 70 ppm to 130 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 460 ppm to 540 ppm hypochlorous acid or free available chlorine, and 80 ppm to 120 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 480 ppm to 520 ppm hypochlorous acid or free available chlorine, and 90 ppm to 110 ppm copper-zinc-calcium oxide particles.

In an aspect of this embodiment, a composition disclosed herein comprises 500 ppm hypochlorous acid or free available chlorine, and 100 ppm copper-zinc-calcium oxide particles.

[100] In an aspect of this embodiment, a composition disclosed herein comprises 400 ppm to 600 ppm hypochlorous acid or free available chlorine, and 100 ppm to 200 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 420 ppm to 580 ppm hypochlorous acid or free available chlorine, and 110 ppm to 190 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 440 ppm to 560 ppm hypochlorous acid or free available chlorine, and 120 ppm to 180 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 460 ppm to 540 ppm hypochlorous acid or free available chlorine, and 130 ppm to 170 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 480 ppm to 520 ppm hypochlorous acid or free available chlorine, and 140 ppm to 160 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 500 ppm hypochlorous acid or free available chlorine, and 150 ppm copper-zinc-calcium oxide particles.

[101] In an aspect of this embodiment, a composition disclosed herein comprises 400 ppm to 600 ppm hypochlorous acid or free available chlorine, and 150 ppm to 250 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 420 ppm to 580 ppm hypochlorous acid or free available chlorine, and 160 ppm to 240 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 440 ppm to 560 ppm hypochlorous acid or free available chlorine, and 170 ppm to 230 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 460 ppm to 540 ppm hypochlorous acid or free available chlorine, and 180 ppm to 220 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 480 ppm to 520 ppm hypochlorous acid or free available chlorine, and 190 ppm to 210 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 500 ppm hypochlorous acid or free available chlorine, and 200 ppm copper-zinc-calcium oxide particles.

[102] In an aspect of this embodiment, a composition disclosed herein comprises 400 ppm to 600 ppm hypochlorous acid or free available chlorine, and 200 ppm to 300 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 420 ppm to 580 ppm hypochlorous acid or free available chlorine, and 210 ppm to 290 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 440 ppm to 560 ppm hypochlorous acid or free available chlorine, and 220 ppm to 280 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 460 ppm to 540 ppm hypochlorous acid or free available chlorine, and 230 ppm to 270 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 480 ppm to 520 ppm hypochlorous acid or free available chlorine, and 240 ppm to 260 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 500 ppm hypochlorous acid or free available chlorine, and 250 ppm copper-zinc-calcium oxide particles.

[103] In an aspect of this embodiment, a composition disclosed herein comprises 400 ppm to 600 ppm hypochlorous acid or free available chlorine, and 250 ppm to 350 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 420 ppm to 580 ppm hypochlorous acid or free available chlorine, and 260 ppm to 340 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 440 ppm to 560 ppm hypochlorous acid or free available chlorine, and 270 ppm to 330 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 460 ppm to 540 ppm hypochlorous acid or free available chlorine, and 280 ppm to 320 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 480 ppm to 520 ppm hypochlorous acid or free available chlorine, and 290 ppm to 310 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 500 ppm hypochlorous acid or free available chlorine, and 300 ppm copper-zinc-calcium oxide particles.

[104] In an aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 200 ppm hypochlorous acid or free available chlorine and 1 ppm to 400 ppm copper-zinc-calcium oxide particles. In another aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 200 ppm hypochlorous acid or free available chlorine and 25 ppm to 300 ppm copper-zinc-calcium oxide particles.

[105] In an aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 150 ppm hypochlorous acid or free available chlorine and 1 ppm to 400 ppm copper-zinc-calcium oxide particles. In another aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 150 ppm hypochlorous acid or free available chlorine and 25 ppm to 300 ppm copper-zinc-calcium oxide particles.

[106] In an aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 100 ppm hypochlorous acid or free available chlorine and 1 ppm to 400 ppm copper-zinc-calcium oxide particles. In another aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 100 ppm hypochlorous acid or free available chlorine and 25 ppm to 300 ppm copper-zinc-calcium oxide particles.

[107] In an aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 75 ppm hypochlorous acid or free available chlorine and 1 ppm to 400 ppm copper-zinc-calcium oxide particles. In another aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 75 ppm hypochlorous acid or free available chlorine and 25 ppm to 300 ppm copper-zinc-calcium oxide particles.

[108] In an aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 50 ppm hypochlorous acid or free available chlorine and 1 ppm to 400 ppm copper-zinc-calcium oxide particles. In another aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 50 ppm hypochlorous acid or free available chlorine and 25 ppm to 300 ppm copper-zinc-calcium oxide particles.

[109] In an aspect of this embodiment, a composition disclosed herein comprises 1 ppm to 50 ppm hypochlorous acid or free available chlorine, and 1 ppm to 50 ppm copper-zinc-calcium oxide particles. In

an aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 45 ppm hypochlorous acid or free available chlorine, and 5 ppm to 45 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 10 ppm to 40 ppm hypochlorous acid or free available chlorine, and 10 ppm to 40 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 15 ppm to 35 ppm hypochlorous acid or free available chlorine, and 15 ppm to 35 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 30 ppm hypochlorous acid or free available chlorine, and 20 ppm to 30 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 25 ppm hypochlorous acid or free available chlorine, and 25 ppm copper-zinc-calcium oxide particles.

[110] In an aspect of this embodiment, a composition disclosed herein comprises 1 ppm to 50 ppm hypochlorous acid or free available chlorine, and 1 ppm to 100 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 45 ppm hypochlorous acid or free available chlorine, and 10 ppm to 90 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 10 ppm to 40 ppm hypochlorous acid or free available chlorine, and 20 ppm to 80 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 15 ppm to 35 ppm hypochlorous acid or free available chlorine, and 30 ppm to 70 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 30 ppm hypochlorous acid or free available chlorine, and 40 ppm to 60 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 25 ppm hypochlorous acid or free available chlorine, and 50 ppm copper-zinc-calcium oxide particles.

[111] In an aspect of this embodiment, a composition disclosed herein comprises 1 ppm to 50 ppm hypochlorous acid or free available chlorine, and 50 ppm to 150 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 45 ppm hypochlorous acid or free available chlorine, and 60 ppm to 140 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 10 ppm to 40 ppm hypochlorous acid or free available chlorine, and 70 ppm to 130 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 15 ppm to 35 ppm hypochlorous acid or free available chlorine, and 80 ppm to 120 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 30 ppm hypochlorous acid or free available chlorine, and 90 ppm to 110 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 25 ppm hypochlorous acid or free available chlorine, and 100 ppm copper-zinc-calcium oxide particles.

[112] In an aspect of this embodiment, a composition disclosed herein comprises 1 ppm to 50 ppm hypochlorous acid or free available chlorine, and 100 ppm to 200 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 45 ppm hypochlorous acid or free available chlorine, and 110 ppm to 190 ppm copper-zinc-calcium oxide particles. In an aspect

of this embodiment, a composition disclosed herein comprises 10 ppm to 40 ppm hypochlorous acid or free available chlorine, and 120 ppm to 180 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 15 ppm to 35 ppm hypochlorous acid or free available chlorine, and 130 ppm to 170 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 30 ppm hypochlorous acid or free available chlorine, and 140 ppm to 160 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 25 ppm hypochlorous acid or free available chlorine, and 150 ppm copper-zinc-calcium oxide particles.

[113] In an aspect of this embodiment, a composition disclosed herein comprises 1 ppm to 50 ppm hypochlorous acid or free available chlorine, and 150 ppm to 250 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 45 ppm hypochlorous acid or free available chlorine, and 160 ppm to 240 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 10 ppm to 40 ppm hypochlorous acid or free available chlorine, and 170 ppm to 230 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 15 ppm to 35 ppm hypochlorous acid or free available chlorine, and 180 ppm to 220 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 30 ppm hypochlorous acid or free available chlorine, and 190 ppm to 210 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 25 ppm hypochlorous acid or free available chlorine, and 200 ppm copper-zinc-calcium oxide particles.

[114] In an aspect of this embodiment, a composition disclosed herein comprises 1 ppm to 50 ppm hypochlorous acid or free available chlorine, and 200 ppm to 300 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 45 ppm hypochlorous acid or free available chlorine, and 210 ppm to 290 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 10 ppm to 40 ppm hypochlorous acid or free available chlorine, and 220 ppm to 280 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 15 ppm to 35 ppm hypochlorous acid or free available chlorine, and 230 ppm to 270 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 30 ppm hypochlorous acid or free available chlorine, and 240 ppm to 260 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 25 ppm hypochlorous acid or free available chlorine, and 250 ppm copper-zinc-calcium oxide particles.

[115] In an aspect of this embodiment, a composition disclosed herein comprises 1 ppm to 50 ppm hypochlorous acid or free available chlorine, and 250 ppm to 350 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 5 ppm to 45 ppm hypochlorous acid or free available chlorine, and 260 ppm to 340 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 10 ppm to 40 ppm hypochlorous acid or free available chlorine, and 270 ppm to 330 ppm copper-zinc-calcium oxide particles. In an aspect of this

embodiment, a composition disclosed herein comprises 15 ppm to 35 ppm hypochlorous acid or free available chlorine, and 280 ppm to 320 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 30 ppm hypochlorous acid or free available chlorine, and 290 ppm to 310 ppm copper-zinc-calcium oxide particles. In an aspect of this embodiment, a composition disclosed herein comprises 25 ppm hypochlorous acid or free available chlorine, and 300 ppm copper-zinc-calcium oxide particles.

[116] In aspects of this embodiment, a composition disclosed herein comprises hypochlorous acid or free available chlorine, and one or more metal salts. In an aspect of this embodiment, a composition disclosed herein comprises hypochlorous acid or free available chlorine, and a copper salt, a zinc salt, a calcium salt or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises hypochlorous acid or free available chlorine, and a copper salt, a zinc salt and a calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises hypochlorous acid or free available chlorine, and a copper chloride, a zinc chloride, a calcium oxide salt or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises hypochlorous acid or free available chlorine, and a copper chloride, a zinc chloride and a calcium oxide salt.

[117] In an embodiment, a composition disclosed herein comprises 200 ppm to 1,000 ppm hypochlorous acid or free available chlorine, and 50 ppm to 500 ppm one or more metal salts. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 1,000 ppm hypochlorous acid or free available chlorine, and 50 ppm to 500 ppm of a copper salt, 50 ppm to 500 ppm of a zinc salt, 50 ppm to 500 ppm of a calcium salt, or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 1,000 ppm hypochlorous acid or free available chlorine, and 50 ppm to 500 ppm of a copper salt, 50 ppm to 500 ppm of a zinc salt and 50 ppm to 500 ppm of a calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 1,000 ppm hypochlorous acid or free available chlorine, and 50 ppm to 500 ppm of a copper chloride, 50 ppm to 500 ppm of a zinc chloride, 50 ppm to 500 ppm of a calcium oxide salt, or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 1,000 ppm hypochlorous acid or free available chlorine, and 50 ppm to 500 ppm of a copper chloride, 50 ppm to 500 ppm of a zinc chloride and 50 ppm to 500 ppm of a calcium oxide salt.

[118] In an embodiment, a composition disclosed herein comprises 50 ppm to 500 ppm hypochlorous acid or free available chlorine, and 10 ppm to 250 ppm one or more metal salts. In an aspect of this embodiment, a composition disclosed herein comprises 50 ppm to 500 ppm hypochlorous acid or free available chlorine, and 10 ppm to 250 ppm of a copper salt, 10 ppm to 250 ppm of zinc salt, 10 ppm to 250 ppm of a calcium salt, or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises 50 ppm to 500 ppm hypochlorous acid or free available chlorine, and 10 ppm to 250 ppm of a copper salt, 10 ppm to 250 ppm of zinc salt and 10 ppm to 250 ppm of a calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 50 ppm to 500 ppm hypochlorous acid or free available chlorine, and 10 ppm to 250 ppm of a copper chloride, 10 ppm to 250 ppm of a zinc chloride, 10 ppm to 250 ppm of a calcium oxide salt, or any combination thereof. In an aspect of this embodiment, a

composition disclosed herein comprises 50 ppm to 500 ppm hypochlorous acid or free available chlorine, and 10 ppm to 250 ppm of a copper chloride, 10 ppm to 250 ppm of a zinc chloride and 10 ppm to 250 ppm of a calcium oxide salt.

[119] In an embodiment, a composition disclosed herein comprises 75 ppm to 400 ppm hypochlorous acid or free available chlorine, and 20 ppm to 200 ppm one or more metal salts. In an aspect of this embodiment, a composition disclosed herein comprises 75 ppm to 400 ppm hypochlorous acid or free available chlorine, and 20 ppm to 200 ppm of a copper salt, 20 ppm to 200 ppm of zinc salt, 20 ppm to 200 ppm of a calcium salt, or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises 75 ppm to 400 ppm hypochlorous acid or free available chlorine, and 20 ppm to 200 ppm of a copper salt, 20 ppm to 200 ppm of zinc salt and 20 ppm to 200 ppm of a calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 75 ppm to 400 ppm hypochlorous acid or free available chlorine, and 20 ppm to 200 ppm of a copper chloride, 20 ppm to 200 ppm of a zinc chloride, 20 ppm to 200 ppm of a calcium oxide salt, or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises 75 ppm to 400 ppm hypochlorous acid or free available chlorine, and 20 ppm to 200 ppm of a copper chloride, 20 ppm to 200 ppm of a zinc chloride and 20 ppm to 200 ppm of a calcium oxide salt.

[120] In an embodiment, a composition disclosed herein comprises 100 ppm to 350 ppm hypochlorous acid or free available chlorine, and 40 ppm to 160 ppm one or more metal salts. In an aspect of this embodiment, a composition disclosed herein comprises 100 ppm to 350 ppm hypochlorous acid or free available chlorine, and 40 ppm to 160 ppm of a copper salt, 40 ppm to 160 ppm of zinc salt, 40 ppm to 160 ppm of a calcium salt, or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises 100 ppm to 350 ppm hypochlorous acid or free available chlorine, and 40 ppm to 160 ppm of a copper salt, 40 ppm to 160 ppm of zinc salt and 40 ppm to 160 ppm of a calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 100 ppm to 350 ppm hypochlorous acid or free available chlorine, and 40 ppm to 160 ppm of a copper chloride, 40 ppm to 160 ppm of a zinc chloride, 40 ppm to 160 ppm of a calcium oxide salt, or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises 100 ppm to 350 ppm hypochlorous acid or free available chlorine, and 40 ppm to 160 ppm of a copper chloride, 40 ppm to 160 ppm of a zinc chloride and 40 ppm to 160 ppm of a calcium oxide salt.

[121] In an embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, and 10 ppm to 500 ppm one or more metal salts. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, and 10 ppm to 500 ppm of a copper salt, 10 ppm to 500 ppm of zinc salt, 10 ppm to 500 ppm of a calcium salt, or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, and 10 ppm to 500 ppm of a copper salt, 10 ppm to 500 ppm of zinc salt and 10 ppm to 500 ppm of a calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, and 10 ppm to 500 ppm of a copper chloride, 10 ppm to 500 ppm of a zinc chloride,

10 ppm to 500 ppm of a calcium oxide salt, or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, and 10 ppm to 500 ppm of a copper chloride, 10 ppm to 500 ppm of a zinc chloride and 10 ppm to 500 ppm of a calcium oxide salt.

[122] In an embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, and 20 ppm to 240 ppm one or more metal salts. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, and 20 ppm to 240 ppm of a copper salt, 20 ppm to 240 ppm of zinc salt, 20 ppm to 240 ppm of a calcium salt, or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, and 20 ppm to 240 ppm of a copper salt, 20 ppm to 240 ppm of zinc salt and 20 ppm to 240 ppm of a calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, and 20 ppm to 240 ppm of a copper chloride, 20 ppm to 240 ppm of a zinc chloride, 20 ppm to 240 ppm of a calcium oxide salt, or any combination thereof. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, and 20 ppm to 240 ppm of a copper chloride, 20 ppm to 240 ppm of a zinc chloride and 20 ppm to 240 ppm of a calcium oxide salt.

[123] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 20 ppm to 220 ppm copper salt, 20 ppm to 220 ppm zinc salt and 10 ppm to 160 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 60 ppm to 180 ppm copper salt, 60 ppm to 180 ppm zinc salt, and 20 ppm to 140 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 80 ppm to 160 ppm copper salt, 80 ppm to 160 ppm zinc salt, and 40 ppm to 120 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 100 ppm to 140 ppm copper salt, 100 ppm to 140 ppm zinc salt, and 60 ppm to 100 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 110 ppm to 130 ppm copper salt, 110 ppm to 130 ppm, zinc salt, and 70 ppm to 90 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 120 ppm copper salt, 120 ppm zinc salt, and 80 ppm calcium salt.

[124] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 20 ppm to 220 ppm copper salt, 10 ppm to 160 ppm zinc salt and 10 ppm to 160 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 60 ppm to 180 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 20 ppm to 140 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 80 ppm to 160 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 40 ppm to 120 ppm calcium salt. In an

aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 100 ppm to 140 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 60 ppm to 100 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 110 ppm to 130 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 70 ppm to 90 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 120 ppm copper salt, 80 ppm zinc salt, and 80 ppm calcium salt.

[125] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 160 ppm copper salt, 10 ppm to 160 ppm zinc salt and 10 ppm to 160 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 140 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 20 ppm to 140 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 40 ppm to 120 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 40 ppm to 120 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 60 ppm to 100 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 60 ppm to 100 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 70 ppm to 90 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 70 ppm to 90 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 80 ppm copper salt, 80 ppm zinc salt, and 80 ppm calcium salt.

[126] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 140 ppm copper salt, 10 ppm to 140 ppm zinc salt and 10 ppm to 160 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 120 ppm copper salt, 20 ppm to 120 ppm zinc salt, and 20 ppm to 140 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 30 ppm to 100 ppm copper salt, 30 ppm to 100 ppm zinc salt, and 40 ppm to 120 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 40 ppm to 80 ppm copper salt, 40 ppm to 80 ppm zinc salt, and 60 ppm to 100 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 50 ppm to 70 ppm copper salt, 50 ppm to 70 ppm, zinc salt, and 70 ppm to 90 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 40 ppm copper salt, 40 ppm zinc salt, and 80 ppm calcium salt.

[127] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 20 ppm to 220 ppm copper salt, 20 ppm to 220 ppm zinc salt and 20 ppm to 180 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein

comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 60 ppm to 180 ppm copper salt, 60 ppm to 180 ppm zinc salt, and 40 ppm to 160 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 80 ppm to 160 ppm copper salt, 80 ppm to 160 ppm zinc salt, and 60 ppm to 140 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 100 ppm to 140 ppm copper salt, 100 ppm to 140 ppm zinc salt, and 80 ppm to 120 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 110 ppm to 130 ppm copper salt, 110 ppm to 130 ppm, zinc salt, and 90 ppm to 110 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 120 ppm copper salt, 120 ppm zinc salt, and 100 ppm calcium salt.

[128] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 20 ppm to 220 ppm copper salt, 10 ppm to 160 ppm zinc salt and 20 ppm to 180 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 60 ppm to 180 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 40 ppm to 160 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 80 ppm to 160 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 60 ppm to 140 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 100 ppm to 140 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 80 ppm to 120 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 110 ppm to 130 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 90 ppm to 110 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 120 ppm copper salt, 80 ppm zinc salt, and 100 ppm calcium salt.

[129] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 160 ppm copper salt, 10 ppm to 160 ppm zinc salt and 20 ppm to 180 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 140 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 40 ppm to 160 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 40 ppm to 120 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 60 ppm to 140 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 60 ppm to 100 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 80 ppm to 120 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 70 ppm to 90 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 90 ppm to 110 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 80 ppm copper salt, 80 ppm zinc salt, and 100 ppm calcium salt.

[130] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 20 ppm to 220 ppm copper salt, 20 ppm to 220 ppm zinc salt and 40 ppm to 200 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 60 ppm to 180 ppm copper salt, 60 ppm to 180 ppm zinc salt, and 60 ppm to 180 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 80 ppm to 160 ppm copper salt, 80 ppm to 160 ppm zinc salt, and 80 ppm to 160 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 100 ppm to 140 ppm copper salt, 100 ppm to 140 ppm zinc salt, and 100 ppm to 140 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 110 ppm to 130 ppm copper salt, 110 ppm to 130 ppm, zinc salt, and 110 ppm to 130 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 120 ppm copper salt, 120 ppm zinc salt, and 120 ppm calcium salt.

[131] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 20 ppm to 220 ppm copper salt, 10 ppm to 160 ppm zinc salt and 40 ppm to 200 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 60 ppm to 180 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 60 ppm to 180 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 80 ppm to 160 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 80 ppm to 160 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 100 ppm to 140 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 100 ppm to 140 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 110 ppm to 130 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 110 ppm to 130 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 120 ppm copper salt, 80 ppm zinc salt, and 120 ppm calcium salt.

[132] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 160 ppm copper salt, 10 ppm to 160 ppm zinc salt and 40 ppm to 200 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 140 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 60 ppm to 180 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 40 ppm to 120 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 80 ppm to 160 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 60 ppm to 100 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 100 ppm to 140 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300

ppm to 320 ppm hypochlorous acid or free available chlorine, 70 ppm to 90 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 110 ppm to 130 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 80 ppm copper salt, 80 ppm zinc salt, and 120 ppm calcium salt.

[133] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 140 ppm copper salt, 10 ppm to 140 ppm zinc salt and 40 ppm to 200 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 120 ppm copper salt, 20 ppm to 120 ppm zinc salt, and 60 ppm to 180 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 30 ppm to 100 ppm copper salt, 30 ppm to 100 ppm zinc salt, and 80 ppm to 160 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 40 ppm to 80 ppm copper salt, 40 ppm to 80 ppm zinc salt, and 100 ppm to 140 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 50 ppm to 70 ppm copper salt, 50 ppm to 70 ppm, zinc salt, and 110 ppm to 130 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 40 ppm copper salt, 40 ppm zinc salt, and 120 ppm calcium salt.

[134] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 20 ppm to 220 ppm copper salt, 20 ppm to 220 ppm zinc salt and 60 ppm to 220 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 60 ppm to 180 ppm copper salt, 60 ppm to 180 ppm zinc salt, and 80 ppm to 200 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 80 ppm to 160 ppm copper salt, 80 ppm to 160 ppm zinc salt, and 100 ppm to 180 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 100 ppm to 140 ppm copper salt, 100 ppm to 140 ppm zinc salt, and 120 ppm to 160 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 110 ppm to 130 ppm copper salt, 110 ppm to 130 ppm, zinc salt, and 130 ppm to 150 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 120 ppm copper salt, 120 ppm zinc salt, and 140 ppm calcium salt.

[135] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 20 ppm to 220 ppm copper salt, 10 ppm to 160 ppm zinc salt and 60 ppm to 220 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 60 ppm to 180 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 80 ppm to 200 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine,

80 ppm to 160 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 100 ppm to 180 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 100 ppm to 140 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 120 ppm to 160 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 110 ppm to 130 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 130 ppm to 150 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 120 ppm copper salt, 80 ppm zinc salt, and 140 ppm calcium salt.

[136] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 160 ppm copper salt, 10 ppm to 160 ppm zinc salt and 60 ppm to 220 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 140 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 80 ppm to 200 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 40 ppm to 120 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 100 ppm to 180 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 60 ppm to 100 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 120 ppm to 160 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 70 ppm to 90 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 130 ppm to 150 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 80 ppm copper salt, 80 ppm zinc salt, and 140 ppm calcium salt.

[137] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 140 ppm copper salt, 10 ppm to 140 ppm zinc salt and 60 ppm to 220 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 120 ppm copper salt, 20 ppm to 120 ppm zinc salt, and 80 ppm to 200 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 30 ppm to 100 ppm copper salt, 30 ppm to 100 ppm zinc salt, and 100 ppm to 180 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 40 ppm to 80 ppm copper salt, 40 ppm to 80 ppm zinc salt, and 120 ppm to 160 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 50 ppm to 70 ppm copper salt, 50 ppm to 70 ppm, zinc salt, and 130 ppm to 150 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 40 ppm copper salt, 40 ppm zinc salt, and 140 ppm calcium salt.

[138] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 20 ppm to 220 ppm copper salt, 20 ppm to 220 ppm zinc salt

and 80 ppm to 240 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 60 ppm to 180 ppm copper salt, 60 ppm to 180 ppm zinc salt, and 100 ppm to 220 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 80 ppm to 160 ppm copper salt, 80 ppm to 160 ppm zinc salt, and 120 ppm to 200 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 100 ppm to 140 ppm copper salt, 100 ppm to 140 ppm zinc salt, and 140 ppm to 180 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 110 ppm to 130 ppm copper salt, 110 ppm to 130 ppm, zinc salt, and 150 ppm to 170 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 120 ppm copper salt, 120 ppm zinc salt, and 160 ppm calcium salt.

[139] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 20 ppm to 220 ppm copper salt, 10 ppm to 160 ppm zinc salt and 80 ppm to 240 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 60 ppm to 180 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 100 ppm to 220 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 80 ppm to 160 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 120 ppm to 200 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 100 ppm to 140 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 140 ppm to 180 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 110 ppm to 130 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 150 ppm to 170 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 120 ppm copper salt, 80 ppm zinc salt, and 160 ppm calcium salt.

[140] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 160 ppm copper salt, 10 ppm to 160 ppm zinc salt and 80 ppm to 240 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 140 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 100 ppm to 220 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 40 ppm to 120 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 120 ppm to 200 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 60 ppm to 100 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 140 ppm to 180 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 70 ppm to 90 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 150 ppm to 170 ppm calcium salt. In an aspect of this embodiment, a composition

disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 80 ppm copper salt, 80 ppm zinc salt, and 160 ppm calcium salt.

[141] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 140 ppm copper salt, 10 ppm to 140 ppm zinc salt and 80 ppm to 240 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 120 ppm copper salt, 20 ppm to 120 ppm zinc salt, and 100 ppm to 220 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 30 ppm to 100 ppm copper salt, 30 ppm to 100 ppm zinc salt, and 120 ppm to 200 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 40 ppm to 80 ppm copper salt, 40 ppm to 80 ppm zinc salt, and 140 ppm to 180 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 50 ppm to 70 ppm copper salt, 50 ppm to 70 ppm, zinc salt, and 150 ppm to 170 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 40 ppm copper salt, 40 ppm zinc salt, and 160 ppm calcium salt.

[142] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 20 ppm to 220 ppm copper salt, 20 ppm to 220 ppm zinc salt and 100 ppm to 260 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 60 ppm to 180 ppm copper salt, 60 ppm to 180 ppm zinc salt, and 120 ppm to 240 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 80 ppm to 160 ppm copper salt, 80 ppm to 160 ppm zinc salt, and 140 ppm to 220 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 100 ppm to 140 ppm copper salt, 100 ppm to 140 ppm zinc salt, and 160 ppm to 200 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 110 ppm to 130 ppm copper salt, 110 ppm to 130 ppm, zinc salt, and 170 ppm to 190 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 120 ppm copper salt, 120 ppm zinc salt, and 180 ppm calcium salt.

[143] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 20 ppm to 220 ppm copper salt, 10 ppm to 160 ppm zinc salt and 100 ppm to 260 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 60 ppm to 180 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 120 ppm to 240 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 80 ppm to 160 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 140 ppm to 220 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous

acid or free available chlorine, 100 ppm to 140 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 160 ppm to 200 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 110 ppm to 130 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 170 ppm to 190 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 120 ppm copper salt, 80 ppm zinc salt, and 180 ppm calcium salt.

[144] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 160 ppm copper salt, 10 ppm to 160 ppm zinc salt and 100 ppm to 260 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 140 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 120 ppm to 240 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 40 ppm to 120 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 140 ppm to 220 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 60 ppm to 100 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 160 ppm to 200 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 70 ppm to 90 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 170 ppm to 190 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 80 ppm copper salt, 80 ppm zinc salt, and 180 ppm calcium salt.

[145] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 140 ppm copper salt, 10 ppm to 140 ppm zinc salt and 100 ppm to 260 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 120 ppm copper salt, 20 ppm to 120 ppm zinc salt, and 120 ppm to 240 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 30 ppm to 100 ppm copper salt, 30 ppm to 100 ppm zinc salt, and 140 ppm to 220 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 40 ppm to 80 ppm copper salt, 40 ppm to 80 ppm zinc salt, and 160 ppm to 200 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 50 ppm to 70 ppm copper salt, 50 ppm to 70 ppm, zinc salt, and 170 ppm to 190 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 40 ppm copper salt, 40 ppm zinc salt, and 180 ppm calcium salt.

[146] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 20 ppm to 220 ppm copper salt, 20 ppm to 220 ppm zinc salt and 120 ppm to 280 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 60 ppm to 180 ppm copper

salt, 60 ppm to 180 ppm zinc salt, and 140 ppm to 260 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 80 ppm to 160 ppm copper salt, 80 ppm to 160 ppm zinc salt, and 160 ppm to 240 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 100 ppm to 140 ppm copper salt, 100 ppm to 140 ppm zinc salt, and 180 ppm to 220 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 110 ppm to 130 ppm copper salt, 110 ppm to 130 ppm, zinc salt, and 190 ppm to 210 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 120 ppm copper salt, 120 ppm zinc salt, and 200 ppm calcium salt.

[147] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 20 ppm to 220 ppm copper salt, 10 ppm to 160 ppm zinc salt and 120 ppm to 280 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 60 ppm to 180 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 140 ppm to 260 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 80 ppm to 160 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 160 ppm to 240 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 100 ppm to 140 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 180 ppm to 220 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 110 ppm to 130 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 190 ppm to 210 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 120 ppm copper salt, 80 ppm zinc salt, and 200 ppm calcium salt.

[148] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 160 ppm copper salt, 10 ppm to 160 ppm zinc salt and 120 ppm to 280 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 140 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 140 ppm to 260 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 40 ppm to 120 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 160 ppm to 240 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 60 ppm to 100 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 180 ppm to 220 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 70 ppm to 90 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 190 ppm to 210 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 80 ppm copper salt, 80 ppm zinc salt, and 200 ppm calcium salt.

[149] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 20 ppm to 220 ppm copper salt, 20 ppm to 220 ppm zinc salt and 140 ppm to 300 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 60 ppm to 180 ppm copper salt, 60 ppm to 180 ppm zinc salt, and 160 ppm to 280 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 80 ppm to 160 ppm copper salt, 80 ppm to 160 ppm zinc salt, and 180 ppm to 260 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 100 ppm to 140 ppm copper salt, 100 ppm to 140 ppm zinc salt, and 200 ppm to 240 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 110 ppm to 130 ppm copper salt, 110 ppm to 130 ppm, zinc salt, and 210 ppm to 230 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 120 ppm copper salt, 120 ppm zinc salt, and 220 ppm calcium salt.

[150] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 20 ppm to 220 ppm copper salt, 10 ppm to 160 ppm zinc salt and 140 ppm to 300 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 60 ppm to 180 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 160 ppm to 280 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 80 ppm to 160 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 180 ppm to 260 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 100 ppm to 140 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 200 ppm to 240 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 110 ppm to 130 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 210 ppm to 230 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 120 ppm copper salt, 80 ppm zinc salt, and 220 ppm calcium salt.

[151] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 160 ppm copper salt, 10 ppm to 160 ppm zinc salt and 140 ppm to 300 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 140 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 160 ppm to 280 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 40 ppm to 120 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 180 ppm to 260 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 60 ppm to 100 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 200 ppm to 240 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 70 ppm to 90 ppm copper salt, 70 ppm to 90

ppm, zinc salt, and 210 ppm to 230 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 80 ppm copper salt, 80 ppm zinc salt, and 220 ppm calcium salt.

[152] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 20 ppm to 220 ppm copper salt, 20 ppm to 220 ppm zinc salt and 160 ppm to 320 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 60 ppm to 180 ppm copper salt, 60 ppm to 180 ppm zinc salt, and 80 ppm to 300 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 80 ppm to 160 ppm copper salt, 80 ppm to 160 ppm zinc salt, and 200 ppm to 280 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 100 ppm to 140 ppm copper salt, 100 ppm to 140 ppm zinc salt, and 200 ppm to 260 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 110 ppm to 130 ppm copper salt, 110 ppm to 130 ppm, zinc salt, and 230 ppm to 250 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 120 ppm copper salt, 120 ppm zinc salt, and 240 ppm calcium salt.

[153] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 20 ppm to 220 ppm copper salt, 10 ppm to 160 ppm zinc salt and 160 ppm to 320 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 60 ppm to 180 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 180 ppm to 300 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 80 ppm to 160 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 200 ppm to 280 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 100 ppm to 140 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 220 ppm to 260 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 110 ppm to 130 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 230 ppm to 250 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 120 ppm copper salt, 80 ppm zinc salt, and 240 ppm calcium salt.

[154] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 160 ppm copper salt, 10 ppm to 160 ppm zinc salt and 160 ppm to 320 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 140 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 80 ppm to 300 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 40 ppm to 120 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 200 ppm to 280 ppm calcium salt. In an

aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 60 ppm to 100 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 220 ppm to 260 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 70 ppm to 90 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 230 ppm to 250 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 80 ppm copper salt, 80 ppm zinc salt, and 240 ppm calcium salt.

[155] In an aspect of this embodiment, a composition disclosed herein comprises 170 ppm to 470 ppm hypochlorous acid or free available chlorine, 40 ppm to 240 ppm copper salt, 30 ppm to 180 ppm zinc salt and 100 ppm to 260 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 220 ppm to 420 ppm hypochlorous acid or free available chlorine, 80 ppm to 200 ppm copper salt, 40 ppm to 160 ppm zinc salt, and 120 ppm to 240 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 380 ppm hypochlorous acid or free available chlorine, 100 ppm to 180 ppm copper salt, 60 ppm to 140 ppm zinc salt, and 140 ppm to 220 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 360 ppm hypochlorous acid or free available chlorine, 120 ppm to 160 ppm copper salt, 80 ppm to 120 ppm zinc salt, and 160 ppm to 200 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 320 ppm to 340 ppm hypochlorous acid or free available chlorine, 130 ppm to 150 ppm copper salt, 90 ppm to 100 ppm, zinc salt, and 170 ppm to 190 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 330 ppm hypochlorous acid or free available chlorine, 140 ppm copper salt, 100 ppm zinc salt, and 180 ppm calcium salt.

[156] In an aspect of this embodiment, a composition disclosed herein comprises 130 ppm to 430 ppm hypochlorous acid or free available chlorine, 10 ppm to 200 ppm copper salt, 10 ppm to 160 ppm zinc salt and 60 ppm to 220 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 180 ppm to 380 ppm hypochlorous acid or free available chlorine, 40 ppm to 160 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 80 ppm to 200 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 240 ppm to 340 ppm hypochlorous acid or free available chlorine, 60 ppm to 140 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 100 ppm to 180 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 320 ppm hypochlorous acid or free available chlorine, 80 ppm to 120 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 120 ppm to 160 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 300 ppm hypochlorous acid or free available chlorine, 90 ppm to 110 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 130 ppm to 150 ppm calcium salt. In an aspect of this embodiment, a composition disclosed herein comprises 290 ppm hypochlorous acid or free available chlorine, 100 ppm copper salt, 80 ppm zinc salt, and 140 ppm calcium salt.

[157] In an embodiment, a composition disclosed herein comprises 20 ppm to 500 ppm hypochlorous acid or free available chlorine, 2.5 ppm to 240 ppm one or more metal salts, and 5 ppm to 200 ppm of a phosphate buffer. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to

500 ppm hypochlorous acid or free available chlorine, 2.5 ppm to 240 ppm of a copper salt, 2.5 ppm to 240 ppm of zinc salt, and 5 ppm to 200 ppm of a phosphate buffer. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 500 ppm hypochlorous acid or free available chlorine, 2.5 ppm to 240 of a copper chloride, 2.5 ppm to 240 of a zinc chloride, and 5 ppm to 200 ppm of a phosphate buffer.

[158] In an aspect of this embodiment, a composition disclosed herein comprises 10 ppm to 200 ppm hypochlorous acid or free available chlorine, 10 ppm to 160 ppm copper salt, 10 ppm to 160 ppm zinc salt and 10 ppm to 160 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 180 ppm hypochlorous acid or free available chlorine, 20 ppm to 140 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 20 ppm to 140 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 40 ppm to 140 ppm hypochlorous acid or free available chlorine, 40 ppm to 120 ppm copper salt, 40 ppm to 120 ppm zinc salt, and 40 ppm to 120 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 60 ppm to 120 ppm hypochlorous acid or free available chlorine, 60 ppm to 100 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 60 ppm to 100 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 80 ppm to 100 ppm hypochlorous acid or free available chlorine, 70 ppm to 90 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 70 ppm to 90 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 90 ppm hypochlorous acid or free available chlorine, 80 ppm copper salt, 80 ppm zinc salt, and 80 ppm of a calcium phosphate or sodium phosphate.

[159] In an aspect of this embodiment, a composition disclosed herein comprises 10 ppm to 200 ppm hypochlorous acid or free available chlorine, 5 ppm to 120 ppm copper salt, 5 ppm to 120 ppm zinc salt and 10 ppm to 160 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 180 ppm hypochlorous acid or free available chlorine, 10 ppm to 100 ppm copper salt, 10 ppm to 100 ppm zinc salt, and 20 ppm to 140 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 40 ppm to 140 ppm hypochlorous acid or free available chlorine, 15 ppm to 80 ppm copper salt, 15 ppm to 80 ppm zinc salt, and 40 ppm to 120 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 60 ppm to 120 ppm hypochlorous acid or free available chlorine, 20 ppm to 60 ppm copper salt, 20 ppm to 60 ppm zinc salt, and 60 ppm to 100 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 80 ppm to 100 ppm hypochlorous acid or free available chlorine, 30 ppm to 50 ppm copper salt, 30 ppm to 50 ppm, zinc salt, and 70 ppm to 90 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 90 ppm hypochlorous acid or free available chlorine, 40 ppm copper salt, 40 ppm zinc salt, and 80 ppm of a calcium phosphate or sodium phosphate.

[160] In an aspect of this embodiment, a composition disclosed herein comprises 10 ppm to 200 ppm hypochlorous acid or free available chlorine, 2.5 ppm to 60 ppm copper salt, 2.5 ppm to 60 ppm zinc salt and 10 ppm to 160 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 180 ppm hypochlorous acid or free available chlorine, 5 ppm to 50 ppm copper salt, 5 ppm to 50 ppm zinc salt, and 20 ppm to 140 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 40 ppm to 140 ppm hypochlorous acid or free available chlorine, 7.5 ppm to 40 ppm copper salt, 7.5 ppm to 40 ppm zinc salt, and 40 ppm to 120 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 60 ppm to 120 ppm hypochlorous acid or free available chlorine, 10 ppm to 30 ppm copper salt, 10 ppm to 30 ppm zinc salt, and 60 ppm to 100 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 80 ppm to 100 ppm hypochlorous acid or free available chlorine, 15 ppm to 25 ppm copper salt, 15 ppm to 25 ppm, zinc salt, and 70 ppm to 90 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 90 ppm hypochlorous acid or free available chlorine, 20 ppm copper salt, 20 ppm zinc salt, and 80 ppm of a calcium phosphate or sodium phosphate.

[161] In an aspect of this embodiment, a composition disclosed herein comprises 10 ppm to 200 ppm hypochlorous acid or free available chlorine, 5 ppm to 120 ppm copper salt, 5 ppm to 120 ppm zinc salt and 5 ppm to 120 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 180 ppm hypochlorous acid or free available chlorine, 10 ppm to 100 ppm copper salt, 10 ppm to 100 ppm zinc salt, and 10 ppm to 100 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 40 ppm to 140 ppm hypochlorous acid or free available chlorine, 15 ppm to 80 ppm copper salt, 15 ppm to 80 ppm zinc salt, and 15 ppm to 80 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 60 ppm to 120 ppm hypochlorous acid or free available chlorine, 20 ppm to 60 ppm copper salt, 20 ppm to 60 ppm zinc salt, and 20 ppm to 60 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 80 ppm to 100 ppm hypochlorous acid or free available chlorine, 30 ppm to 50 ppm copper salt, 30 ppm to 50 ppm, zinc salt, and 30 ppm to 50 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 90 ppm hypochlorous acid or free available chlorine, 40 ppm copper salt, 40 ppm zinc salt, and 40 ppm of a calcium phosphate or sodium phosphate.

[162] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 160 ppm copper salt, 10 ppm to 160 ppm zinc salt and 10 ppm to 160 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 140 ppm copper salt, 20 ppm to 140 ppm zinc salt, and 20 ppm to 140 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 40 ppm to 120 ppm copper

salt, 40 ppm to 120 ppm zinc salt, and 40 ppm to 120 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 60 ppm to 100 ppm copper salt, 60 ppm to 100 ppm zinc salt, and 60 ppm to 100 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 70 ppm to 90 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and 70 ppm to 90 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 80 ppm copper salt, 80 ppm zinc salt, and 80 ppm of a calcium phosphate or sodium phosphate.

[163] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 140 ppm copper salt, 10 ppm to 140 ppm zinc salt and 10 ppm to 160 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 120 ppm copper salt, 20 ppm to 120 ppm zinc salt, and 20 ppm to 140 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 30 ppm to 100 ppm copper salt, 30 ppm to 100 ppm zinc salt, and 40 ppm to 120 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 40 ppm to 80 ppm copper salt, 40 ppm to 80 ppm zinc salt, and 60 ppm to 100 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 50 ppm to 70 ppm copper salt, 50 ppm to 70 ppm, zinc salt, and 70 ppm to 90 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 40 ppm copper salt, 40 ppm zinc salt, and 80 ppm of a calcium phosphate or sodium phosphate.

[164] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 140 ppm copper salt, 10 ppm to 140 ppm zinc salt and 10 ppm to 140 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 120 ppm copper salt, 20 ppm to 120 ppm zinc salt, and 20 ppm to 120 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 30 ppm to 100 ppm copper salt, 30 ppm to 100 ppm zinc salt, and 30 ppm to 100 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 40 ppm to 80 ppm copper salt, 40 ppm to 80 ppm zinc salt, and 40 ppm to 80 ppm of a calcium phosphate or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 50 ppm to 70 ppm copper salt, 50 ppm to 70 ppm, zinc salt, and 50 ppm to 70 ppm of a calcium phosphate

or sodium phosphate. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 40 ppm copper salt, 40 ppm zinc salt, and 40 ppm of a calcium phosphate or sodium phosphate.

[165] In an embodiment, a composition disclosed herein comprises 20 ppm to 500 ppm hypochlorous acid or free available chlorine, 2.5 ppm to 240 ppm one or more metal salts, 5 ppm to 200 ppm of a phosphate buffer, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 500 ppm hypochlorous acid or free available chlorine, 2.5 ppm to 240 of a copper salt, 2.5 ppm to 240 of zinc salt, 5 ppm to 200 ppm of a phosphate buffer and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 500 ppm hypochlorous acid or free available chlorine, 2.5 ppm to 240 of a copper chloride, 2.5 ppm to 240 of a zinc chloride, and 5 ppm to 200 ppm of a phosphate buffer and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0.

[166] In an aspect of this embodiment, a composition disclosed herein comprises 10 ppm to 200 ppm hypochlorous acid or free available chlorine, 10 ppm to 160 ppm copper salt, 10 ppm to 160 ppm zinc salt, 10 ppm to 160 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 180 ppm hypochlorous acid or free available chlorine, 20 ppm to 140 ppm copper salt, 20 ppm to 140 ppm zinc salt, 20 ppm to 140 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 40 ppm to 140 ppm hypochlorous acid or free available chlorine, 40 ppm to 120 ppm copper salt, 40 ppm to 120 ppm zinc salt, 40 ppm to 120 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 60 ppm to 120 ppm hypochlorous acid or free available chlorine, 60 ppm to 100 ppm copper salt, 60 ppm to 100 ppm zinc salt, 60 ppm to 100 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 80 ppm to 100 ppm hypochlorous acid or free available chlorine, 70 ppm to 90 ppm copper salt, 70 ppm to 90 ppm, zinc salt, 70 ppm to 90 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 90 ppm hypochlorous acid or free available chlorine, 80 ppm copper salt, 80 ppm zinc salt, 80 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0.

[167] In an aspect of this embodiment, a composition disclosed herein comprises 10 ppm to 200 ppm hypochlorous acid or free available chlorine, 5 ppm to 120 ppm copper salt, 5 ppm to 120 ppm zinc salt, 10 ppm to 160 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 180 ppm hypochlorous acid or free available chlorine, 10 ppm to 100 ppm copper

salt, 10 ppm to 100 ppm zinc salt, 20 ppm to 140 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 40 ppm to 140 ppm hypochlorous acid or free available chlorine, 15 ppm to 80 ppm copper salt, 15 ppm to 80 ppm zinc salt, 40 ppm to 120 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 60 ppm to 120 ppm hypochlorous acid or free available chlorine, 20 ppm to 60 ppm copper salt, 20 ppm to 60 ppm zinc salt, 60 ppm to 100 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 80 ppm to 100 ppm hypochlorous acid or free available chlorine, 30 ppm to 50 ppm copper salt, 30 ppm to 50 ppm, zinc salt, 70 ppm to 90 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 90 ppm hypochlorous acid or free available chlorine, 40 ppm copper salt, 40 ppm zinc salt, 80 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0.

[168] In an aspect of this embodiment, a composition disclosed herein comprises 10 ppm to 200 ppm hypochlorous acid or free available chlorine, 2.5 ppm to 60 ppm copper salt, 2.5 ppm to 60 ppm zinc salt, 10 ppm to 160 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 180 ppm hypochlorous acid or free available chlorine, 5 ppm to 50 ppm copper salt, 5 ppm to 50 ppm zinc salt, 20 ppm to 140 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 40 ppm to 140 ppm hypochlorous acid or free available chlorine, 7.5 ppm to 40 ppm copper salt, 7.5 ppm to 40 ppm zinc salt, 40 ppm to 120 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 60 ppm to 120 ppm hypochlorous acid or free available chlorine, 10 ppm to 30 ppm copper salt, 10 ppm to 30 ppm zinc salt, 60 ppm to 100 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 80 ppm to 100 ppm hypochlorous acid or free available chlorine, 15 ppm to 25 ppm copper salt, 15 ppm to 25 ppm, zinc salt, 70 ppm to 90 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 90 ppm hypochlorous acid or free available chlorine, 20 ppm copper salt, 20 ppm zinc salt, 80 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0.

[169] In an aspect of this embodiment, a composition disclosed herein comprises 10 ppm to 200 ppm hypochlorous acid or free available chlorine, 5 ppm to 120 ppm copper salt, 5 ppm to 120 ppm zinc salt, 5 ppm to 120 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein

comprises 20 ppm to 180 ppm hypochlorous acid or free available chlorine, 10 ppm to 100 ppm copper salt, 10 ppm to 100 ppm zinc salt, 10 ppm to 100 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 40 ppm to 140 ppm hypochlorous acid or free available chlorine, 15 ppm to 80 ppm copper salt, 15 ppm to 80 ppm zinc salt, 15 ppm to 80 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 60 ppm to 120 ppm hypochlorous acid or free available chlorine, 20 ppm to 60 ppm copper salt, 20 ppm to 60 ppm zinc salt, 20 ppm to 60 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 80 ppm to 100 ppm hypochlorous acid or free available chlorine, 30 ppm to 50 ppm copper salt, 30 ppm to 50 ppm, zinc salt, 30 ppm to 50 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 90 ppm hypochlorous acid or free available chlorine, 40 ppm copper salt, 40 ppm zinc salt, 40 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0.

[170] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 160 ppm copper salt, 10 ppm to 160 ppm zinc salt, 10 ppm to 160 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 140 ppm copper salt, 20 ppm to 140 ppm zinc salt, 20 ppm to 140 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 40 ppm to 120 ppm copper salt, 40 ppm to 120 ppm zinc salt, 40 ppm to 120 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 60 ppm to 100 ppm copper salt, 60 ppm to 100 ppm zinc salt, 60 ppm to 100 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 70 ppm to 90 ppm copper salt, 70 ppm to 90 ppm, zinc salt, 70 ppm to 90 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 80 ppm copper salt, 80 ppm zinc salt, 80 ppm of a calcium phosphate or sodium phosphate, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0.

[171] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 140 ppm copper salt, 10 ppm to 140 ppm zinc salt, 10 ppm to 160 ppm of a calcium phosphate or sodium phosphate and an amount of calcium oxide needed

to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 120 ppm copper salt, 20 ppm to 120 ppm zinc salt, 20 ppm to 140 ppm of a calcium phosphate or sodium phosphate and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 30 ppm to 100 ppm copper salt, 30 ppm to 100 ppm zinc salt, 40 ppm to 120 ppm of a calcium phosphate or sodium phosphate and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 40 ppm to 80 ppm copper salt, 40 ppm to 80 ppm zinc salt, 60 ppm to 100 ppm of a calcium phosphate or sodium phosphate and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 50 ppm to 70 ppm copper salt, 50 ppm to 70 ppm, zinc salt, 70 ppm to 90 ppm of a calcium phosphate or sodium phosphate and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 40 ppm copper salt, 40 ppm zinc salt, 80 ppm of a calcium phosphate or sodium phosphate and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0.

[172] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 140 ppm copper salt, 10 ppm to 140 ppm zinc salt, 10 ppm to 140 ppm of a calcium phosphate or sodium phosphate and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 120 ppm copper salt, 20 ppm to 120 ppm zinc salt, 20 ppm to 120 ppm of a calcium phosphate or sodium phosphate and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 30 ppm to 100 ppm copper salt, 30 ppm to 100 ppm zinc salt, 30 ppm to 100 ppm of a calcium phosphate or sodium phosphate and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 40 ppm to 80 ppm copper salt, 40 ppm to 80 ppm zinc salt, 40 ppm to 80 ppm of a calcium phosphate or sodium phosphate and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 50 ppm to 70 ppm copper salt, 50 ppm to 70 ppm, zinc salt, 50 ppm to 70 ppm of a calcium phosphate or sodium phosphate and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 40 ppm copper salt, 40 ppm zinc salt, 40 ppm of a calcium phosphate or sodium phosphate and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0.

[173] In an embodiment, a composition disclosed herein comprises 20 ppm to 500 ppm hypochlorous acid or free available chlorine, 2.5 ppm to 240 ppm one or more metal salts, and an amount of calcium

oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 500 ppm hypochlorous acid or free available chlorine, 2.5 ppm to 240 of a copper salt, 2.5 ppm to 240 of zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 500 ppm hypochlorous acid or free available chlorine, 2.5 ppm to 240 of a copper chloride, 2.5 ppm to 240 of a zinc chloride, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0.

[174] In an aspect of this embodiment, a composition disclosed herein comprises 10 ppm to 200 ppm hypochlorous acid or free available chlorine, 10 ppm to 160 ppm copper salt, 10 ppm to 160 ppm zinc salt and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 180 ppm hypochlorous acid or free available chlorine, 20 ppm to 140 ppm copper salt, 20 ppm to 140 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 40 ppm to 140 ppm hypochlorous acid or free available chlorine, 40 ppm to 120 ppm copper salt, 40 ppm to 120 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 60 ppm to 120 ppm hypochlorous acid or free available chlorine, 60 ppm to 100 ppm copper salt, 60 ppm to 100 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 80 ppm to 100 ppm hypochlorous acid or free available chlorine, 70 ppm to 90 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 90 ppm hypochlorous acid or free available chlorine, 80 ppm copper salt, 80 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0.

[175] In an aspect of this embodiment, a composition disclosed herein comprises 10 ppm to 200 ppm hypochlorous acid or free available chlorine, 5 ppm to 120 ppm copper salt, 5 ppm to 120 ppm zinc salt and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 180 ppm hypochlorous acid or free available chlorine, 10 ppm to 100 ppm copper salt, 10 ppm to 100 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 40 ppm to 140 ppm hypochlorous acid or free available chlorine, 15 ppm to 80 ppm copper salt, 15 ppm to 80 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 60 ppm to 120 ppm hypochlorous acid or free available chlorine, 20 ppm to 60 ppm copper salt, 20 ppm to 60 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 80 ppm to 100 ppm hypochlorous acid or free available chlorine, 30 ppm to 50 ppm copper salt, 30 ppm to 50 ppm, zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 90 ppm hypochlorous acid or free available chlorine, 40 ppm copper salt, 40 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0.

[176] In an aspect of this embodiment, a composition disclosed herein comprises 10 ppm to 200 ppm hypochlorous acid or free available chlorine, 2.5 ppm to 60 ppm copper salt, 2.5 ppm to 60 ppm zinc salt and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 180 ppm hypochlorous acid or free available chlorine, 5 ppm to 50 ppm copper salt, 5 ppm to 50 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 40 ppm to 140 ppm hypochlorous acid or free available chlorine, 7.5 ppm to 40 ppm copper salt, 7.5 ppm to 40 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 60 ppm to 120 ppm hypochlorous acid or free available chlorine, 10 ppm to 30 ppm copper salt, 10 ppm to 30 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 80 ppm to 100 ppm hypochlorous acid or free available chlorine, 15 ppm to 25 ppm copper salt, 15 ppm to 25 ppm, zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 90 ppm hypochlorous acid or free available chlorine, 20 ppm copper salt, 20 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0.

[177] In an aspect of this embodiment, a composition disclosed herein comprises 10 ppm to 200 ppm hypochlorous acid or free available chlorine, 5 ppm to 120 ppm copper salt, 5 ppm to 120 ppm zinc salt and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 20 ppm to 180 ppm hypochlorous acid or free available chlorine, 10 ppm to 100 ppm copper salt, 10 ppm to 100 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 40 ppm to 140 ppm hypochlorous acid or free available chlorine, 15 ppm to 80 ppm copper salt, 15 ppm to 80 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 60 ppm to 120 ppm hypochlorous acid or free available chlorine, 20 ppm to 60 ppm copper salt, 20 ppm to 60 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 80 ppm to 100 ppm hypochlorous acid or free available chlorine, 30 ppm to 50 ppm copper salt, 30 ppm to 50 ppm, zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 90 ppm hypochlorous acid or free available chlorine, 40 ppm copper salt, 40 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0.

[178] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 160 ppm copper salt, 10 ppm to 160 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 140 ppm copper salt, 20 ppm to 140 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition

disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 40 ppm to 120 ppm copper salt, 40 ppm to 120 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 60 ppm to 100 ppm copper salt, 60 ppm to 100 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 70 ppm to 90 ppm copper salt, 70 ppm to 90 ppm, zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 80 ppm copper salt, 80 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0.

[179] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 140 ppm copper salt, 10 ppm to 140 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 120 ppm copper salt, 20 ppm to 120 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 30 ppm to 100 ppm copper salt, 30 ppm to 100 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 40 ppm to 80 ppm copper salt, 40 ppm to 80 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 50 ppm to 70 ppm copper salt, 50 ppm to 70 ppm, zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 40 ppm copper salt, 40 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0.

[180] In an aspect of this embodiment, a composition disclosed herein comprises 150 ppm to 450 ppm hypochlorous acid or free available chlorine, 10 ppm to 140 ppm copper salt, 10 ppm to 140 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 200 ppm to 400 ppm hypochlorous acid or free available chlorine, 20 ppm to 120 ppm copper salt, 20 ppm to 120 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 260 ppm to 360 ppm hypochlorous acid or free available chlorine, 30 ppm to 100 ppm copper salt, 30 ppm to 100 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 280 ppm to 340 ppm hypochlorous acid or free available chlorine, 40 ppm to 80 ppm copper salt, 40 ppm to 80 ppm zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In

an aspect of this embodiment, a composition disclosed herein comprises 300 ppm to 320 ppm hypochlorous acid or free available chlorine, 50 ppm to 70 ppm copper salt, 50 ppm to 70 ppm, zinc salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0. In an aspect of this embodiment, a composition disclosed herein comprises 310 ppm hypochlorous acid or free available chlorine, 40 ppm copper salt, and an amount of calcium oxide needed to adjust the pH to a range of 5.0 to 6.0.

[181] Aspects of the present specification disclose a kit. In one embodiment, the kit can comprise a container including a composition disclosed herein. In another embodiment, a kit can comprise one or more containers, each container including an individual component or more than one individual component disclosed herein in combination. For example, a kit can comprise one container including hypochlorous acid or free available chlorine and a second container including one or more metallic particles. As another example, a kit can comprise one container including hypochlorous acid or free available chlorine and a second container including copper-zinc-calcium oxide particles. As another example, a kit can comprise one container including hypochlorous acid or free available chlorine and a second container including metal salts. As another example, a kit can comprise one container including hypochlorous acid or free available chlorine and a second container including copper chloride salt, zinc chloride salt, and/or calcium oxide salt. The remainder of the components of a composition disclosed herein may be included in either the first or second container, or may be separately including in at least a third container. For example, a third container including a rinse solution disclosed herein can be included in the kit. Packaging of individual components into separate container can assist in prolonging the stability of the individual components, and thus shelf life of the product.

[182] In another example, a kit can comprise one container including hypochlorous acid and/or free available chlorine, a second container including one or more metallic particles, and a third container including a rinse solution. As another example, a kit can comprise one container including hypochlorous acid and/or free available chlorine, a second container including copper-zinc-calcium oxide particles, and a third container including a rinse solution. As another example, a kit can comprise one container including hypochlorous acid and/or free available chlorine, a second container including metal salts and a third container including a rinse solution. As another example, a kit can comprise one container including hypochlorous acid and/or free available chlorine, a second container including copper chloride salt, zinc chloride salts, and/or calcium oxide salt, and a third container including a rinse solution.

[183] In another embodiment, a kit can comprise one container including a composition disclosed herein and a second container including a rinse solution disclosed herein. For example, a kit can comprise one container including hypochlorous acid and/or free available chlorine and one or more metallic particles and a second container including a rinse solution. As another example, a kit can comprise one container including hypochlorous acid and/or free available chlorine and copper-zinc-calcium oxide particles and a second container including a rinse solution. As another example, a kit can comprise one container including hypochlorous acid and/or free available chlorine and metal salts and a second container including a rinse solution. As another example, a kit can comprise one container including hypochlorous acid and/or free available chlorine, copper chloride salt, zinc chloride salt, and/or calcium oxide salt and a second container

including a rinse solution. The remainder of the components of a composition disclosed herein may be included in either the first container or may be separately including in at least a third container. Packaging of individual components into separate container can assist in prolonging the stability of the individual components, and thus shelf life of the product.

[184] A kit disclosed herein can comprise a delivery or application system. The delivery or application system of the kit are useful for applying a composition disclosed herein, and/or individual components disclosed herein to a site of interest, such as, *e.g.*, a surface of a device disclosed herein. A delivery or application system disclosed herein, includes, without limitation, one or more of an applicator brush, porous foam swab or pad, hollow tube, dipstick, or a combination thereof. In an embodiment, a kit comprises a single delivery or application system. In another embodiment, a kit comprises a plurality delivery or application systems. For example, in a 30-day supply kit, there can be 30 delivery or application systems, such that there is one delivery or application system per day for 30 days. Alternately, there can be 2, 10, 20, 30, 40, 50, 60, 90, 120, etc. delivery or application systems per kit. Within the kit, the delivery or application system may be packaged individually, or in sets of 2 or more. The delivery or application system can be packaged such that it remains sterile until use. In certain embodiments, a delivery or application system disclosed herein can be packaged in plastic sheaths. Further, to prevent contamination, delivery or application system disclosed herein is preferably single-use, disposable delivery or application system.

[185] The kit can also comprise a set of instructions. The instructions may include information useful to the end user such as how to use a delivery or application system to apply a composition and/or individual components disclosed herein, and/or how often to apply a composition and/or individual components disclosed herein. In addition, such instructions may include information regarding how to mix the individual components disclosed herein to form a composition disclosed herein. Such instructions can indicate that mixing should be done at a certain time before application, such as, *e.g.*, just prior to use. Instructions disclosed herein may also include information regarding how to apply the individual components disclosed herein directly to a site of interest, such as, *e.g.*, a surface of a device disclosed herein, and in what order the individual components should be applied to such sites of interest.

[186] The contents of the kit, including the container including a composition or component disclosed herein, the delivery or application system, and instructions, are enclosed in an outer casing. The outer casing can be a box, a sealed bag, a foil pouch, etc. In certain embodiments, the delivery system, container and instructions are enclosed in a box. In other embodiments of the kit, the container and instructions are contained in a first box, the delivery system is contained in a second box, and the first and second box are contained together in a third box.

[187] The presently disclosed compositions are useful in any application involving the cleansing, disinfecting or sterilizing. In one embodiment, a composition disclosed herein is used to clean, disinfect or sterilize a device. In one embodiment, a composition disclosed herein is used to clean, disinfect or sterilize an endoscope. In one embodiment, a composition disclosed herein is used to clean, disinfect or sterilize a

hard surface. In one embodiment, a composition disclosed herein is useful in any application were hypochlorous acid is applied or administered.

[188] Aspects of the present specification disclose a method to clean, disinfect and/or sterilize a device. In one embodiment, a method disclosed herein comprises applying a composition disclosed herein to a device for a specified amount of time, wherein application results in the cleaning, disinfecting and/or sterilization of the device. In another aspect of this embodiment, a method disclosed herein further comprises rinsing the cleaned, disinfected and/or sterilized device with a rinse solution disclosed herein. Other aspects of the present specification disclose a composition disclosed herein for use to clean, disinfect and/or sterilize a device, including a medical device. Yet other aspects of the present specification disclose a use of a disclosed composition to clean, disinfect and/or sterilize a device, including a medical device.

[189] Aspects of the present specification disclose a method to clean, disinfect and/or sterilize an endoscope. In an aspect of this embodiment, a method disclosed herein comprises applying a composition disclosed herein to an endoscope for a specified amount of time, wherein application results in the cleaning, disinfecting and/or sterilization of the endoscope. In another aspect of this embodiment, a method disclosed herein further comprises rinsing the cleaned, disinfected and/or sterilized endoscope with a rinse solution disclosed herein. Other aspects of the present specification disclose a composition disclosed herein for use to clean, disinfect and/or sterilize an endoscope. Yet other aspects of the present specification disclose a use of a disclosed composition to clean, disinfect and/or sterilize an endoscope.

[190] A device, including a medical device is cleaned by removal of visible soil, such as, *e.g.*, organic and inorganic material, from objects and surfaces and normally is accomplished manually or mechanically. Thorough cleaning is essential before disinfection and sterilization because inorganic and organic materials that remain on the surfaces of a medical device interferes with the effectiveness of these processes.

[191] A device, including a medical device is disinfected by eliminating many or all pathogenic microorganisms, except bacterial spores. Disinfection is less lethal than sterilization because it destroys most recognized pathogenic microorganisms but not necessarily all microbial forms (e.g., bacterial spores). A medical device is sterilized by destroying or eliminating all forms of microorganisms. Decontamination of a medical device removes pathogenic microorganisms from a medical device so that it is safe to handle, use, or discard.

[192] A medical device is an instrument, apparatus, material, or other article, whether used alone or in combination, including software necessary for its application, intended by the manufacturer to be used for human beings for diagnosis, prevention, monitoring treatment, or alleviation of disease; diagnosis, monitoring, treatment, or alleviation of or compensation for an injury or handicap; investigation, replacement, or modification of the anatomy or of a physiologic process; or control of conception, and that does not achieve its primary intended action in or on the human body by pharmacologic, immunologic, or metabolic means but might be assisted in its function by such means. A medical device includes, without limitation, a surgical instrument, a respiratory therapy instrument, an anesthesia instrument, a catheter, an

implant, a probe, an endoscope, an arthroscope, a laparoscope, a blade, a cystoscope, a spirometer, a CPAP mask and tubing, dialysis instrument and accessories, a heart-lung machine and accessories, a heart-lung bypass machine and accessories, and a diaphragm fitting ring. Non-limiting examples of a probe includes an ultrasound probe and an esophageal manometry probe. Non-limiting examples of a catheter includes a cardiac catheter, an urinary catheter, an anorectal manometry catheter. Non-limiting examples of an endoscope includes a gastrointestinal endoscope, a bronchoscope, and a nasopharyngoscope. Non-limiting examples of a blade includes a laryngoscope blade.

[193] Aspects of the present specification disclose a method to clean, disinfect and/or sterilize a hard surface area. In an aspect of this embodiment, a method disclosed herein comprises applying a composition disclosed herein to a hard surface area for a specified amount of time, wherein application results in the cleaning, disinfecting and/or sterilization of the hard surface area. In another aspect of this embodiment, a method disclosed herein further comprises rinsing the cleaned, disinfected and/or sterilized surface with a rinse solution disclosed herein. Other aspects of the present specification disclose a composition disclosed herein for use to clean, disinfect and/or sterilize a hard surface area. Yet other aspects of the present specification disclose a use of a disclosed composition to clean, disinfect and/or sterilize a hard surface area. A hard surface area can be a porous surface area or a non-porous surface area.

[194] In another aspect of this embodiment, a method disclosed herein comprises applying one or more individual components disclosed herein to a hard surface area for a specified amount of time, wherein application results in the cleaning, disinfecting and/or sterilization of the hard surface area. In an aspect of this embodiment, the one or more individual components include a first component including hypochlorous acid or free available chlorine and a second component including one or more disinfectants. In another aspect, application of the one or more individual components occur in a specific order, such as. *e.g.*, first applying a first component including hypochlorous acid or free available chlorine and then applying a second component including one or more disinfectants. A hard surface area can be a porous surface area or a non-porous surface area.

[195] A hard surface area can include any items present in a residence or a commercial, industrial and/or agricultural facility, such as, *e.g.*, a hospital, a laboratory, a restaurant, an educational center, a food-processing facility, a dairy-processing facility, an airport, an oil field system, a sport facility, a shipping dock, a freight transport center, or any other commercial or industrial setting. A surface area can include any type of transportation carrier, such as, *e.g.*, a water vessel like a boat, barge or ship, an aircraft like an airplane or helicopter, a ground vehicle like a motorcycle, car, truck or train, A surface area may be made of any material including brass, copper, aluminum, stainless steel, carbon steel, rubber, plastic, glass, wood, painted surface, or any combination thereof. A surface area includes, without limitation, a table top, counter top, floor, wall, ceiling, window, bed, gurney, door, door handle, shower, bath, sink, faucet, toilet, toilet seat, drain, equipment, machinery, personal protective gear, personal biohazard gear, and the like. A surface area may comprise a medical, dental, pharmaceutical, veterinary or mortuary device. A surface area may comprise human skin.

[196] A composition or component disclosed herein can be applied to a hard surface area according to a method disclosed herein as often as needed and/or desired. A composition disclosed herein can be applied to a hard surface area daily, every other day, every third of day, once a week, multiple times per week, once a month, multiple times per month, once a year or multiple times per year, as desired. A composition disclosed herein can be applied to a hard surface area multiple times per day, *e.g.*, twice a day, three times a day, four time a day, five times a day, six times a day or as often as desired.

[197] The presently disclosed compositions are useful in any application involving treating an individual. The presently disclosed compositions are useful in any application involving medical use, veterinarian use, or both. In one embodiment, a composition disclosed herein is useful in any application were hypochlorous acid is applied or administered.

[198] In one embodiment, the presently disclosed compositions are useful in any application involving treating a tissue in an individual. For example, the compositions disclosed herein can be used to treat a wound by enhancing angiogenesis in an area in and around a wound, or promoting rapid healing of a wound.

[199] In one embodiment, the presently disclosed compositions are useful in any application involving treating a wound in an individual. For example, the compositions disclosed herein can be used to treat a wound by enhancing angiogenesis in an area in and around a wound, or promoting rapid healing of a wound. A wound can be an open wound, a closed wound or a burn. Non-limiting examples, of an open wound include a laceration, an abrasion, an incision, a puncture, an avulsion, an ulcer, and a tear. Non-limiting examples, of a closed wound includes a bruise, a contusion and a hematoma.

[200] Aspects of the present specification disclose a method of cleaning, disinfecting and/or sterilizing a wound in an individual. In an aspect of this embodiment, a method disclosed herein comprises applying a composition disclosed herein to a wound for a specified amount of time, wherein application results in the cleaning, disinfecting and/or sterilization of the wound. In another aspect of this embodiment, a method disclosed herein further comprises rinsing the cleaned, disinfected and/or sterilized wound with a rinse solution disclosed herein. Other aspects of the present specification disclose a composition disclosed herein for use to clean, disinfect and/or sterilize a wound. Yet other aspects of the present specification disclose a use of a disclosed composition to clean, disinfect and/or sterilize a wound.

[201] Aspects of the present specification disclose a method of treating a wound in an individual. In an aspect of this embodiment, a method disclosed herein comprises applying a composition disclosed herein to a wound for a specified amount of time, wherein application promotes healing of the wound. In another aspect of this embodiment, a method disclosed herein further comprises rinsing the treated wound with a rinse solution disclosed herein. Other aspects of the present specification disclose a composition disclosed herein for use to treat a wound. Yet other aspects of the present specification disclose a use of a disclosed

composition to treat a wound. A wound can be an external wound on, *e.g.*, a surface area of an individual or an internal wound located in the body or body cavity of an individual.

[202] In one embodiment, the presently disclosed compositions are useful in any application involving a microbial infection in an individual. A microbial infection includes a viral infection, a bacterial infection and a fungal infection. A microbial infection can be an external infection on, *e.g.*, a surface area of an individual or an internal infection, *e.g.*, a mercer infection or sepsis, located in the body or body cavity of an individual.

[203] Aspects of the present specification disclose a method of cleaning, disinfecting and/or sterilizing a microbial infection in an individual. In an aspect of this embodiment, a method disclosed herein comprises applying a composition disclosed herein to a microbial infection for a specified amount of time, wherein application results in a cleaning, disinfecting and/or sterilization of the microbial infection. In another aspect of this embodiment, a method disclosed herein further comprises rinsing the cleaned, disinfected and/or sterilized microbial infection with a rinse solution disclosed herein. Other aspects of the present specification disclose a composition disclosed herein for use to clean, disinfect and/or sterilize a microbial infection. Yet other aspects of the present specification disclose a use of a disclosed composition to clean, disinfect and/or sterilize a microbial infection.

[204] In one embodiment, a composition disclosed herein is used to clean, disinfect or sterilize a body part of an individual. Non-limiting examples of uses for a composition disclosed herein include cleaning/disinfecting tissue in wound care, pre-operative preparation, and surgery or other invasive procedure, cleaning/disinfecting a skin region in dermatological applications, and cleaning/disinfecting the eye in ophthalmological applications.

[205] Aspects of the present specification disclose a method of treating a microbial infection in an individual. In an aspect of this embodiment, a method disclosed herein comprises applying a composition disclosed herein to a microbial infection for a specified amount of time, wherein application results in a reduction, elimination and/or killing microbes causing the microbial infection. In another aspect of this embodiment, a method disclosed herein further comprises rinsing the treated microbial infection with a rinse solution disclosed herein. Other aspects of the present specification disclose a composition disclosed herein for use to treat a microbial infection. Yet other aspects of the present specification disclose a use of a disclosed composition to treat a microbial infection.

[206] A dermatological application refers to cleaning/disinfecting a skin region of an individual of a microbial infection, such as, *e.g.*, a viral, bacterial or fungal infection. Non-limiting examples of a microbial infection of a skin region include urinary tract infection, eye lid wash, cataract treatment, warts, cutaneous leishmaniasis, candidal vulvovagititis, derrmatophytoses, bromhidrosis, pityriasis versicolor, acne vulgarish, rosasea, hydradenitis suppurativa, psoriasis, eczema, alopecia areata, oral lichen planus, xeroderma pigmentosum, actinic keratoses, melasma, keloids, and anti-aging.

[207] An ophthalmological application refers to cleaning/disinfecting an eye of an individual of a microbial infection, such as, *e.g.*, a viral, bacterial or fungal infection. Non-limiting examples of a microbial infection of an eye include a bacterial conjunctivitis, a viral conjunctivitis, an epidemic keratoconjunctivitis, a pharyngoconjunctival fever, a stye, a blephartis, an episcleritis, a keratitis, a trachoma, and a corneal ulcer.

[208] The presently disclosed compositions are useful in any application involving treating and/or providing relief of an inflammation, an ache and/or a pain in an individual.

[209] Aspects of the present specification disclose a method of treating an inflammation, an ache and/or a pain in an individual. In an aspect of this embodiment, a method disclosed herein comprises applying a composition disclosed herein to an area of inflammation, an ache and/or a pain for a specified amount of time, wherein application results in a reduction and/or elimination of the pain. In another aspect of this embodiment, a method disclosed herein further comprises rinsing the treated area with a rinse solution disclosed herein. Other aspects of the present specification disclose a composition disclosed herein for use to treat an inflammation, an ache and/or a pain. Yet other aspects of the present specification disclose a use of a disclosed composition to treat an inflammation, an ache and/or a pain.

[210] The presently disclosed compositions are useful in enteral and parenteral applications, including oral, injectable and topical applications. For example, the compositions disclosed herein can be used to clean, disinfect or sterilize a body region injured by a wound or infected with a microbe.

[211] In an aspect of this embodiment, a method disclosed herein comprises applying a composition disclosed herein to an individual for a specified amount of time, wherein application results in the cleaning, disinfecting and/or sterilization of a microbial infection in the individual. Other aspects of the present specification disclose a composition disclosed herein for use to clean, disinfect and/or sterilize a microbial infection in an individual. Yet other aspects of the present specification disclose a use of a disclosed composition to clean, disinfect and/or sterilize a microbial infection in an individual. Still other aspects of the present specification disclose a composition disclosed herein for the manufacture of a medicament to clean, disinfect and/or sterilize a microbial infection in an individual.

[212] A method and/or use disclosed herein applies a composition disclosed herein to an individual. An individual refers to any animal including, without limitation, a fish, an amphibian, a bird and a mammal. A mammal includes a human, a horse, a cow, a sheep, a dog and a cat. As such, a method disclosed herein is for human use as well as veterinarian use.

[213] In applications to an individual, a composition disclosed herein can be applied to a skin surface or can be internally administered. In one embodiment, a composition disclosed herein is applied topically to a skin region of an individual in order to clean, disinfect and/or sterilize the skin region. A skin region, includes, without limitation, the face, forehead, lips, scalp, neck, shoulder, arms, hands, thighs, legs, knees, feet, chest, breast, back, groin, buttocks, and the like.

[214] In one embodiment, a composition disclosed herein is internally administered to an individual. Such routes of administration include enteral routes of administration and parenteral routes of administration.

[215] A composition disclosed herein can be applied according to a method disclosed herein to a skin region. Application of a composition disclosed herein can be by rubbing, pouring, sprinkling, or spraying on, or otherwise applied to the human body. A composition disclosed herein can be applied by introducing the composition into or onto a solid support such as, *e.g.*, a wipe, a towelette, a towel, a mitt, a glove, or a mask and then applying the composition to a skin region. A composition disclosed herein can be applied by using a delivery device, such as, *e.g.*, an aerosol dispenser, a pump spray, a trigger spray, a squeeze bottle, a topical patch, a transdermal patch, or a dermal implant to apply the composition to a skin region.

[216] A composition disclosed herein can be applied to an individual according to a method disclosed herein as often as needed and/or desired. A composition disclosed herein can be applied to an individual daily, every other day, every third of day, once a week, multiple times per week, once a month, multiple times per month, once a year or multiple times per year, as desired. A composition disclosed herein can be applied to an individual multiple times per day, *e.g.*, twice a day, three times a day, four time a day, five times a day, six times a day or as often as desired.

[217] The presently disclosed compositions are useful in food product, poultry, meat, vegetable production. For example, the compositions disclosed herein can be used to clean, disinfect or sterilize machinery, instruments, tables, rooms, including floors, ceilings and walls and any other hard surface from microbial contamination.

[218] The presently disclosed compositions are useful in formulations on plants as a preservative or pesticide. For example, the compositions disclosed herein can be used to clean, disinfect or sterilize a plant injured by a wound or infected with a microbe.

[219] The presently disclosed compositions are useful in formulations on cut flowers to prolong freshness and health. For example, the compositions disclosed herein can be used to clean, disinfect or sterilize a cut flower at a wound or to prevent microbial infection.

[220] A disclosed method and/or use applies a composition disclosed herein for specified amount of time. In one embodiment, a specified amount of time is a time sufficient to clean a medical device, a surface, or an individual. In another embodiment, a specified amount of time is a time sufficient to disinfect a medical device, a surface, or an individual. In yet another embodiment, a specified amount of time is a time sufficient to sterilize a medical device, a surface, or an individual.

[221] In aspects of this embodiment, a composition disclosed herein is applied to a device, like a medical device, a surface, or an individual for, *e.g.*, about 1 minute, about 5 minutes, about 10 minutes, about 15 minutes, about 20 minutes, about 25 minutes, about 30 minutes, about 35 minutes, about 40 minutes, about 45 minutes, about 50 minutes, about 55 minutes, about 60 minutes, about 70 minutes, about 80 minutes,

about 90 minutes, about 100 minutes, about 110 minutes, or about 120 minutes. In other aspects of this embodiment, a composition disclosed herein is applied to a device, like a medical device, a surface, or an individual for, *e.g.*, at least 1 minute, at least 5 minutes, at least 10 minutes, at least 15 minutes, at least 20 minutes, at least 25 minutes, at least 30 minutes, at least 35 minutes, at least 40 minutes, at least 45 minutes, at least 50 minutes, at least 55 minutes, at least 60 minutes, at least 70 minutes, at least 80 minutes, at least 90 minutes, at least 100 minutes, at least 110 minutes, or at least 120 minutes. In yet other aspects of this embodiment, a composition disclosed herein is applied to device, like a medical device, a surface, or an individual for, *e.g.*, at most 1 minute, at most 5 minutes, at most 10 minutes, at most 15 minutes, at most 20 minutes, at most 25 minutes, at most 30 minutes, at most 35 minutes, at most 40 minutes, at most 45 minutes, at most 50 minutes, at most 55 minutes, at most 60 minutes, at most 70 minutes, at most 80 minutes, at most 90 minutes, at most 100 minutes, at most 110 minutes, or at most 120 minutes.

[222] In still other aspects of this embodiment, a composition disclosed herein is applied to a device, like a medical device, a surface, or an individual for, *e.g.*, about 1 minute to about 5 minutes, about 1 minute to about 10 minutes, about 1 minute to about 15 minutes, about 1 minute to about 20 minutes, about 1 minute to about 25 minutes, about 1 minute to about 30 minutes, about 1 minute to about 35 minutes, about 1 minute to about 40 minutes, about 1 minute to about 45 minutes, about 1 minute to about 50 minutes, about 1 minute to about 55 minutes, about 1 minute to about 60 minutes, about 5 minutes to about 10 minutes, about 5 minutes to about 15 minutes, about 5 minutes to about 20 minutes, about 5 minutes to about 25 minutes, about 5 minutes to about 30 minutes, about 5 minutes to about 35 minutes, about 5 minutes to about 40 minutes, about 5 minutes to about 45 minutes, about 5 minutes to about 50 minutes, about 5 minutes to about 55 minutes, about 5 minutes to about 60 minutes, about 5 minutes to about 70 minutes, about 5 minutes to about 80 minutes, about 5 minutes to about 90 minutes, about 5 minutes to about 100 minutes, about 5 minutes to about 110 minutes, about 5 minutes to about 120 minutes, about 10 minutes to about 15 minutes, about 10 minutes to about 20 minutes, about 10 minutes to about 25 minutes, about 10 minutes to about 30 minutes, about 10 minutes to about 35 minutes, about 10 minutes to about 40 minutes, about 10 minutes to about 45 minutes, about 10 minutes to about 50 minutes, about 10 minutes to about 55 minutes, about 10 minutes to about 60 minutes, about 10 minutes to about 70 minutes, about 10 minutes to about 80 minutes, about 10 minutes to about 90 minutes, about 10 minutes to about 100 minutes, about 10 minutes to about 110 minutes, about 10 minutes to about 120 minutes, about 15 minutes to about 20 minutes, about 15 minutes to about 25 minutes, about 15 minutes to about 30 minutes, about 15 minutes to about 35 minutes, about 15 minutes to about 40 minutes, about 15 minutes to about 45 minutes, about 15 minutes to about 50 minutes, about 15 minutes to about 55 minutes, about 15 minutes to about 60 minutes, about 15 minutes to about 70 minutes, about 15 minutes to about 80 minutes, about 15 minutes to about 90 minutes, about 15 minutes to about 100 minutes, about 15 minutes to about 110 minutes, about 15 minutes to about 120 minutes, about 20 minutes to about 25 minutes, about 20 minutes to about 30 minutes, about 20 minutes to about 35 minutes, about 20 minutes to about 40 minutes, about 20 minutes to about 45 minutes, about 20 minutes to about 50 minutes, about 20 minutes to about 55 minutes, about 20 minutes to about 60 minutes, about 20 minutes to about 70 minutes, about 20 minutes to about 80 minutes, about 20 minutes to about 90 minutes, about 20 minutes to about 100 minutes, about

20 minutes to about 110 minutes, about 20 minutes to about 120 minutes, about 25 minutes to about 30 minutes, about 25 minutes to about 35 minutes, about 25 minutes to about 40 minutes, about 25 minutes to about 45 minutes, about 25 minutes to about 50 minutes, about 25 minutes to about 55 minutes, about 25 minutes to about 60 minutes, about 25 minutes to about 70 minutes, about 25 minutes to about 80 minutes, about 25 minutes to about 90 minutes, about 25 minutes to about 100 minutes, about 25 minutes to about 110 minutes, about 25 minutes to about 120 minutes, about 30 minutes to about 35 minutes, about 30 minutes to about 40 minutes, about 30 minutes to about 45 minutes, about 30 minutes to about 50 minutes, about 30 minutes to about 55 minutes, about 30 minutes to about 60 minutes, about 30 minutes to about 70 minutes, about 30 minutes to about 80 minutes, about 30 minutes to about 90 minutes, about 30 minutes to about 100 minutes, about 30 minutes to about 110 minutes, about 30 minutes to about 120 minutes, about 35 minutes to about 40 minutes, about 35 minutes to about 45 minutes, about 35 minutes to about 50 minutes, about 35 minutes to about 55 minutes, about 35 minutes to about 60 minutes, about 35 minutes to about 70 minutes, about 35 minutes to about 80 minutes, about 35 minutes to about 90 minutes, about 35 minutes to about 100 minutes, about 35 minutes to about 110 minutes, about 35 minutes to about 120 minutes, about 40 minutes to about 45 minutes, about 40 minutes to about 50 minutes, about 40 minutes to about 55 minutes, about 40 minutes to about 60 minutes, about 40 minutes to about 70 minutes, about 40 minutes to about 80 minutes, about 40 minutes to about 90 minutes, about 40 minutes to about 100 minutes, about 40 minutes to about 110 minutes, about 40 minutes to about 120 minutes, about 45 minutes to about 50 minutes, about 45 minutes to about 55 minutes, about 45 minutes to about 60 minutes, about 45 minutes to about 70 minutes, about 45 minutes to about 80 minutes, about 45 minutes to about 90 minutes, about 45 minutes to about 100 minutes, about 45 minutes to about 110 minutes, about 45 minutes to about 120 minutes, about 50 minutes to about 55 minutes, about 50 minutes to about 60 minutes, about 50 minutes to about 70 minutes, about 50 minutes to about 80 minutes, about 50 minutes to about 90 minutes, about 50 minutes to about 100 minutes, about 50 minutes to about 110 minutes, about 50 minutes to about 120 minutes, about 55 minutes to about 60 minutes, about 55 minutes to about 70 minutes, about 55 minutes to about 80 minutes, about 55 minutes to about 90 minutes, about 55 minutes to about 100 minutes, about 55 minutes to about 110 minutes, about 55 minutes to about 120 minutes, about 60 minutes to about 70 minutes, about 60 minutes to about 80 minutes, about 60 minutes to about 90 minutes, about 60 minutes to about 100 minutes, about 60 minutes to about 110 minutes, about 60 minutes to about 120 minutes, about 70 minutes to about 80 minutes, about 70 minutes to about 90 minutes, about 70 minutes to about 100 minutes, about 70 minutes to about 110 minutes, about 70 minutes to about 120 minutes, about 80 minutes to about 90 minutes, about 80 minutes to about 100 minutes, about 80 minutes to about 110 minutes, about 80 minutes to about 120 minutes, about 90 minutes to about 100 minutes, about 90 minutes to about 110 minutes, about 90 minutes to about 120 minutes, about 100 minutes to about 110 minutes, about 100 minutes to about 120 minutes, or about 110 minutes to about 120 minutes.

[223] A disclosed composition, method and/or use are less harsh on a medical device resulting in a longer lifetime use of a medical device. In aspects of this embodiment, a medical device can be cleaned, disinfected and/or sterilized, *e.g.*, about 50 times, about 60 times, about 70 times, about 80 times, about 90 times, about 100 times, about 110 times, about 120 times, about 130 times, about 140 times, about 150

times, about 160 times, about 170 times, about 180 times, about 190 times, about 200 times, about 210 times, about 220 times, about 230 times, about 240 times, about 250 times, about 260 times, about 270 times, about 280 times, about 290 times, or about 300 times. In other aspects of this embodiment, a medical device can be cleaned, disinfected and/or sterilized, *e.g.*, at least 50 times, at least 60 times, at least 70 times, at least 80 times, at least 90 times, at least 100 times, at least 110 times, at least 120 times, at least 130 times, at least 140 times, at least 150 times, at least 160 times, at least 170 times, at least 180 times, at least 190 times, at least 200 times, at least 210 times, at least 220 times, at least 230 times, at least 240 times, at least 250 times, at least 260 times, at least 270 times, at least 280 times, at least 290 times, or at least 300 times. In yet other aspects of this embodiment, a medical device can be cleaned, disinfected and/or sterilized, *e.g.*, at most 50 times, at most 60 times, at most 70 times, at most 80 times, at most 90 times, at most 100 times, at most 110 times, at most 120 times, at most 130 times, at most 140 times, at most 150 times, at most 160 times, at most 170 times, at most 180 times, at most 190 times, at most 200 times, at most 210 times, at most 220 times, at most 230 times, at most 240 times, at most 250 times, at most 260 times, at most 270 times, at most 280 times, at most 290 times, or at most 300 times.

[224] In still other aspects of this embodiment, a medical device can be cleaned, disinfected and/or sterilized, *e.g.*, about 50 times to about 60 times, about 50 times to about 70 times, about 50 times to about 80 times, about 50 times to about 90 times, about 50 times to about 100 times, about 50 times to about 110 times, about 50 times to about 120 times, about 50 times to about 130 times, about 50 times to about 140 times, about 50 times to about 150 times, about 50 times to about 175 times, about 50 times to about 200 times, about 50 times to about 225 times, about 50 times to about 250 times, about 50 times to about 275 times, about 50 times to about 300 times, about 75 times to about 90 times, about 75 times to about 100 times, about 75 times to about 110 times, about 75 times to about 120 times, about 75 times to about 130 times, about 75 times to about 140 times, about 75 times to about 150 times, about 75 times to about 175 times, about 75 times to about 200 times, about 75 times to about 225 times, about 75 times to about 250 times, about 75 times to about 275 times, about 75 times to about 300 times, about 100 times to about 110 times, about 100 times to about 120 times, about 100 times to about 130 times, about 100 times to about 140 times, about 100 times to about 150 times, about 100 times to about 175 times, about 100 times to about 200 times, about 100 times to about 225 times, about 100 times to about 250 times, about 100 times to about 275 times, about 100 times to about 300 times, about 125 times to about 150 times, about 125 times to about 175 times, about 125 times to about 200 times, about 125 times to about 225 times, about 125 times to about 250 times, about 125 times to about 275 times, about 125 times to about 300 times, about 150 times to about 175 times, about 150 times to about 200 times, about 150 times to about 225 times, about 150 times to about 250 times, about 150 times to about 275 times, about 150 times to about 300 times, about 175 times to about 200 times, about 175 times to about 225 times, about 175 times to about 250 times, about 175 times to about 275 times, about 175 times to about 300 times, about 200 times to about 225 times, about 200 times to about 250 times, about 200 times to about 275 times, about 200 times to about 300 times, about 225 times to about 250 times, about 225 times to about 275 times, about 225 times to about 300 times, about 250 times to about 275 times, about 250 times to about 300 times, or about 275 times to about 300 times.

[225] A method disclosed herein may further comprises a rinsing step using a rinse solution. Typically, the rinse solution is used to rinse a cleaned, disinfected and/or sterilized medical device or surface. The rinse solution is preferably a sterile solution. In one embodiment, a rinse solution disclosed herein comprises water. In another embodiment, a rinse solution disclosed herein comprises hypochlorous acid or free available chlorine and water. In another embodiment, a rinse solution disclosed herein does not comprises hypochlorous acid and/or free available chlorine. When present in a kit disclosed herein, the rinse solution is present in a separate container.

[226] The amount of hypochlorous acid or free available chlorine present in a rinse solution disclosed herein is any amount that provides an antimicrobial effect, with the proviso that the total amount of hypochlorous acid or free available chlorine present is an amount below the threshold level that results in oxidation of a medical device of surface as disclosed herein. In aspects of this embodiment, the amount of hypochlorous acid or free available chlorine present in a rinse solution may be, *e.g.*, about 5 ppm, about 10 ppm, about 20 ppm, about 30 ppm, about 40 ppm, about 50 ppm, about 60 ppm, about 70 ppm, about 80 ppm, about 90 ppm, about 100 ppm, about 110 ppm, or about 120 ppm. In other aspects of this embodiment, the amount of hypochlorous acid or free available chlorine present in a rinse solution may be, *e.g.*, at most 5 ppm, at most 10 ppm, at most 20 ppm, at most 30 ppm, at most 40 ppm, at most 50 ppm, at most 60 ppm, at most 70 ppm, at most 80 ppm, at most 90 ppm, at most 100 ppm, at most 110 ppm, or at most 120 ppm. In yet other aspects of this embodiment, the amount of hypochlorous acid or free available chlorine present in a rinse solution may be, *e.g.*, about 5 ppm to about 10 ppm, about 5 ppm to about 20 ppm, about 5 ppm to about 30 ppm, about 5 ppm to about 40 ppm, about 5 ppm to about 50 ppm, about 5 ppm to about 60 ppm, about 5 ppm to about 70 ppm, about 5 ppm to about 80 ppm, about 5 ppm to about 90 ppm, about 5 ppm to about 100 ppm, about 5 ppm to about 110 ppm, about 5 ppm to about 120 ppm, about 10 ppm to about 20 ppm, about 10 ppm to about 30 ppm, about 10 ppm to about 40 ppm, about 10 ppm to about 50 ppm, about 10 ppm to about 60 ppm, about 10 ppm to about 70 ppm, about 10 ppm to about 80 ppm, about 10 ppm to about 90 ppm, about 10 ppm to about 100 ppm, about 10 ppm to about 110 ppm, about 10 ppm to about 120 ppm, about 20 ppm to about 30 ppm, about 20 ppm to about 40 ppm, about 20 ppm to about 50 ppm, about 20 ppm to about 60 ppm, about 20 ppm to about 70 ppm, about 20 ppm to about 80 ppm, about 20 ppm to about 90 ppm, about 20 ppm to about 100 ppm, about 20 ppm to about 110 ppm, about 20 ppm to about 120 ppm, about 30 ppm to about 40 ppm, about 30 ppm to about 50 ppm, about 30 ppm to about 60 ppm, about 30 ppm to about 70 ppm, about 30 ppm to about 80 ppm, about 30 ppm to about 90 ppm, about 30 ppm to about 100 ppm, about 30 ppm to about 110 ppm, about 30 ppm to about 120 ppm, about 40 ppm to about 50 ppm, about 40 ppm to about 60 ppm, about 40 ppm to about 70 ppm, about 40 ppm to about 80 ppm, about 40 ppm to about 90 ppm, about 40 ppm to about 100 ppm, about 40 ppm to about 110 ppm, about 40 ppm to about 120 ppm, about 50 ppm to about 60 ppm, about 50 ppm to about 70 ppm, about 50 ppm to about 80 ppm, about 50 ppm to about 90 ppm, about 50 ppm to about 100 ppm, about 50 ppm to about 110 ppm, about 50 ppm to about 120 ppm, about 60 ppm to about 70 ppm, about 60 ppm to about 80 ppm, about 60 ppm to about 90 ppm, about 60 ppm to about 100 ppm, about 60 ppm to about 110 ppm, about 60 ppm to about 120 ppm, about 70 ppm to about 80 ppm, about 70 ppm to about 90 ppm, about 70 ppm to about 100 ppm, about 70 ppm to about 110 ppm, about 70 ppm to about 120 ppm, about 80 ppm to about 90 ppm, about 80 ppm to about 100 ppm, about

80 ppm to about 110 ppm, about 80 ppm to about 120 ppm, about 90 ppm to about 100 ppm, about 90 ppm to about 110 ppm, about 90 ppm to about 120 ppm, about 100 ppm to about 110 ppm, about 100 ppm to about 120 ppm, or about 110 ppm to about 120 ppm.

[227] Aspects of the present specification can also be described as follows:

1. A composition comprising, consisting essentially of, or consisting of hypochlorous acid or free available chlorine and one or more metallic particles.
2. A composition comprising, consisting essentially of, or consisting of hypochlorous acid or free available chlorine and one or more metal salts.
3. A composition comprising, consisting essentially of, or consisting of hypochlorous acid or free available chlorine, one or more metallic particles and one or more metal salts.
4. The composition according to embodiments 1-3, wherein the hypochlorous acid or free available chlorine is in an amount of 0.05 ppm, 0.10 ppm, 0.15 ppm, 0.20 ppm, 0.25 ppm, 0.30 ppm, 0.35 ppm, 0.40 ppm, 0.45 ppm, 0.50 ppm, 0.55 ppm, 0.60 ppm, 0.65 ppm, 0.70 ppm, 0.75 ppm, 0.80 ppm, 0.85 ppm, 0.90 ppm, 0.95 ppm, 1 ppm, 5 ppm, 10 ppm, 15 ppm, 20 ppm, 25 ppm, 30 ppm, 35 ppm, 40 ppm, 45 ppm, 50 ppm, 55 ppm, 60 ppm, 65 ppm, 70 ppm, 75 ppm, 80 ppm, 85 ppm, 90 ppm, 95 ppm, 100 ppm, 125 ppm, 150 ppm, 175 ppm, 200 ppm, 225 ppm, 250 ppm, 275 ppm, 300 ppm, 325 ppm, 350 ppm, 375 ppm, 400 ppm, 425 ppm, 450 ppm, 475 ppm, 500 ppm, 525 ppm, 550 ppm, 575 ppm, 600 ppm, 625 ppm, 650 ppm, 675 ppm, 700 ppm, 725 ppm, 750 ppm, 775 ppm, 800 ppm, 825 ppm, 850 ppm, 875 ppm, 900 ppm, 925 ppm, 950 ppm, 975 ppm, 1,000 ppm, 1,025 ppm, 1,050 ppm, 1075 ppm, 1,100 ppm, 1,125 ppm, 1,150 ppm, 1,175 ppm, 1,200 ppm, 1,225 ppm, 1,250 ppm, 1,275 ppm, 1,300 ppm, 1,325 ppm, 1,350 ppm, 1,375 ppm, 1,400 ppm, 1,425 ppm, 1,450 ppm, 1,475 ppm, 1,500 ppm, 1,600 ppm, 1,700 ppm, 1,800 ppm, 1,900 ppm, or 2,000 ppm or at least 0.05 ppm, at least 0.10 ppm, at least 0.20 ppm, at least 0.30 ppm, at least 0.40 ppm, at least 0.50 ppm, at least 0.60 ppm, at least 0.70 ppm, at least 0.80 ppm, at least 0.90 ppm, at least 1 ppm, at least 10 ppm, at least 20 ppm, at least 30 ppm, at least 40 ppm, at least 50 ppm, at least 60 ppm, at least 70 ppm, at least 80 ppm, at least 90 ppm, at least 100 ppm, at least 125 ppm, at least 150 ppm, at least 175 ppm, at least 200 ppm, at least 225 ppm, at least 250 ppm, at least 275 ppm, at least 300 ppm, at least 325 ppm, at least 350 ppm, at least 375 ppm, at least 400 ppm, at least 425 ppm, at least 450 ppm, at least 475 ppm, at least 500 ppm, at least 525 ppm, at least 550 ppm, at least 575 ppm, at least 600 ppm, at least 625 ppm, at least 650 ppm, at least 675 ppm, at least 700 ppm, at least 725 ppm, at least 750 ppm, at least 775 ppm, at least 800 ppm, at least 825 ppm, at least 850 ppm, at least 875 ppm, at least 900 ppm, at least 925 ppm, at least 950 ppm, at least 975 ppm, at least 1,000 ppm, at least 1,025 ppm, at least 1,050 ppm, at least 1075 ppm, at least 1,100 ppm, at least 1,125 ppm, at least 1,150 ppm, at least 1,175 ppm, at least 1,200 ppm, at least 1,225 ppm, at least 1,250 ppm, at least 1,275 ppm, at least 1,300 ppm, at least 1,325 ppm, at least 1,350 ppm, at least 1,375 ppm, at least 1,400 ppm, at least 1,425 ppm, at least 1,450 ppm, at least 1,475 ppm, at least 1,500 ppm, at least 1,600 ppm, at least 1,700 ppm, at least 1,800 ppm, at least 1,900 ppm, or at least 2,000 ppm or at most 0.05 ppm, at most 0.10 ppm, at most 0.20 ppm, at most 0.30 ppm, at most 0.40 ppm, at most 0.50 ppm, at most 0.60 ppm, at most 0.70 ppm, at most 0.80 ppm, at most 0.90 ppm, at most 1 ppm, at most 10 ppm, at most 20 ppm, at most 30 ppm, at most 40 ppm, at most 50 ppm, at most 60 ppm, at most 70 ppm, at most 80 ppm,

at most 90 ppm, at most 100 ppm, at most 125 ppm, at most 150 ppm, at most 175 ppm, at most 200 ppm, at most 225 ppm, at most 250 ppm, at most 275 ppm, at most 300 ppm, at most 325 ppm, at most 350 ppm, at most 375 ppm, at most 400 ppm, at most 425 ppm, at most 450 ppm, at most 475 ppm, at most 500 ppm, at most 525 ppm, at most 550 ppm, at most 575 ppm, at most 600 ppm, at most 625 ppm, at most 650 ppm, at most 675 ppm, at most 700 ppm, at most 725 ppm, at most 750 ppm, at most 775 ppm, at most 800 ppm, at most 825 ppm, at most 850 ppm, at most 875 ppm, at most 900 ppm, at most 925 ppm, at most 950 ppm, at most 975 ppm, at most 1,000 ppm, at most 1,025 ppm, at most 1,050 ppm, at most 1075 ppm, at most 1,100 ppm, at most 1,125 ppm, at most 1,150 ppm, at most 1,175 ppm, at most 1,200 ppm, at most 1,225 ppm, at most 1,250 ppm, at most 1,275 ppm, at most 1,300 ppm, at most 1,325 ppm, at most 1,350 ppm, at most 1,375 ppm, at most 1,400 ppm, at most 1,425 ppm, at most 1,450 ppm, at most 1,475 ppm, at most 1,500 ppm, at most 1,600 ppm, at most 1,700 ppm, at most 1,800 ppm, at most 1,900 ppm, or at most 2,000 ppm or about 0.5 ppm to about 20 ppm, about 0.5 ppm to about 25 ppm, about 0.5 ppm to about 30 ppm, about 0.5 ppm to about 35 ppm, about 0.5 ppm to about 40 ppm, about 0.5 ppm to about 45 ppm, about 0.5 ppm to about 50 ppm, about 0.5 ppm to about 55 ppm, about 0.5 ppm to about 60 ppm, about 0.5 ppm to about 65 ppm, about 0.5 ppm to about 70 ppm, about 0.5 ppm to about 75 ppm, about 0.5 ppm to about 80 ppm, about 0.5 ppm to about 85 ppm, about 0.5 ppm to about 90 ppm, about 0.5 ppm to about 95 ppm, about 0.5 ppm to about 100 ppm, about 0.75 ppm to about 20 ppm, about 0.75 ppm to about 25 ppm, about 0.75 ppm to about 30 ppm, about 0.75 ppm to about 35 ppm, about 0.75 ppm to about 40 ppm, about 0.75 ppm to about 45 ppm, about 0.75 ppm to about 50 ppm, about 0.75 ppm to about 55 ppm, about 0.75 ppm to about 60 ppm, about 0.75 ppm to about 65 ppm, about 0.75 ppm to about 70 ppm, about 0.75 ppm to about 75 ppm, about 0.75 ppm to about 80 ppm, about 0.75 ppm to about 85 ppm, about 0.75 ppm to about 90 ppm, about 0.75 ppm to about 95 ppm, about 0.75 ppm to about 100 ppm, about 1 ppm to about 20 ppm, about 1 ppm to about 25 ppm, about 1 ppm to about 30 ppm, about 1 ppm to about 35 ppm, about 1 ppm to about 40 ppm, about 1 ppm to about 45 ppm, about 1 ppm to about 50 ppm, about 1 ppm to about 55 ppm, about 1 ppm to about 60 ppm, about 1 ppm to about 65 ppm, about 1 ppm to about 70 ppm, about 1 ppm to about 75 ppm, about 1 ppm to about 80 ppm, about 1 ppm to about 85 ppm, about 1 ppm to about 90 ppm, about 1 ppm to about 95 ppm, about 1 ppm to about 100 ppm, about 5 ppm to about 20 ppm, about 5 ppm to about 25 ppm, about 5 ppm to about 30 ppm, about 5 ppm to about 35 ppm, about 5 ppm to about 40 ppm, about 5 ppm to about 45 ppm, about 5 ppm to about 50 ppm, about 5 ppm to about 55 ppm, about 5 ppm to about 60 ppm, about 5 ppm to about 65 ppm, about 5 ppm to about 70 ppm, about 5 ppm to about 75 ppm, about 5 ppm to about 80 ppm, about 5 ppm to about 85 ppm, about 5 ppm to about 90 ppm, about 5 ppm to about 95 ppm, about 5 ppm to about 100 ppm, about 10 ppm to about 20 ppm, about 10 ppm to about 25 ppm, about 10 ppm to about 30 ppm, about 10 ppm to about 35 ppm, about 10 ppm to about 40 ppm, about 10 ppm to about 45 ppm, about 10 ppm to about 50 ppm, about 10 ppm to about 55 ppm, about 10 ppm to about 60 ppm, about 10 ppm to about 65 ppm, about 10 ppm to about 70 ppm, about 10 ppm to about 75 ppm, about 10 ppm to about 80 ppm, about 10 ppm to about 85 ppm, about 10 ppm to about 90 ppm, about 10 ppm to about 95 ppm, or about 10 ppm to about 100 ppm, about 1 ppm to about 25 ppm, about 1 ppm to about 50 ppm, about 1 ppm to about 75 ppm, about 1 ppm to about 100 ppm, about 1 ppm to about 125 ppm, about 1 ppm to about 150 ppm, about 1 ppm to about 175 ppm, about 1 ppm to about 200

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5. The composition according to any one of embodiments 1-4, wherein the hypochlorous acid or free available chlorine is in an amount of about 0.10%, about 0.11%, about 0.12%, about 0.13%, about 0.14%, about 0.15%, about 0.16%, about 0.17%, about 0.18%, about 0.19%, about 0.2%, about 0.25%, about 0.3%, about 0.35%, about 0.4%, about 0.45%, or about 0.5% by weight of the composition, or at least 0.10%, at least 0.11%, at least 0.12%, at least 0.13%, at least 0.14%, at least 0.15%, at least 0.16%, at least 0.17%, at least 0.18%, at least 0.19%, at least 0.2%, at least 0.25%, at least 0.3%, at least 0.35%, at least 0.4%, at least 0.45%, or at least 0.5% by weight of the composition, or at most 0.10%, at most 0.11%, at most 0.12%, at most 0.13%, at most 0.14%, at most 0.15%, at most 0.16%, at most 0.17%, at most 0.18%, at most 0.19%, at most 0.2%, at most 0.25%, at most 0.3%, at most 0.35%, at most 0.4%, at most 0.45%, or at most 0.5% by weight of the composition, or about 0.10% to about 0.15%, about 0.10% to about 0.20%, about 0.10% to about 0.25%, about 0.10% to about 0.30%, about 0.10% to about 0.35%, about 0.10% to about 0.40%, about 0.10% to about 0.45%, about 0.10% to about 0.50%, about 0.20% to about 0.25%, about 0.20% to about 0.30%, about 0.20% to about 0.35%, about 0.20% to about 0.40%, about 0.20% to about 0.45%, about 0.20% to about 0.50%, about 0.30% to about 0.35%, about 0.30% to about 0.40%, about 0.30% to about 0.45%, about 0.30% to about 0.50%, about 0.40% to about 0.45%, about 0.40% to about 0.50%, or about 0.40% to about 0.50% by weight of the composition.
6. The composition according to any one of embodiments 1 or 3-5, wherein the one or more metallic particles include a metal acetate particle, a metal chloride particle, a metal nitrate particle, or a metal oxide particle, or any combination thereof.
7. The composition according to any one of embodiments 1 or 3-5, wherein the one or more metallic particles are in an amount of 0.05 ppm, 0.10 ppm, 0.15 ppm, 0.20 ppm, 0.25 ppm, 0.30 ppm, 0.35 ppm, 0.40 ppm, 0.45 ppm, 0.50 ppm, 0.55 ppm, 0.60 ppm, 0.65 ppm, 0.70 ppm, 0.75 ppm, 0.80 ppm, 0.85 ppm, 0.90 ppm, 0.95 ppm, 1 ppm, 5 ppm, 10 ppm, 15 ppm, 20 ppm, 25 ppm, 30 ppm, 35 ppm, 40 ppm, 45 ppm, 50 ppm, 55 ppm, 60 ppm, 65 ppm, 70 ppm, 75 ppm, 80 ppm, 85 ppm, 90 ppm, 95 ppm, 100 ppm, 125 ppm, 150 ppm, 175 ppm, 200 ppm, 225 ppm, 250 ppm, 275 ppm, 300 ppm, 325 ppm, 350

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8. The composition according to any one of embodiments 1 or 3-5, wherein the one or more metallic particles are in an amount of about 0.10%, about 0.11%, about 0.12%, about 0.13%, about 0.14%, about 0.15%, about 0.16%, about 0.17%, about 0.18%, about 0.19%, about 0.2%, about 0.25%, about 0.3%, about 0.35%, about 0.4%, about 0.45%, or about 0.5% by weight of the composition, or at least 0.10%, at least 0.11%, at least 0.12%, at least 0.13%, at least 0.14%, at least 0.15%, at least 0.16%, at least 0.17%, at least 0.18%, at least 0.19%, at least 0.2%, at least 0.25%, at least 0.3%, at least 0.35%, at least 0.4%, at least 0.45%, or at least 0.5% by weight of the composition, or at most 0.10%, at most 0.11%, at most 0.12%, at most 0.13%, at most 0.14%, at most 0.15%, at most 0.16%, at most 0.17%, at most 0.18%, at most 0.19%, at most 0.2%, at most 0.25%, at most 0.3%, at most 0.35%, at most 0.4%, at most 0.45%, or at most 0.5% by weight of the composition, or about 0.10% to about 0.15%, about 0.10% to about 0.20%, about 0.10% to about 0.25%, about 0.10% to about 0.30%, about 0.10% to about 0.35%, about 0.10% to about 0.40%, about 0.10% to about 0.45%, about 0.10% to about 0.50%, about 0.20% to about 0.25%, about 0.20% to about 0.30%, about 0.20% to about 0.35%, about 0.20% to about 0.40%, about 0.20% to about 0.45%, about 0.20% to about 0.50%, about 0.30% to about 0.35%, about 0.30% to about 0.40%, about 0.30% to about 0.45%, about 0.30% to about 0.50%, about 0.40% to about 0.45%, about 0.40% to about 0.50%, or about 0.40% to about 0.50% by weight of the composition.

9. The composition according to any one of embodiments 1 or 3-8, wherein the one or more metallic particles have a mean diameter of about 10 nm, about 20 nm, about 30 nm, about 40 nm, about 50 nm, about 60 nm, about 70 nm, about 80 nm, about 90 nm, about 100 nm, or at least 10 nm, at least 20 nm, at least 30 nm, at least 40 nm, at least 50 nm, at least 60 nm, at least 70 nm, at least 80 nm, at least 90 nm, at least 100 nm, or at most 10 nm, at most 20 nm, at most 30 nm, at most 40 nm, at most 50 nm, at most 60 nm, at most 70 nm, at most 80 nm, at most 90 nm, at most 100 nm, or about 10 nm to about 20 nm, about 10 nm to about 30 nm, about 10 nm to about 40 nm, about 10 nm to about 50 nm, about 10 nm to about 60 nm, about 10 nm to about 70 nm, about 10 nm to about 80 nm, about 10 nm to about 90 nm, about 10 nm to about 100 nm, about 20 nm to about 30 nm, about 20 nm to about 40 nm, about 20 nm to about 50 nm, about 20 nm to about 60 nm, about 20 nm to about 70 nm, about 20 nm to about 80 nm, about 20 nm to about 90 nm, about 20 nm to about 100 nm, about 30 nm to

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10. The composition according to any one of embodiments 2-9, wherein the one or more metal salts include copper chloride, iron chloride, titanium chloride, zinc chloride, calcium oxide, or any combination thereof.

11. The composition according to any one of embodiments 2-10, wherein the one or more metal salt are in an amount of 0.05 ppm, 0.10 ppm, 0.15 ppm, 0.20 ppm, 0.25 ppm, 0.30 ppm, 0.35 ppm, 0.40 ppm, 0.45 ppm, 0.50 ppm, 0.55 ppm, 0.60 ppm, 0.65 ppm, 0.70 ppm, 0.75 ppm, 0.80 ppm, 0.85 ppm, 0.90 ppm, 0.95 ppm, 1 ppm, 5 ppm, 10 ppm, 15 ppm, 20 ppm, 25 ppm, 30 ppm, 35 ppm, 40 ppm, 45 ppm, 50 ppm, 55 ppm, 60 ppm, 65 ppm, 70 ppm, 75 ppm, 80 ppm, 85 ppm, 90 ppm, 95 ppm, 100 ppm, 125 ppm, 150 ppm, 175 ppm, 200 ppm, 225 ppm, 250 ppm, 275 ppm, 300 ppm, 325 ppm, 350 ppm, 375 ppm, 400 ppm, 425 ppm, 450 ppm, 475 ppm, 500 ppm, 525 ppm, 550 ppm, 575 ppm, 600 ppm, 625 ppm, 650 ppm, 675 ppm, 700 ppm, 725 ppm, 750 ppm, 775 ppm, 800 ppm, 825 ppm, 850 ppm, 875 ppm, 900 ppm, 925 ppm, 950 ppm, 975 ppm, 1,000 ppm, 1,025 ppm, 1,050 ppm, 1075 ppm, 1,100 ppm, 1,125 ppm, 1,150 ppm, 1,175 ppm, 1,200 ppm, 1,225 ppm, 1,250 ppm, 1,275 ppm, 1,300 ppm, 1,325 ppm, 1,350 ppm, 1,375 ppm, 1,400 ppm, 1,425 ppm, 1,450 ppm, 1,475 ppm, 1,500 ppm, 1,600 ppm, 1,700 ppm, 1,800 ppm, 1,900 ppm, or 2,000 ppm or at least 0.05 ppm, at least 0.10 ppm, at least 0.20 ppm, at least 0.30 ppm, at least 0.40 ppm, at least 0.50 ppm, at least 0.60 ppm, at least 0.70 ppm, at least 0.80 ppm, at least 0.90 ppm, at least 1 ppm, at least 10 ppm, at least 20 ppm, at least 30 ppm, at least 40 ppm, at least 50 ppm, at least 60 ppm, at least 70 ppm, at least 80 ppm, at least 90 ppm, at least 100 ppm, at least 125 ppm, at least 150 ppm, at least 175 ppm, at least 200 ppm, at least 225 ppm, at least 250 ppm, at least 275 ppm, at least 300 ppm, at least 325 ppm, at least 350 ppm, at least 375 ppm, at least 400 ppm, at least 425 ppm, at least 450 ppm, at least 475 ppm, at least 500 ppm, at least 525 ppm, at least 550 ppm, at least 575 ppm, at least 600 ppm, at least 625 ppm, at least 650 ppm, at least 675 ppm, at least 700 ppm, at least 725 ppm, at least 750 ppm, at least 775 ppm, at least 800 ppm, at least 825 ppm, at least 850 ppm, at least 875 ppm, at least 900 ppm, at least 925 ppm, at least 950 ppm, at least 975 ppm, at least 1,000 ppm, at least 1,025 ppm, at least 1,050 ppm, at least 1075 ppm, at least 1,100 ppm, at least 1,125 ppm, at least 1,150 ppm, at least 1,175 ppm, at least 1,200 ppm, at least 1,225 ppm, at least 1,250 ppm, at least 1,275 ppm, at least 1,300 ppm, at least 1,325 ppm, at least 1,350 ppm, at least 1,375 ppm, at least 1,400 ppm, at least 1,425 ppm, at least 1,450 ppm, at least 1,475 ppm, at least 1,500 ppm, at least 1,600 ppm, at least 1,700 ppm, at least 1,800 ppm, at least 1,900 ppm, or at least 2,000 ppm or at most 0.05 ppm, at most 0.10 ppm, at most 0.20 ppm, at most 0.30 ppm, at most 0.40 ppm, at most 0.50 ppm, at most 0.60 ppm, at most 0.70 ppm, at most 0.80 ppm, at most 0.90 ppm, at most 1 ppm, at most 10 ppm, at most 20 ppm, at most

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12. The composition according to any one of embodiments 2-10, wherein the one or more metal salt are in an amount of about 0.10%, about 0.11%, about 0.12%, about 0.13%, about 0.14%, about 0.15%, about 0.16%, about 0.17%, about 0.18%, about 0.19%, about 0.2%, about 0.25%, about 0.3%, about 0.35%, about 0.4%, about 0.45%, or about 0.5% by weight of the composition, or at least 0.10%, at least 0.11%, at least 0.12%, at least 0.13%, at least 0.14%, at least 0.15%, at least 0.16%, at least 0.17%, at least 0.18%, at least 0.19%, at least 0.2%, at least 0.25%, at least 0.3%, at least 0.35%, at least 0.4%, at least 0.45%, or at least 0.5% by weight of the composition, or at most 0.10%, at most 0.11%, at most 0.12%, at most 0.13%, at most 0.14%, at most 0.15%, at most 0.16%, at most 0.17%, at most 0.18%, at most 0.19%, at most 0.2%, at most 0.25%, at most 0.3%, at most 0.35%, at most 0.4%, at most 0.45%, or at most 0.5% by weight of the composition, or about 0.10% to about 0.15%, about 0.10% to

about 0.20%, about 0.10% to about 0.25%, about 0.10% to about 0.30%, about 0.10% to about 0.35%, about 0.10% to about 0.40%, about 0.10% to about 0.45%, about 0.10% to about 0.50%, about 0.20% to about 0.25%, about 0.20% to about 0.30%, about 0.20% to about 0.35%, about 0.20% to about 0.40%, about 0.20% to about 0.45%, about 0.20% to about 0.50%, about 0.30% to about 0.35%, about 0.30% to about 0.40%, about 0.30% to about 0.45%, about 0.30% to about 0.50%, about 0.40% to about 0.45%, about 0.40% to about 0.50%, or about 0.40% to about 0.50% by weight of the composition.

13. The composition according to any one of embodiments 1-12, further comprising a phosphate buffer.
14. The composition according to embodiment 13, wherein the phosphate buffer is a calcium phosphate buffer or a sodium phosphate buffer.
15. The composition according to embodiments 13 or 14, wherein the phosphate buffer is in an amount of 0.05 ppm, 0.10 ppm, 0.15 ppm, 0.20 ppm, 0.25 ppm, 0.30 ppm, 0.35 ppm, 0.40 ppm, 0.45 ppm, 0.50 ppm, 0.55 ppm, 0.60 ppm, 0.65 ppm, 0.70 ppm, 0.75 ppm, 0.80 ppm, 0.85 ppm, 0.90 ppm, 0.95 ppm, 1 ppm, 5 ppm, 10 ppm, 15 ppm, 20 ppm, 25 ppm, 30 ppm, 35 ppm, 40 ppm, 45 ppm, 50 ppm, 55 ppm, 60 ppm, 65 ppm, 70 ppm, 75 ppm, 80 ppm, 85 ppm, 90 ppm, 95 ppm, 100 ppm, 125 ppm, 150 ppm, 175 ppm, 200 ppm, 225 ppm, 250 ppm, 275 ppm, 300 ppm, 325 ppm, 350 ppm, 375 ppm, 400 ppm, 425 ppm, 450 ppm, 475 ppm, 500 ppm, 525 ppm, 550 ppm, 575 ppm, 600 ppm, 625 ppm, 650 ppm, 675 ppm, 700 ppm, 725 ppm, 750 ppm, 775 ppm, 800 ppm, 825 ppm, 850 ppm, 875 ppm, 900 ppm, 925 ppm, 950 ppm, 975 ppm, 1,000 ppm, 1,025 ppm, 1,050 ppm, 1075 ppm, 1,100 ppm, 1,125 ppm, 1,150 ppm, 1,175 ppm, 1,200 ppm, 1,225 ppm, 1,250 ppm, 1,275 ppm, 1,300 ppm, 1,325 ppm, 1,350 ppm, 1,375 ppm, 1,400 ppm, 1,425 ppm, 1,450 ppm, 1,475 ppm, 1,500 ppm, 1,600 ppm, 1,700 ppm, 1,800 ppm, 1,900 ppm, or 2,000 ppm or at least 0.05 ppm, at least 0.10 ppm, at least 0.20 ppm, at least 0.30 ppm, at least 0.40 ppm, at least 0.50 ppm, at least 0.60 ppm, at least 0.70 ppm, at least 0.80 ppm, at least 0.90 ppm, at least 1 ppm, at least 10 ppm, at least 20 ppm, at least 30 ppm, at least 40 ppm, at least 50 ppm, at least 60 ppm, at least 70 ppm, at least 80 ppm, at least 90 ppm, at least 100 ppm, at least 125 ppm, at least 150 ppm, at least 175 ppm, at least 200 ppm, at least 225 ppm, at least 250 ppm, at least 275 ppm, at least 300 ppm, at least 325 ppm, at least 350 ppm, at least 375 ppm, at least 400 ppm, at least 425 ppm, at least 450 ppm, at least 475 ppm, at least 500 ppm, at least 525 ppm, at least 550 ppm, at least 575 ppm, at least 600 ppm, at least 625 ppm, at least 650 ppm, at least 675 ppm, at least 700 ppm, at least 725 ppm, at least 750 ppm, at least 775 ppm, at least 800 ppm, at least 825 ppm, at least 850 ppm, at least 875 ppm, at least 900 ppm, at least 925 ppm, at least 950 ppm, at least 975 ppm, at least 1,000 ppm, at least 1,025 ppm, at least 1,050 ppm, at least 1075 ppm, at least 1,100 ppm, at least 1,125 ppm, at least 1,150 ppm, at least 1,175 ppm, at least 1,200 ppm, at least 1,225 ppm, at least 1,250 ppm, at least 1,275 ppm, at least 1,300 ppm, at least 1,325 ppm, at least 1,350 ppm, at least 1,375 ppm, at least 1,400 ppm, at least 1,425 ppm, at least 1,450 ppm, at least 1,475 ppm, at least 1,500 ppm, at least 1,600 ppm, at least 1,700 ppm, at least 1,800 ppm, at least 1,900 ppm, or at least 2,000 ppm or at most 0.05 ppm, at most 0.10 ppm, at most 0.20 ppm, at most 0.30 ppm, at most 0.40 ppm, at most 0.50 ppm, at most 0.60 ppm, at most 0.70 ppm, at most 0.80 ppm, at most 0.90 ppm, at most 1 ppm, at most 10 ppm, at most 20 ppm, at most 30 ppm, at most 40 ppm, at most 50 ppm, at most 60 ppm, at most 70 ppm, at most 80 ppm, at most 90 ppm, at most 100 ppm, at most 125 ppm, at most 150 ppm, at most 175 ppm, at most 200 ppm, at most 225 ppm, at

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16. The composition according to any one of embodiments 1-15, further comprising, consisting essentially of, or consisting of one or more carriers.
17. The composition according to embodiment 16, wherein the one or more carrier includes an aqueous carrier, a semi-solid carrier, a solid carrier, or any combination thereof.
18. The composition according to embodiment 16 or 17, wherein the one or more carrier includes water, a vegetable oil, a mineral oil, an ester oil, an ether, an alcohol, a fatty alcohol, an isoparaffin, a hydrocarbon oil, a polyol, a wax, or any combination thereof.
19. The composition according to embodiment 18, wherein the ester oil includes octal palmitate, isopropyl myristate or isopropyl palmitate.
20. The composition according to embodiment 18, wherein the ether includes dicapryl ether or dimethyl isosorbide.
21. The composition according to embodiment 18, wherein the alcohol includes ethanol or isopropanol.
22. The composition according to embodiment 18, wherein the fatty alcohol includes cetyl alcohol, cetearyl alcohol, stearyl alcohol or behenyl alcohol.
23. The composition according to embodiment 18, wherein the isoparaffin includes isooctane, isododecane (IDD) or isohexadecane.

24. The composition according to embodiment 18, wherein the hydrocarbon oil includes mineral oil, petrolatum, isoeicosane or a polyolefin.
25. The composition according to embodiment 18, wherein the polyol includes propylene glycol, glycerin, butylene glycol, pentylene glycol, hexylene glycol, or caprylyl glycol.
26. The composition according to embodiment 18, wherein the wax includes beeswax, carnauba, ozokerite, microcrystalline wax, polyethylene wax, or a botanical wax.
27. The composition according to any one of embodiments 16-26, wherein the one or more carriers are in an amount of at least 5%, at least 10%, at least 15%, at least 20%, at least 25%, at least 30%, at least 35%, at least 40%, at least 45%, at least 50%, at least 55%, at least 60%, at least 65%, at least 70%, at least 75%, at least 80%, at least 85%, at least 90%, at least 95%, at least 96%, at least 97%, at least 98% or at least 99% by weight of the composition or at most 5%, at most 10%, at most 15%, at most 20%, at most 25%, at most 30%, at most 35%, at most 40%, at most 45%, at most 50%, at most 55%, at most 60%, at most 65%, at most 70%, at most 75%, at most 80%, at most 85%, at most 90%, at most 95%, at most 96%, at most 97%, at most 98% or at most 99% by weight of the composition or about 5% to about 25%, about 5% to about 50%, about 5% to about 75%, about 5% to about 90%, about 5% to about 95%, about 5% to about 96%, about 5% to about 97%, about 5% to about 98%, about 5% to about 99%, about 25% to about 50%, about 25% to about 75%, about 25% to about 90%, about 25% to about 95%, about 25% to about 96%, about 25% to about 97%, about 25% to about 98%, about 25% to about 99%, about 50% to about 75%, about 50% to about 90%, about 50% to about 95%, about 50% to about 96%, about 50% to about 97%, about 50% to about 98%, about 50% to about 99%, about 75% to about 80%, about 75% to about 85%, about 75% to about 90%, about 75% to about 95%, about 75% to about 96%, about 75% to about 97%, about 75% to about 98%, about 75% to about 99%, about 80% to about 85%, about 80% to about 90%, about 80% to about 95%, about 80% to about 96%, about 80% to about 97%, about 80% to about 98%, about 80% to about 99%, about 85% to about 90%, about 85% to about 95%, about 85% to about 96%, about 85% to about 97%, about 85% to about 98%, about 85% to about 99%, about 90% to about 95%, about 90% to about 96%, about 90% to about 97%, about 90% to about 98%, about 90% to about 99%, or about 95% to about 99%, by weight of the composition.
28. The composition according to any one of embodiments 1-27, further comprising, consisting essentially of, or consisting of one or more additional ingredients.
29. The composition according to embodiment 28, wherein the one or more additional ingredient includes a preservative, a chelating agent, or any combination thereof.
30. The composition according to any one of embodiments 1-29, having a pH of about 2 to about 5, about 2 to about 5.5, about 2 to about 6, about 2 to about 6.5, about 2 to about 7, about 2 to about 7.5, about 2 to about 8, about 2 to about 8.5, about 2 to about 9, about 2.5 to about 5, about 2.5 to about 5.5, about 2.5 to about 6, about 2.5 to about 6.5, about 2.5 to about 7, about 2.5 to about 7.5, about 2.5 to about 8, about 2.5 to about 8.5, about 2.5 to about 9, about 3 to about 5, about 3 to about 5.5, about 3 to about 6, about 3 to about 6.5, about 3 to about 7, about 3 to about 7.5, about 3 to about 8, about 3 to about 8.5, about 3 to about 9, about 3.5 to about 5, about 3.5 to about 5.5, about 3.5 to about 6, about 3.5 to about 6.5, about 3.5 to about 7, about 3.5 to about 7.5, about 3.5 to about 8, about 3.5 to about 8.5, about 3.5 to about 9, about 4 to about 5, about 4 to about 5.5, about 4 to about 6, about 4 to

about 6.5, about 4 to about 7, about 4 to about 7.5, about 4 to about 8, about 4 to about 8.5, about 4 to about 9, about 4.5 to about 5, about 4.5 to about 5.5, about 4.5 to about 6, about 4.5 to about 6.5, about 4.5 to about 7, about 4.5 to about 7.5, about 4.5 to about 8, about 4.5 to about 8.5, about 4.5 to about 9, about 5 to about 5.5, about 5 to about 6, about 5 to about 6.5, about 5 to about 7, about 5 to about 7.5, about 5 to about 8, about 5 to about 8.5, about 5 to about 9, about 5.5 to about 6, about 5.5 to about 6.5, about 5.5 to about 7, about 5.5 to about 7.5, about 5.5 to about 8, about 5.5 to about 8.5, about 5.5 to about 9, about 6 to about 6.5, about 6 to about 7, about 6 to about 7.5, about 6 to about 8, about 6 to about 8.5, about 6 to about 9, about 6.5 to about 7, about 6.5 to about 7.5, about 6.5 to about 8, about 6.5 to about 8.5, about 6.5 to about 9, about 7 to about 7.5, about 7 to about 8, about 7 to about 8.5, about 7 to about 9, about 7.5 to about 8, about 7.5 to about 8.5, about 7.5 to about 9, about 8 to about 8.5, about 8 to about 9, or about 8.5 to about 9.

31. The composition according to any one of embodiments 1-30, wherein a calcium oxide is used to adjust the pH level of the composition.
32. A kit comprising, consisting essentially of, or consisting of a composition as defined in any one of embodiments 1-31.
33. The kit according to embodiment 32, further comprising, consisting essentially of, or consisting of one or more delivery or application systems, and/or instructions, and/or a container.
34. A kit comprising, consisting essentially of, or consisting of a first component including hypochlorous acid or free available chlorine and a second component including one or more metallic particles.
35. A kit comprising, consisting essentially of, or consisting of a first component including hypochlorous acid or free available chlorine and a second component including one or more metal salts.
36. A kit comprising, consisting essentially of, or consisting of a first component including hypochlorous acid or free available chlorine, a second component including one or more metallic particles and a third component including one or more metal salts.
37. A kit comprising, consisting essentially of, or consisting of a first component including hypochlorous acid or free available chlorine, a second component including one or more metallic particles and one or more metal salts.
38. The kit according to any one of embodiments 32-37, further comprising container comprising a rinse solution and/or one or more delivery or application systems, and/or instructions, and/or a container
39. The kit according to embodiments 34-38, wherein the hypochlorous acid or free available chlorine is in an amount of 0.05 ppm, 0.10 ppm, 0.15 ppm, 0.20 ppm, 0.25 ppm, 0.30 ppm, 0.35 ppm, 0.40 ppm, 0.45 ppm, 0.50 ppm, 0.55 ppm, 0.60 ppm, 0.65 ppm, 0.70 ppm, 0.75 ppm, 0.80 ppm, 0.85 ppm, 0.90 ppm, 0.95 ppm, 1 ppm, 5 ppm, 10 ppm, 15 ppm, 20 ppm, 25 ppm, 30 ppm, 35 ppm, 40 ppm, 45 ppm, 50 ppm, 55 ppm, 60 ppm, 65 ppm, 70 ppm, 75 ppm, 80 ppm, 85 ppm, 90 ppm, 95 ppm, 100 ppm, 125 ppm, 150 ppm, 175 ppm, 200 ppm, 225 ppm, 250 ppm, 275 ppm, 300 ppm, 325 ppm, 350 ppm, 375 ppm, 400 ppm, 425 ppm, 450 ppm, 475 ppm, 500 ppm, 525 ppm, 550 ppm, 575 ppm, 600 ppm, 625 ppm, 650 ppm, 675 ppm, 700 ppm, 725 ppm, 750 ppm, 775 ppm, 800 ppm, 825 ppm, 850 ppm, 875 ppm, 900 ppm, 925 ppm, 950 ppm, 975 ppm, 1,000 ppm, 1,025 ppm, 1,050 ppm, 1075 ppm, 1,100 ppm, 1,125 ppm, 1,150 ppm, 1,175 ppm, 1,200 ppm, 1,225 ppm, 1,250 ppm, 1,275 ppm, 1,300 ppm, 1,325 ppm, 1,350 ppm, 1,375 ppm, 1,400 ppm, 1,425 ppm, 1,450 ppm, 1,475 ppm, 1,500 ppm, 1,600 ppm, 1,700 ppm, 1,800 ppm, 1,900 ppm, or 2,000 ppm or at least 0.05 ppm, at least 0.10 ppm, at least

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40. The kit according to any one of embodiments 34-48, wherein the hypochlorous acid or free available chlorine is in an amount of about 0.10%, about 0.11%, about 0.12%, about 0.13%, about 0.14%, about 0.15%, about 0.16%, about 0.17%, about 0.18%, about 0.19%, about 0.2%, about 0.25%, about 0.3%, about 0.35%, about 0.4%, about 0.45%, or about 0.5% by weight of the composition, or at least 0.10%, at least 0.11%, at least 0.12%, at least 0.13%, at least 0.14%, at least 0.15%, at least 0.16%, at least 0.17%, at least 0.18%, at least 0.19%, at least 0.2%, at least 0.25%, at least 0.3%, at least 0.35%, at least 0.4%, at least 0.45%, or at least 0.5% by weight of the composition, or at most 0.10%, at most 0.11%, at most 0.12%, at most 0.13%, at most 0.14%, at most 0.15%, at most 0.16%, at most 0.17%,

at most 0.18%, at most 0.19%, at most 0.2%, at most 0.25%, at most 0.3%, at most 0.35%, at most 0.4%, at most 0.45%, or at most 0.5% by weight of the composition, or about 0.10% to about 0.15%, about 0.10% to about 0.20%, about 0.10% to about 0.25%, about 0.10% to about 0.30%, about 0.10% to about 0.35%, about 0.10% to about 0.40%, about 0.10% to about 0.45%, about 0.10% to about 0.50%, about 0.20% to about 0.25%, about 0.20% to about 0.30%, about 0.20% to about 0.35%, about 0.20% to about 0.40%, about 0.20% to about 0.45%, about 0.20% to about 0.50%, about 0.30% to about 0.35%, about 0.30% to about 0.40%, about 0.30% to about 0.45%, about 0.30% to about 0.50%, about 0.40% to about 0.45%, about 0.40% to about 0.50%, or about 0.40% to about 0.50% by weight of the composition.

41. The kit according to any one of embodiments 34 or 36-40, wherein the one or more metallic particles include a metal acetate particle, a metal chloride particle, a metal nitrate particle, or a metal oxide particle, or any combination thereof.

42. The kit according to any one of embodiments 34 or 36-41 wherein the one or more metallic particles are in an amount of 0.05 ppm, 0.10 ppm, 0.15 ppm, 0.20 ppm, 0.25 ppm, 0.30 ppm, 0.35 ppm, 0.40 ppm, 0.45 ppm, 0.50 ppm, 0.55 ppm, 0.60 ppm, 0.65 ppm, 0.70 ppm, 0.75 ppm, 0.80 ppm, 0.85 ppm, 0.90 ppm, 0.95 ppm, 1 ppm, 5 ppm, 10 ppm, 15 ppm, 20 ppm, 25 ppm, 30 ppm, 35 ppm, 40 ppm, 45 ppm, 50 ppm, 55 ppm, 60 ppm, 65 ppm, 70 ppm, 75 ppm, 80 ppm, 85 ppm, 90 ppm, 95 ppm, 100 ppm, 125 ppm, 150 ppm, 175 ppm, 200 ppm, 225 ppm, 250 ppm, 275 ppm, 300 ppm, 325 ppm, 350 ppm, 375 ppm, 400 ppm, 425 ppm, 450 ppm, 475 ppm, 500 ppm, 525 ppm, 550 ppm, 575 ppm, 600 ppm, 625 ppm, 650 ppm, 675 ppm, 700 ppm, 725 ppm, 750 ppm, 775 ppm, 800 ppm, 825 ppm, 850 ppm, 875 ppm, 900 ppm, 925 ppm, 950 ppm, 975 ppm, 1,000 ppm, 1,025 ppm, 1,050 ppm, 1075 ppm, 1,100 ppm, 1,125 ppm, 1,150 ppm, 1,175 ppm, 1,200 ppm, 1,225 ppm, 1,250 ppm, 1,275 ppm, 1,300 ppm, 1,325 ppm, 1,350 ppm, 1,375 ppm, 1,400 ppm, 1,425 ppm, 1,450 ppm, 1,475 ppm, 1,500 ppm, 1,600 ppm, 1,700 ppm, 1,800 ppm, 1,900 ppm, or 2,000 ppm or at least 0.05 ppm, at least 0.10 ppm, at least 0.20 ppm, at least 0.30 ppm, at least 0.40 ppm, at least 0.50 ppm, at least 0.60 ppm, at least 0.70 ppm, at least 0.80 ppm, at least 0.90 ppm, at least 1 ppm, at least 10 ppm, at least 20 ppm, at least 30 ppm, at least 40 ppm, at least 50 ppm, at least 60 ppm, at least 70 ppm, at least 80 ppm, at least 90 ppm, at least 100 ppm, at least 125 ppm, at least 150 ppm, at least 175 ppm, at least 200 ppm, at least 225 ppm, at least 250 ppm, at least 275 ppm, at least 300 ppm, at least 325 ppm, at least 350 ppm, at least 375 ppm, at least 400 ppm, at least 425 ppm, at least 450 ppm, at least 475 ppm, at least 500 ppm, at least 525 ppm, at least 550 ppm, at least 575 ppm, at least 600 ppm, at least 625 ppm, at least 650 ppm, at least 675 ppm, at least 700 ppm, at least 725 ppm, at least 750 ppm, at least 775 ppm, at least 800 ppm, at least 825 ppm, at least 850 ppm, at least 875 ppm, at least 900 ppm, at least 925 ppm, at least 950 ppm, at least 975 ppm, at least 1,000 ppm, at least 1,025 ppm, at least 1,050 ppm, at least 1075 ppm, at least 1,100 ppm, at least 1,125 ppm, at least 1,150 ppm, at least 1,175 ppm, at least 1,200 ppm, at least 1,225 ppm, at least 1,250 ppm, at least 1,275 ppm, at least 1,300 ppm, at least 1,325 ppm, at least 1,350 ppm, at least 1,375 ppm, at least 1,400 ppm, at least 1,425 ppm, at least 1,450 ppm, at least 1,475 ppm, at least 1,500 ppm, at least 1,600 ppm, at least 1,700 ppm, at least 1,800 ppm, at least 1,900 ppm, or at least 2,000 ppm or at most 0.05 ppm, at most 0.10 ppm, at most 0.20 ppm, at most 0.30 ppm, at most 0.40 ppm, at most 0.50 ppm, at most 0.60 ppm, at most 0.70 ppm, at most 0.80 ppm, at most 0.90 ppm, at most 1 ppm, at most 10 ppm, at most 20 ppm, at most

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43. The kit according to any one of embodiments 34 or 36-41, wherein the one or more metallic particles are in an amount of about 0.10%, about 0.11%, about 0.12%, about 0.13%, about 0.14%, about 0.15%, about 0.16%, about 0.17%, about 0.18%, about 0.19%, about 0.2%, about 0.25%, about 0.3%, about 0.35%, about 0.4%, about 0.45%, or about 0.5% by weight of the composition, or at least 0.10%, at least 0.11%, at least 0.12%, at least 0.13%, at least 0.14%, at least 0.15%, at least 0.16%, at least 0.17%, at least 0.18%, at least 0.19%, at least 0.2%, at least 0.25%, at least 0.3%, at least 0.35%, at least 0.4%, at least 0.45%, or at least 0.5% by weight of the composition, or at most 0.10%, at most 0.11%, at most 0.12%, at most 0.13%, at most 0.14%, at most 0.15%, at most 0.16%, at most 0.17%, at most 0.18%, at most 0.19%, at most 0.2%, at most 0.25%, at most 0.3%, at most 0.35%, at most 0.4%, at most 0.45%, or at most 0.5% by weight of the composition, or about 0.10% to about 0.15%,

about 0.10% to about 0.20%, about 0.10% to about 0.25%, about 0.10% to about 0.30%, about 0.10% to about 0.35%, about 0.10% to about 0.40%, about 0.10% to about 0.45%, about 0.10% to about 0.50%, about 0.20% to about 0.25%, about 0.20% to about 0.30%, about 0.20% to about 0.35%, about 0.20% to about 0.40%, about 0.20% to about 0.45%, about 0.20% to about 0.50%, about 0.30% to about 0.35%, about 0.30% to about 0.40%, about 0.30% to about 0.45%, about 0.30% to about 0.50%, about 0.40% to about 0.45%, about 0.40% to about 0.50%, or about 0.40% to about 0.50% by weight of the composition.

44. The kit according to any one of embodiments 34 or 36-43, wherein the one or more metallic particles have a mean diameter of about 10 nm, about 20 nm, about 30 nm, about 40 nm, about 50 nm, about 60 nm, about 70 nm, about 80 nm, about 90 nm, about 100 nm, or at least 10 nm, at least 20 nm, at least 30 nm, at least 40 nm, at least 50 nm, at least 60 nm, at least 70 nm, at least 80 nm, at least 90 nm, at least 100 nm, or at most 10 nm, at most 20 nm, at most 30 nm, at most 40 nm, at most 50 nm, at most 60 nm, at most 70 nm, at most 80 nm, at most 90 nm, at most 100 nm, or about 10 nm to about 20 nm, about 10 nm to about 30 nm, about 10 nm to about 40 nm, about 10 nm to about 50 nm, about 10 nm to about 60 nm, about 10 nm to about 70 nm, about 10 nm to about 80 nm, about 10 nm to about 90 nm, about 10 nm to about 100 nm, about 20 nm to about 30 nm, about 20 nm to about 40 nm, about 20 nm to about 50 nm, about 20 nm to about 60 nm, about 20 nm to about 70 nm, about 20 nm to about 80 nm, about 20 nm to about 90 nm, about 20 nm to about 100 nm, about 30 nm to about 40 nm, about 30 nm to about 50 nm, about 30 nm to about 60 nm, about 30 nm to about 70 nm, about 30 nm to about 80 nm, about 30 nm to about 90 nm, about 30 nm to about 100 nm, about 40 nm to about 50 nm, about 40 nm to about 60 nm, about 40 nm to about 70 nm, about 40 nm to about 80 nm, about 40 nm to about 90 nm, about 40 nm to about 100 nm, about 50 nm to about 60 nm, about 50 nm to about 70 nm, about 50 nm to about 80 nm, about 50 nm to about 90 nm, about 50 nm to about 100 nm, about 60 nm to about 70 nm, about 60 nm to about 80 nm, about 60 nm to about 90 nm, about 60 nm to about 100 nm, about 70 nm to about 80 nm, about 70 nm to about 90 nm, about 70 nm to about 100 nm, about 80 nm to about 90 nm, about 80 nm to about 100 nm, or about 90 nm to about 100 nm.

45. The kit according to any one of embodiments 35-44, wherein the one or more metal salts include copper chloride, iron chloride, titanium chloride, zinc chloride, calcium oxide, or any combination thereof.

46. The kit according to any one of embodiments 35-45, wherein the one or more metal salts are in an amount of 0.05 ppm, 0.10 ppm, 0.15 ppm, 0.20 ppm, 0.25 ppm, 0.30 ppm, 0.35 ppm, 0.40 ppm, 0.45 ppm, 0.50 ppm, 0.55 ppm, 0.60 ppm, 0.65 ppm, 0.70 ppm, 0.75 ppm, 0.80 ppm, 0.85 ppm, 0.90 ppm, 0.95 ppm, 1 ppm, 5 ppm, 10 ppm, 15 ppm, 20 ppm, 25 ppm, 30 ppm, 35 ppm, 40 ppm, 45 ppm, 50 ppm, 55 ppm, 60 ppm, 65 ppm, 70 ppm, 75 ppm, 80 ppm, 85 ppm, 90 ppm, 95 ppm, 100 ppm, 125 ppm, 150 ppm, 175 ppm, 200 ppm, 225 ppm, 250 ppm, 275 ppm, 300 ppm, 325 ppm, 350 ppm, 375 ppm, 400 ppm, 425 ppm, 450 ppm, 475 ppm, 500 ppm, 525 ppm, 550 ppm, 575 ppm, 600 ppm, 625 ppm, 650 ppm, 675 ppm, 700 ppm, 725 ppm, 750 ppm, 775 ppm, 800 ppm, 825 ppm, 850 ppm, 875 ppm, 900 ppm, 925 ppm, 950 ppm, 975 ppm, 1,000 ppm, 1,025 ppm, 1,050 ppm, 1075 ppm, 1,100 ppm, 1,125 ppm, 1,150 ppm, 1,175 ppm, 1,200 ppm, 1,225 ppm, 1,250 ppm, 1,275 ppm, 1,300 ppm, 1,325 ppm, 1,350 ppm, 1,375 ppm, 1,400 ppm, 1,425 ppm, 1,450 ppm, 1,475 ppm, 1,500 ppm, 1,600 ppm, 1,700 ppm, 1,800 ppm, 1,900 ppm, or 2,000 ppm or at least 0.05 ppm, at least 0.10 ppm, at least 0.20 ppm, at least 0.30 ppm, at least 0.40 ppm, at least 0.50 ppm, at least 0.60 ppm, at least 0.70 ppm,

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47. The kit according to any one of embodiments 35-45, wherein the one or more metal salts are in an amount of about 0.10%, about 0.11%, about 0.12%, about 0.13%, about 0.14%, about 0.15%, about 0.16%, about 0.17%, about 0.18%, about 0.19%, about 0.2%, about 0.25%, about 0.3%, about 0.35%, about 0.4%, about 0.45%, or about 0.5% by weight of the composition, or at least 0.10%, at least 0.11%, at least 0.12%, at least 0.13%, at least 0.14%, at least 0.15%, at least 0.16%, at least 0.17%, at least 0.18%, at least 0.19%, at least 0.2%, at least 0.25%, at least 0.3%, at least 0.35%, at least 0.4%, at least 0.45%, or at least 0.5% by weight of the composition, or at most 0.10%, at most 0.11%, at most 0.12%, at most 0.13%, at most 0.14%, at most 0.15%, at most 0.16%, at most 0.17%, at most 0.18%, at most 0.19%, at most 0.2%, at most 0.25%, at most 0.3%, at most 0.35%, at most 0.4%, at most 0.45%, or at most 0.5% by weight of the composition, or about 0.10% to about 0.15%, about 0.10% to about 0.20%, about 0.10% to about 0.25%, about 0.10% to about 0.30%, about 0.10% to about 0.35%, about 0.10% to about 0.40%, about 0.10% to about 0.45%, about 0.10% to about 0.50%, about 0.20% to about 0.25%, about 0.20% to about 0.30%, about 0.20% to about 0.35%, about 0.20% to about 0.40%, about 0.20% to about 0.45%, about 0.20% to about 0.50%, about 0.30% to about 0.35%, about 0.30% to about 0.40%, about 0.30% to about 0.45%, about 0.30% to about 0.50%, about 0.40% to about 0.45%, about 0.40% to about 0.50%, or about 0.40% to about 0.50% by weight of the composition.
48. The kit according to any one of embodiments 34-47, further comprising container comprising a phosphate buffer.
49. The kit according to embodiment 48, wherein the phosphate buffer is a calcium phosphate buffer or a sodium phosphate buffer.
50. The kit according to embodiments 48 or 49, wherein the phosphate buffer is in an amount of 0.05 ppm, 0.10 ppm, 0.15 ppm, 0.20 ppm, 0.25 ppm, 0.30 ppm, 0.35 ppm, 0.40 ppm, 0.45 ppm, 0.50 ppm, 0.55 ppm, 0.60 ppm, 0.65 ppm, 0.70 ppm, 0.75 ppm, 0.80 ppm, 0.85 ppm, 0.90 ppm, 0.95 ppm, 1 ppm, 5 ppm, 10 ppm, 15 ppm, 20 ppm, 25 ppm, 30 ppm, 35 ppm, 40 ppm, 45 ppm, 50 ppm, 55 ppm, 60 ppm, 65 ppm, 70 ppm, 75 ppm, 80 ppm, 85 ppm, 90 ppm, 95 ppm, 100 ppm, 125 ppm, 150 ppm, 175 ppm, 200 ppm, 225 ppm, 250 ppm, 275 ppm, 300 ppm, 325 ppm, 350 ppm, 375 ppm, 400 ppm, 425 ppm, 450 ppm, 475 ppm, 500 ppm, 525 ppm, 550 ppm, 575 ppm, 600 ppm, 625 ppm, 650 ppm, 675 ppm, 700 ppm, 725 ppm, 750 ppm, 775 ppm, 800 ppm, 825 ppm, 850 ppm, 875 ppm, 900 ppm, 925 ppm, 950 ppm, 975 ppm, 1,000 ppm, 1,025 ppm, 1,050 ppm, 1075 ppm, 1,100 ppm, 1,125 ppm, 1,150 ppm, 1,175 ppm, 1,200 ppm, 1,225 ppm, 1,250 ppm, 1,275 ppm, 1,300 ppm, 1,325 ppm, 1,350 ppm, 1,375 ppm, 1,400 ppm, 1,425 ppm, 1,450 ppm, 1,475 ppm, 1,500 ppm, 1,600 ppm, 1,700 ppm, 1,800 ppm, 1,900 ppm, or 2,000 ppm or at least 0.05 ppm, at least 0.10 ppm, at least 0.20 ppm, at least 0.30 ppm, at least 0.40 ppm, at least 0.50 ppm, at least 0.60 ppm, at least 0.70 ppm, at least 0.80 ppm, at least 0.90 ppm, at least 1 ppm, at least 10 ppm, at least 20 ppm, at least 30 ppm, at least 40 ppm, at least

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about 225 ppm, about 50 ppm to about 250 ppm, about 50 ppm to about 275 ppm, about 50 ppm to about 300 ppm, about 50 ppm to about 325 ppm, about 50 ppm to about 350 ppm, about 50 ppm to about 375 ppm, about 50 ppm to about 400 ppm, about 50 ppm to about 425 ppm, about 50 ppm to about 450 ppm, about 50 ppm to about 475 ppm, about 50 ppm to about 500 ppm, about 75 ppm to about 100 ppm, about 75 ppm to about 125 ppm, about 75 ppm to about 150 ppm, about 75 ppm to about 175 ppm, about 75 ppm to about 200 ppm, about 75 ppm to about 225 ppm, about 75 ppm to about 250 ppm, about 75 ppm to about 275 ppm, about 75 ppm to about 300 ppm, about 75 ppm to about 325 ppm, about 75 ppm to about 350 ppm, about 75 ppm to about 375 ppm, about 75 ppm to about 400 ppm, about 75 ppm to about 425 ppm, about 75 ppm to about 450 ppm, about 75 ppm to about 475 ppm, about 75 ppm to about 500 ppm, about 100 ppm to about 125 ppm, about 100 ppm to about 150 ppm, about 100 ppm to about 175 ppm, about 100 ppm to about 200 ppm, about 100 ppm to about 225 ppm, about 100 ppm to about 250 ppm, about 100 ppm to about 275 ppm, about 100 ppm to about 300 ppm, about 100 ppm to about 325 ppm, about 100 ppm to about 350 ppm, about 100 ppm to about 375 ppm, about 100 ppm to about 400 ppm, about 100 ppm to about 425 ppm, about 100 ppm to about 450 ppm, about 100 ppm to about 475 ppm, about 100 ppm to about 500 ppm, about 150 ppm to about 175 ppm, about 150 ppm to about 200 ppm, about 150 ppm to about 225 ppm, about 150 ppm to about 250 ppm, about 150 ppm to about 275 ppm, about 150 ppm to about 300 ppm, about 150 ppm to about 325 ppm, about 150 ppm to about 350 ppm, about 150 ppm to about 375 ppm, about 150 ppm to about 400 ppm, about 150 ppm to about 425 ppm, about 150 ppm to about 450 ppm, about 150 ppm to about 475 ppm, about 150 ppm to about 500 ppm, about 200 ppm to about 225 ppm, about 200 ppm to about 250 ppm, about 200 ppm to about 275 ppm, about 200 ppm to about 300 ppm, about 200 ppm to about 325 ppm, about 200 ppm to about 350 ppm, about 200 ppm to about 375 ppm, about 200 ppm to about 400 ppm, about 200 ppm to about 425 ppm, about 200 ppm to about 450 ppm, about 200 ppm to about 475 ppm, about 200 ppm to about 500 ppm, about 200 ppm to about 525 ppm, about 200 ppm to about 550 ppm, about 200 ppm to about 575 ppm, about 200 ppm to about 600 ppm, about 250 ppm to about 275 ppm, about 250 ppm to about 300 ppm, about 250 ppm to about 325 ppm, about 250 ppm to about 350 ppm, about 250 ppm to about 375 ppm, about 250 ppm to about 400 ppm, about 250 ppm to about 425 ppm, about 250 ppm to about 450 ppm, about 250 ppm to about 475 ppm, about 250 ppm to about 500 ppm, about 250 ppm to about 525 ppm, about 250 ppm to about 550 ppm, about 250 ppm to about 575 ppm, about 250 ppm to about 600 ppm, about 300 ppm to about 325 ppm, about 300 ppm to about 350 ppm, about 300 ppm to about 375 ppm, about 300 ppm to about 400 ppm, about 300 ppm to about 425 ppm, about 300 ppm to about 450 ppm, about 300 ppm to about 475 ppm, about 300 ppm to about 500 ppm, about 300 ppm to about 525 ppm, about 300 ppm to about 550 ppm, about 300 ppm to about 575 ppm, about 300 ppm to about 600 ppm, about 350 ppm to about 375 ppm, about 350 ppm to about 400 ppm, about 375 ppm to about 400 ppm, about 350 ppm to about 425 ppm, about 350 ppm to about 450 ppm, about 350 ppm to about 475 ppm, about 350 ppm to about 500 ppm, about 350 ppm to about 525 ppm, about 350 ppm to about 550 ppm, about 350 ppm to about 575 ppm, about 350 ppm to about 600 ppm, about 400 ppm to about 500 ppm, about 400 ppm to about 600 ppm, about 400 ppm to about 700 ppm, about 400 ppm to about 800 ppm, about 400 ppm to about 900 ppm, about 400 ppm to about 1,000 ppm, about 500 ppm to about 600 ppm, about 500 ppm to about 700 ppm, about 500 ppm to about 800 ppm, about 500 ppm to about 900 ppm, or about 500 ppm to about 1,000 ppm.

51. A method to clean, disinfect and/or sterilize a device, the method comprising, consisting essentially of, or consisting of applying a composition as defined in any one of embodiments 1-31 or applying the components of a kit as defined in any one of embodiments 32-50, to a device, wherein application of the composition cleans, disinfects and/or sterilizes the device.
52. A composition as defined in any one of embodiments 1-31 or applying the components of a kit as defined in any one of embodiments 32-50 for use in cleaning, disinfecting and/or sterilizing a device.
53. Use of a composition as defined in any one of embodiments 1-31 or applying the components of a kit as defined in any one of embodiments 32-50 to clean, disinfect and/or sterilize a device.
54. A method to clean, disinfect and/or sterilize a surface area, the method comprising, consisting essentially of, or consisting of applying a composition as defined in any one of embodiments 1-31 or applying the components of a kit as defined in any one of embodiments 32-50, to a device, wherein application of the composition cleans, disinfects and/or sterilizes the device.
55. A composition as defined in any one of embodiments 1-31 or applying the components of a kit as defined in any one of embodiments 32-50 for use in cleaning, disinfecting and/or sterilizing a surface area.
56. Use of a composition as defined in any one of embodiments 1-31 or applying the components of a kit as defined in any one of embodiments 32-50 to clean, disinfect and/or sterilize a surface area.
57. The method of embodiment 54, or the use of embodiment 55 or 56, wherein the surface area is a porous surface area or a non-porous surface area.
58. The method of embodiment 54 or 57, or the use of any one of embodiments 55-57, wherein the surface area comprises a table top, counter top, floor, wall, ceiling, window, door, door handle, shower, bath, sink, faucet, toilet, toilet seat, drain, equipment, machinery, personal protective gear, personal biohazard gear, a medical device, dental device, pharmaceutical device, veterinary device, mortuary device or human skin.
59. A method to clean, disinfect and/or sterilize a microbial infection in an individual, the method comprising, consisting essentially of, or consisting of applying a composition as defined in any one of embodiments 1-31 or applying the components of a kit as defined in any one of embodiments 32-50 to the individual, wherein application of the composition cleans, disinfects and/or sterilizes the individual.
60. A composition as defined in any one of embodiments 1-31 or applying the components of a kit as defined in any one of embodiments 32-50 for use in cleaning, disinfecting and/or sterilizing a microbial infection in an individual.
61. Use of a composition as defined in any one of embodiments 1-31 or applying the components of a kit as defined in any one of embodiments 32-50 to clean, disinfect and/or sterilize a microbial infection in an individual.
62. The method of embodiment 59, or the use of embodiment 60 or 61, wherein application of the composition is applied topically or administered enterally or parenterally.
63. The method of any one of embodiments 54, 57-59 or 62, or the use of any one of embodiments 55-58 or 59-62, wherein the composition is applied daily, every other day, every third of day, once a week, multiple times per week, once a month, multiple times per month, once a year or multiple times per year, as desired.

64. The method of any one of embodiments 54, 57-59, 62 or 63, or the use of any one of embodiments 55-58 or 59-63, wherein the composition is applied multiple times per day.
65. A method to treat an individual, the method comprising, consisting essentially of, or consisting of applying a composition as defined in any one of embodiments 1-31 or applying the components of a kit as defined in any one of embodiments 32-50 to the individual, wherein application of the composition treats the individual.
66. A composition as defined in any one of embodiments 1-31 or applying the components of a kit as defined in any one of embodiments 32-50 for use in treating a condition an individual.
67. Use of a composition as defined in any one of embodiments 1-31 or applying the components of a kit as defined in any one of embodiments 32-50 in treating a condition an individual.
68. The method of embodiment 65, or the use of embodiment 66 or 67, wherein application of the composition is applied topically or administered enterally or parenterally.
69. The method of any one of embodiments 65 or 68, or the use of any one of embodiments 66-68, wherein the composition is applied daily, every other day, every third of day, once a week, multiple times per week, once a month, multiple times per month, once a year or multiple times per year, as desired.
70. The method of any one of embodiments 65, 68 or 69, or the use of any one of embodiments 66-69, wherein the composition is applied multiple times per day.
71. The method of any one of embodiments 65 or 68-70, or the use of any one of embodiments 66-70, wherein the condition is a wound, an ophthalmic condition, a dermatological condition, an inflammation, an ache or a pain.

EXAMPLES

[228] The following non-limiting examples are provided for illustrative purposes only in order to facilitate a more complete understanding of representative embodiments now contemplated. These examples should not be construed to limit any of the embodiments described in the present specification, including those pertaining to the compositions, methods and uses disclosed herein.

Example 1
Compositions

[229] This example illustrates how to formulate a composition disclosed herein. The components listed below were mixed at ambient temperature using a high shear mixer until the mixture was uniform. The pH of the mixture was adjusted as shown.

Table 1. Composition Formulations

Component	K1	K2	K3	K4	K5	K6
Hypochlorous Acid/FAC	300 ppm	—	—	—	310 ppm	310 ppm
Copper Chloride	—	—	—	—	—	—
Zinc Chloride	—	—	—	—	—	—
Iron (III) Chloride	—	—	—	—	—	—
Calcium Oxide	—	240 ppm	160 ppm	80 ppm	80 ppm	200 ppm

Water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
pH	5.2	N/A	N/A	N/A	5.7	6.7

Table 2. Composition Formulations						
Component	**K7**	**K8**	**K9**	**F451**	**F452**	**F453**
Hypochlorous Acid/FAC	320 ppm	290 ppm	290 ppm	290 ppm	280 ppm	280 ppm
Copper Chloride	—	—	—	—	—	—
Zinc Chloride	—	—	—	—	—	—
Iron (III) Chloride	—	—	—	—	—	—
Calcium Oxide	80 ppm	160 ppm	—	240 ppm	80 ppm	160 ppm
Water	—	—	—	q.s.	q.s.	q.s.
pH	5.6	5.6	5.1	7.7	5.3	5.8

Table 3. Composition Formulations						
Component	**F454**	**F455**	**F459**	**F461**	**F463**	**F465**
Hypochlorous Acid/FAC	290 ppm	340 ppm	300 ppm	310 ppm	290 ppm	310 ppm
Copper Chloride	80 ppm	80 ppm	80 ppm	80 ppm	80 ppm	80 ppm
Zinc Chloride	80 ppm	80 ppm	80 ppm	80 ppm	80 ppm	80 ppm
Iron (III) Chloride	80 ppm	—	160 ppm	—	80 ppm	—
Calcium Oxide	80 ppm	80 ppm	200 ppm	160 ppm	pH adj.[a]	160 ppm
Water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
pH	5.1	5.6	5.0	7.7	5.1	5.5
[a] pH of solution adjusted with about 40 ppm to 200 ppm calcium oxide depending on pH desired.						

Table 4. Composition Formulations						
Component	**F466**	**F467**	**F468**	**F469**	**F470**	**F471**
Hypochlorous Acid/FAC	310 ppm	310 ppm	310 ppm	310 ppm	310 ppm	310 ppm
Copper Chloride	120 ppm	80 ppm	120 ppm	120 ppm	80 ppm	120 ppm
Zinc Chloride	80 ppm	120 ppm	120 ppm	80 ppm	120 ppm	120 ppm
Iron (III) Chloride	—	—	—	—	—	—
Calcium Oxide	80 ppm	80 ppm	80 ppm	160 ppm	160 ppm	160 ppm
Water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
pH	5.1	5.1	5.5	5.0	5.1	5.8

Table 5. Composition Formulations						
Component	**F472**	**F473**	**F474**	**F475**	**F479**	**F480**
Hypochlorous Acid/FAC	310 ppm	310 ppm	310 ppm	320 ppm	320 ppm	320 ppm
Copper Chloride	40 ppm	80 ppm	40 ppm	80 ppm	80 ppm	40 ppm
Zinc Chloride	80 ppm	40 ppm	40 ppm	80 ppm	80 ppm	80 ppm
Iron (III) Chloride	—	—	—	—	—	—
Calcium Oxide	160 ppm	160 ppm	160 ppm	pH adj.[a]	pH adj.[a]	pH adj.[a]
Sodium Phosphate Buffer	—	—	—	—	80 ppm	60 ppm
Water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
pH	5.1	5.6	5.0	6.5	5.0	5.0
[a] pH of solution adjusted with about 40 ppm to 200 ppm calcium oxide depending on pH desired.						

Table 6. Composition Formulations

Component	F481	F482	F484	F485	F486	F487
Hypochlorous Acid/FAC	320 ppm	320 ppm	320 ppm	320 ppm	320 ppm	90 ppm
Copper Chloride	80 ppm	—	80 ppm	80 ppm	80 ppm	80 ppm
Zinc Chloride	40 ppm	80 ppm	120 ppm	80 ppm	80 ppm	80 ppm
Iron (III) Chloride	—	—	—	—	—	—
Calcium Oxide	pH adj.[a]	pH adj.[a]	pH adj.[a]	—	pH adj.[a]	pH adj.[a]
Calcium Phosphate Buffer	—	—	—	80 ppm	80 ppm	—
Sodium Phosphate Buffer	60 ppm	60 ppm	60 ppm	—	—	—
Water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
pH	5.0	5.7	5.0	5.0	5.0	5.8
[a] pH of solution adjusted with about 40 ppm to 200 ppm calcium oxide depending on pH desired.						

Table 7. Composition Formulations						
Component	**F488**	**F489**	**F490**	**F491**	**F492**	**F493**
Hypochlorous Acid/FAC	90 ppm	90 ppm	90 ppm	90 ppm	90 ppm	310 ppm
Copper Chloride	80 ppm	40 ppm	40 ppm	20 ppm	20 ppm	80 ppm
Zinc Chloride	80 ppm	40 ppm	40 ppm	20 ppm	20 ppm	80 ppm
Iron (III) Chloride	—	—	—	—	—	—
Calcium Oxide	pH adj.[a]	pH adj.[a]	pH adj.[a]	pH adj.[a]	pH adj.[a]	pH adj.[a]
Calcium Phosphate Buffer	80 ppm	—	80 ppm	—	80 ppm	80 ppm
Sodium Phosphate Buffer	—	—	—	—	—	—
Water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
pH	5.1	5.3	5.2	5.4	5.5	5.1
[a] pH of solution adjusted with about 40 ppm to 200 ppm calcium oxide depending on pH desired.						

Table 8. Composition Formulations						
Component	**F494**	**F495**				
Hypochlorous Acid/FAC	310 ppm	310 ppm				
Copper Chloride	40 ppm	80 ppm				
Zinc Chloride	40 ppm	80 ppm				
Iron (III) Chloride	—	—				
Calcium Oxide	pH adj.[a]	pH adj.[a]				
Calcium Phosphate Buffer	40 ppm	—				
Sodium Phosphate Buffer	—	—				
Water	q.s.	q.s.				
pH	5.2	5.4				
[a] pH of solution adjusted with about 40 ppm to 200 ppm calcium oxide depending on pH desired.						

Example 2

Bacterial Viability Assays

[230] This example illustrates how to conduct a bacterial viability assay using a composition disclosed herein.

[231] To prepare stock cultures of pathogenic bacteria, 10 mL nutrient broth was inoculated using a stock culture of *Staphylococcus aureus* (ATCC 29213) and incubated on an orbital shaker for 24±2 hours at

approximately 150 rpm at 36±1ºC. This culture was used to inoculate Tryptic Soy Agar (TSA) plates. Each plate was inoculated with the culture. Each plate was incubated for up to 5 days at 30ºC to 35ºC. Following incubation, suspensions were prepared by adding growth from TSA plates into a tube containing sterile water. Each tube was then vortexed and an aliquot was serially diluted and plated onto TSA plate for further numeration. The final numeration count uses aliquot volume, count obtained on TSA plate and the total original volume of culture. The remaining amount in the tube was used to inoculate actual test samples.

[232] The compositions of Example 1 were prepared and glass storage containers were filled with 250 mL of each composition. These storage containers were then placed in a stability chamber at 25°C. Aliquots of compositions from these storage containers were taken on Day 5, 10, 11, 15, 18, 29, 30, 31, 41, or 66 and the effectiveness of the compositions tested using a bacterial viability assay as described below.

[233] Sample aliquots from each composition were tested with or without serum (TSB or Bovine Serum) as follows: 1) assays without serum contained 100 µL of pathogen bacteria suspension and 9900 µL of a composition disclosed herein; 2) assays with 5% serum contained 100 µL of pathogenic bacteria suspension, 500 µL of serum and 9400 µL of a composition disclosed herein; and 3) Assays with 10% serum contained 100 µL of pathogenic bacteria suspension, 1000 µL of serum and 8900 µL of a composition disclosed herein. Samples were exposed for 5 minutes at which point a neutralizing agent was used to inhibit the activity of the microbial agent being tested. The treated samples were serially diluted 1 in 10 over a 6-fold range after treatment using a neutralizing agent, and the treated sample was plated on petri dishes containing TSA growth medium and incubated at 30°C to 35°C for up to 5 days. The presence of viable bacteria was then measured by counting the number of colonies observed on the agar medium for each assay sample. Log reduction is determined by taking the $\log_{10}$ of the number calculated by taking the number of viable pathogenic bacteria colonies present in the assay sample without serum divided by the number of viable pathogenic bacteria colonies present in the assay sample with serum. The results of this series of experiments are shown in Tables 7 and 8.

[234] The results indicate that at least Compositions F451, F452, F453, F454, F455, F459, F461, F463, F465, F466, F467, F468, F469, F470, F471, F472, F473, F474, F475, F479, F480, F481, F482, F484, F485, and F486 show greater potential as a disinfectant for applications disclosed herein given the significant log reduction in the number of pathogenic bacteria observed.

Table 7. Bacterial Viability Assay

Formulation	Day 3-5 Colony Count Reduction[a,b,c]			Day 10-18 Colony Count Reduction[a,b,c]		
	0% Serum	5% Serum	10% Serum	0% Serum	5% Serum	10% Serum
K1	N/D	N/D	N/D	N/D	3.53 log	N/D
K2	N/D	N/D	N/D	N/D	N/D	N/D
K3	N/D	N/D	N/D	N/D	0	N/D
K4	N/D	N/D	N/D	N/D	0	N/D
K5	N/D	N/D	N/D	N/D	0	N/D
K6	N/D	N/D	N/D	N/D	0	N/D

K7	N/D	N/D	N/D	N/D	0.65 log	N/D
K8	N/D	N/D	N/D	N/D	1.22 log	N/D
K9	N/D	N/D	N/D	N/D	0.63 log	N/D
F451	N/D	N/D	N/D	N/D	N/D	N/D
F452	N/D	N/D	N/D	N/D	N/D	N/D
F453	N/D	N/D	N/D	N/D	3.31 log	N/D
F454	N/D	N/D	N/D	N/D	6.60 log	N/D
F455	N/D	N/D	N/D	N/D	5.85 log	N/D
F459	N/D	N/D	N/D	N/D	6.17 log	N/D
F461	N/D	N/D	N/D	N/D	5.04 log	N/D
F463	N/D	N/D	N/D	N/D	6.60 log	N/D
F465	—	—	—	N/D	5.73 log	N/D
F466	—	—	—	N/D	7.43 log	N/D
F467	—	—	—	N/D	7.00 log	N/D
F468	—	—	—	N/D	5.68 log	N/D
F469	—	—	—	N/D	6.39 log	N/D
F470	—	—	—	N/D	6.49 log	N/D
F471	—	—	—	N/D	6.83 log	N/D
F472	—	—	—	N/D	6.33 log	N/D
F473	—	—	—	N/D	6.10 log	N/D
F474	—	—	—	N/D	5.04 log	N/D
F475	—	—	—	N/D	5.42 log	N/D
F479	N/D	5.04 log	N/D	N/D	N/D	N/D
F480	N/D	5.76 log	N/D	N/D	N/D	N/D
F481	N/D	7.38 log	N/D	N/D	N/D	N/D
F482	N/D	4.54 log	N/D	N/D	N/D	N/D
F484	N/D	5.88 log	N/D	N/D	N/D	N/D
F485	N/D	N/A	N/D	N/D	7.33 log	N/D
F486	N/D	N/A	N/D	N/D	6.33 log	N/D

[a] A minimum of 3 log reduction in bacterial growth represents ≥ 99.9% kill of bacteria.
[b] Positive controls for all assays conducted exhibited 0 log reduction in bacterial growth.
[c] N/D, Not Determined.

Table 8. Bacterial Viability Assay

Formulation	Day 31-41 Colony Count Reduction[a,b,c]			Day 66 Colony Count Reduction[a,b,c]		
	0% Serum	5% Serum	10% Serum	0% Serum	5% Serum	10% Serum
K1	N/D	N/D	N/D	—	—	—
K2	N/D	N/D	N/D	—	—	—
K3	N/D	N/D	N/D	—	—	—
K4	N/D	N/D	N/D	—	—	—
K5	N/D	0.54 log	N/D	N/D	N/D	N/D
K6	N/D	0.91 log	N/D	N/D	N/D	N/D
K7	—	—	—	—	—	—
K8	—	—	—	—	—	—
K9	—	—	—	—	—	—
F451	N/D	N/D	N/D	—	—	—
F452	N/D	N/D	N/D	—	—	—
F453	N/D	N/D	N/D	—	—	—

F454	N/D	N/D	N/D	—	—	—
F455	N/D	N/D	N/D	—	—	—
F459	N/D	N/D	N/D	—	—	—
F461	N/D	N/D	N/D	—	—	—
F463	N/D	N/D	N/D	—	—	—
F465	N/D	N/D	4.06	N/D	N/D	3.41 log
F466	N/D	N/D	N/D	N/D	N/D	N/D
F467	N/D	N/D	N/D	N/D	N/D	N/D
F468	N/D	N/D	4.71 log	N/D	N/D	3.50 log
F469	N/D	N/D	4.59 log	N/D	N/D	3.27 log
F470	N/D	N/D	N/D	N/D	N/D	N/D
F471	N/D	N/D	4.39 log	N/D	N/D	2.60 log
F472	N/D	N/D	N/D	N/D	N/D	N/D
F473	N/D	N/D	N/D	N/D	N/D	N/D
F474	N/D	N/D	N/D	N/D	N/D	N/D
F475	N/D	N/D	N/D	N/D	N/D	2.57 log
F479	—	—	—	—	—	—
F480	—	—	—	—	—	—
F481	—	—	—	—	—	—
F482	—	—	—	—	—	—
F484	—	—	—	—	—	—
F485	—	—	—	—	—	—
F486	—	—	—	—	—	—

[a] A minimum of 3 log reduction in bacterial growth represents ≥ 99.9% kill of bacteria.
[b] Positive controls for all assays conducted exhibited 0 log reduction in bacterial growth.
[c] N/D, Not Determined.

[235] In a second series of experiments, the compositions of Example 1 will be prepared and glass storage containers will be filled with 250 mL of each composition. These storage containers will then be placed in a stability chamber at 40°C. Aliquots of compositions from these storage containers will be taken on Day 14 and 30 and the effectiveness of the compositions will be tested using a bacterial viability assay as described above. The results will indicate that at least Compositions F465, F466, F467, F468, F469, F470, F471, F472, F473, F474, and F475 show greater potential as a disinfectant for applications disclosed herein given the significant log reduction in the number of pathogenic bacteria observed.

Example 3

Bacterial Viability Assays

[236] This example illustrates how to conduct a bacterial viability assay using a composition disclosed herein to assess a time course of effectiveness for inhalation administration.

[237] To prepare stock cultures of pathogenic bacteria, 10 mL nutrient broth was inoculated using a stock culture of Methicillin-resistance *Staphylococcus aureus* (MRSA; ATCC 33591) and incubated on an orbital shaker for 24±2 hours at approximately 150 rpm at 36±1°C. This culture was used to inoculate Tryptic Soy Agar (TSA) plates. Each plate was inoculated with the culture. Each plate was incubated for up to 48 hours

at 30ºC to 35ºC. Following incubation, suspensions were prepared by adding growth from TSA plates into a tube containing sterile water. Each tube was then vortexed and an aliquot was serially diluted and plated onto TSA plate for further numeration. The final numeration count uses aliquot volume, count obtained on TSA plate and the total original volume of culture. The remaining amount in the tube was used to inoculate actual test samples.

[238] Sample aliquots from each composition were tested with or without serum (TSB or Bovine Serum) as follows: 1) assays without serum contained 100 µL of pathogen bacteria suspension and 9900 µL of a composition disclosed herein; and 2) assays with 5% serum contained 100 µL of pathogenic bacteria suspension, 500 µL of serum and 9400 µL of a composition disclosed herein. Samples were exposed for 20, 40 and 60 minutes at which point a neutralizing agent was used to inhibit the activity of the microbial agent being tested. The treated samples were serially diluted 1 in 10 over a 6-fold range after treatment using a neutralizing agent, and the treated sample was plated on petri dishes containing TSA growth medium and incubated at 30°C to 35°C for up to 48 hours. The presence of viable bacteria was then measured by counting the number of colonies observed on the agar medium for each assay sample. Log reduction is determined by taking the $\log_{10}$ of the number calculated by taking the number of viable pathogenic bacteria colonies present in the assay sample without serum divided by the number of viable pathogenic bacteria colonies present in the assay sample with serum. The results of this series of experiments are shown in Table 9.

[239] The results indicate that at least Compositions F487, F488, F489, F490, F491, and F492 show greater potential as a disinfectant for applications disclosed herein given the significant log reduction in the number of pathogenic bacteria observed.

Table 9. Bacterial Viability Assay

Formulation	Colony Count Reduction[a,b]		
	20 minutes	40 minutes	60 minutes
F487	0.55 log	4.93 log	6.04 log
F488	0.43 log	2.36 log	7.04 log
F489	0.19 log	2.26 log	6.04 log
F490	0.11 log	0.73 log	2.16 log
F491	0 log	0.21 log	1.57 log
F492	0 log	0.41 log	1.88 log

[a] A minimum of 3 log reduction in bacterial growth represents ≥ 99.9% kill of bacteria.
[b] Positive controls for all assays conducted exhibited 0 log reduction in bacterial growth.

Example 4

Bacterial Viability Assays (Staph Aureus)

[240] This example illustrates how to conduct a bacterial viability assay using a composition disclosed herein.

[241] To prepare stock cultures of pathogenic bacteria, 10 mL nutrient broth was inoculated using a stock culture of *Staphylococcus aureus* (ATCC 29213) and incubated on an orbital shaker for 24±2 hours at approximately 150 rpm at 36±1°C. This culture was used to inoculate Tryptic Soy Agar (TSA) plates. Each plate was inoculated with the culture. Each plate was incubated for up to 48 hours at 30°C to 35°C. Following incubation, suspensions were prepared by adding growth from TSA plates into a tube containing sterile water. Each tube was then vortexed and an aliquot was serially diluted and plated onto TSA plate for further numeration. The final numeration count uses aliquot volume, count obtained on TSA plate and the total original volume of culture. The remaining amount in the tube was used to inoculate actual test samples.

[242] Sample aliquots from each composition were tested with or without serum (TSB or Bovine Serum) as follows: 1) Assays without serum contained 100 µL of pathogen bacteria suspension and 9900 µL of a composition disclosed herein; and 2) assays with 5% serum contained 100 µL of pathogenic bacteria suspension, 500 µL of serum and 9400 µL of a composition disclosed herein. Samples were exposed for 15 minutes at which point a neutralizing agent was used to inhibit the activity of the microbial agent being tested. The treated samples were serially diluted 1 in 10 over a 6-fold range after treatment using a neutralizing agent, and the treated sample was plated on petri dishes containing TSA growth medium and incubated at 30°C to 35°C for up to 48 hours. The presence of viable bacteria was then measured by counting the number of colonies observed on the agar medium for each assay sample. Log reduction is determined by taking the $\log_{10}$ of the number calculated by taking the number of viable pathogenic bacteria colonies present in the assay sample without serum divided by the number of viable pathogenic bacteria colonies present in the assay sample with serum. The results of this series of experiments are shown in Table 10.

[243] The results indicate that at least Compositions F493, F494, and F495 show greater potential as a disinfectant for applications disclosed herein given the significant log reduction in the number of pathogenic bacteria observed.

Table 10. Bacterial Viability Assay

Formulation	Colony Count Reduction[a,b]
F493	7.53 log
F494	5.04 log
F495	7.53 log

[a] A minimum of 3 log reduction in bacterial growth represents ≥ 99.9% kill of bacteria.
[b] Positive controls for all assays conducted exhibited 0 log reduction in bacterial growth.

Example 5

Bacterial Viability Assays

[244] This example illustrates how to conduct a bacterial viability assay using a composition disclosed herein.

[245] To prepare stock cultures of pathogenic bacteria, 10 mL nutrient broth was inoculated using a stock culture of Methicillin-resistance *Staphylococcus aureus* (MRSA; ATCC 33591), *Staphylococcus aureus* (ATCC 29213), *Pseudomonas aeruginosa* (ATCC 27853), *Escherichia coli* (ATCC: 11229) or *Enterococcus faecalis* and incubated on an orbital shaker for 24±2 hours at approximately 150 rpm at 36±1ºC. This culture was used to inoculate Tryptic Soy Agar (TSA) plates. Each plate was inoculated with the culture. Each plate was incubated for up to 48 hours at 30ºC to 35ºC. Following incubation, suspensions were prepared by adding growth from TSA plates into a tube containing sterile water. Each tube was then vortexed and an aliquot was serially diluted and plated onto TSA plate for further numeration. The final numeration count uses aliquot volume, count obtained on TSA plate and the total original volume of culture. The remaining amount in the tube was used to inoculate actual test samples.

[246] Sample aliquots from each composition were tested with or without serum (TSB or Bovine Serum) as follows: 1) Assays without serum contained 100 µL of pathogen bacteria suspension and 9900 µL of a composition disclosed herein; and 2) assays with 5% serum contained 100 µL of pathogenic bacteria suspension, 500 µL of serum and 9400 µL of a composition disclosed herein. Samples were exposed for 15 minutes at which point a neutralizing agent was used to inhibit the activity of the microbial agent being tested. The treated samples were serially diluted 1 in 10 over a 6-fold range after treatment using a neutralizing agent, and the treated sample was plated on petri dishes containing TSA growth medium and incubated at 30°C to 35°C for up to 48 hours. The presence of viable bacteria was then measured by counting the number of colonies observed on the agar medium for each assay sample. Log reduction is determined by taking the $\log_{10}$ of the number calculated by taking the number of viable pathogenic bacteria colonies present in the assay sample without serum divided by the number of viable pathogenic bacteria colonies present in the assay sample with serum. The results of this series of experiments are shown in Table 11.

[247] The results indicate that at least Compositions F465, F468, F469, F470, F472, F474, F481, F485, and F486 show greater potential as a disinfectant for applications disclosed herein given the significant log reduction in the number of pathogenic bacteria observed.

Table 11. Bacterial Viability Assay

Formulation	Colony Count Reduction[a,b,c]				
	MRSA	*S. aureus*	*P. aeruginosa*	*E. coli*	*E. faecalis*
F465	4.95 log	7.46 log	6.94 log	6.29 log	N/D
F468	3.75 log	7.13 log	6.94 log	6.29 log	N/D
F469	5.64 log	4.37 log	5.26 log	4.84 log	N/D
F470	5.76 log	6.78 log	6.01 log	4.73 log	N/D
F472	6.01 log	6.46 log	6.29 log	5.34 log	N/D
F474	5.42 log	6.52 log	6.94 log	7.05 log	6.91 log
F481	5.19 log	7.28 log	6.94 log	7.05 log	N/D
F485	4.60 log	7.33 log	6.61 log	6.00 log	N/D
F486	5.18 log	6.33 log	6.94 log	5.48 log	N/D

[a] A minimum of 3 log reduction in bacterial growth represents ≥ 99.9% kill of bacteria.
[b] Positive controls for all assays conducted exhibited 0 log reduction in bacterial growth.

[c] N/D, Not Determined.

Example 6

Viral Viability Assays

[248] This example illustrates how to conduct a viral viability assay using a composition disclosed herein.

[249] Stock cultures of pathogenic virus were prepared according to standard procedures. For human immunodeficiency viruses 1 (HIV-1; NL4.3) the viral host cells were from a human T cell leukemia C8166 cell line; for human Coronavirus, Strain 229E (ATCC VR-740) the viral host cells were from a human lung fibroblast MRC-5 cell line (ATCC CCL–171); for human Adenovirus type 5, Strain Adenoid 75 (ATCC VR-5) the viral host cells were from a human lung epithelial carcinoma A549 cell line (ATCC CCL-185).

[250] For HIV-1 inactivation assays, sample aliquots from each composition were tested for virucidal activity according to protocol ASTM E1053-11, Standard Test Method to Assess Virucidal Activity of Chemicals Intended for Disinfection of Inanimate, Nonporous Environmental Surfaces. Dried viral films were prepared by dispensing a viral suspension comprising 200 µL of pathogenic viral suspension containing a titer of at least 1 x 10^4 infective units onto a sterile plastic petri plate and this suspension was allowed to air dry for no more than 10 minutes within a biological safety cabinet. For each test assay, a dried viral film is overlaid with 2 mL of a composition disclosed herein and incubated for 10 minutes at room temperature. For control samples, the dried viral film is overlaid with a buffered solution harmless to the virus and incubated for 10 minutes at room temperature. After incubation, an equal volume of a neutralizing agent was added to the overlaid solution to inhibit the activity of the composition being tested and the viral film scraped to resuspend this virus mixture. Serial 10-fold dilutions of the resuspended mixture were prepared and used to inoculate viral host cells by added to petri dishes containing cells from a human T cell leukemia C8166 cell line. The inoculated cultures were then incubated at 37°C for 48 hours. After incubation, 100 µL of supernatant taken from each culture was assayed for the presence of P24 protein by ELISA in order to assess the levels of infectious virus present in each sample.

[251] For Adenovirus type 5 inactivation assays, sample aliquots from each composition were tested for virucidal activity according to protocol ASTM E1053-11, Standard Test Method to Assess Virucidal Activity of Chemicals Intended for Disinfection of Inanimate, Nonporous Environmental Surfaces. Dried viral films were prepared by dispensing a viral suspension comprising 200 µL of pathogenic viral suspension containing a titer of at least 1 x 10^4 infective units onto a sterile plastic petri plate and this suspension was allowed to air dry for no more than 10 minutes within a biological safety cabinet. For each test assay, a dried viral film is overlaid with 2 mL of a composition disclosed herein and incubated for 15 minutes at room temperature. For control samples, the dried viral film is overlaid with a buffered solution harmless to the virus and incubated for 15 minutes at room temperature at which point the reaction was stopped by serially diluting each sample 1 in 10 over a 6-fold range. The serially diluted samples were used to inoculate viral host cells by added to petri dishes containing cells from a human lung epithelial carcinoma A549 cell line and incubated at 30°C to 35°C for up to 7 days. After incubation, supernatant taken from each culture was

assayed for the presence of viable virus using a Tissue Culture Infectivity Dose ($TCID_{50}$). The $TCID_{50}$ value represents the endpoint dilution where 50% of the cell cultures exhibit cytopathic effects due to infection by the test virus. The TCD_{50} value represents the endpoint dilution where 50% of the host cell monolayers exhibit cytotoxicity due to infection by the test virus. The $TCID_{50}$, and TCD_{50} was determined using the Spearman-Kärber method and calculated as follows: Negative logarithm of endpoint titer = [– Log of first dilution inoculated] – [((sum of %mortality at each dilution/100) – 0.5) x Logarithm of dilution], The result of this calculation is expressed as $TCID_{50}$/0.1 ml (or volume of dilution inoculated) for the test, virus control, and neutralization control and TCD_{50}/0.1 ml (or volume of dilution inoculated) for the cytotoxicity control. The log reduction in viral titer was calculated as follows: Plate Recovery Control Log_{10} $TCID_{50}$ – Virus-Test Substance Log_{10} $TCID_{50}$. The percent reduction in viral titer was calculated as follows: Percent Reduction = 1- (C/B) x 100, where B = Average $TCID_{50}$ of virus in control suspensions and C = Average $TCID_{50}$ of virus in virus-test suspensions.

[252] For Coronavirus inactivation assays, sample aliquots from each composition were tested for virucidal activity according to protocol ASTM E1052-11, Standard Test Method to Assess the Activity of Microbicides against Viruses in Suspension. A test solution was prepared by mixing 100 µL of serum and 800 µL of a composition disclosed herein. A control solution was prepared by mixing 100 µL of serum and 800 µL of a buffered solution harmless to the virus. A 100 µL of aliquot of pathogenic viral suspension containing a titer of at least 1 x 10^4 infective units was then added to each sample and incubated for 15 minutes at which point the reaction was stopped by serially diluting each sample 1 in 10 over a 6-fold range. The serially diluted samples were then used to inoculate viral host cells by added to petri dishes containing cells from a human lung fibroblast MRC-5 cell line and incubated at 30°C to 35°C for up to 7 days. After incubation, supernatant taken from each culture was assayed for the presence of viable virus using a $TCID_{50}$ assay as described above.

[253] The results from the P24 ELISA indicated that F474 resulted in a complete inactivation of HIV-1 on 10 minutes. The results of the Coronavirus and Adenovirus type 5 series of experiments are shown in Table 12. Taken together, these results indicate that at least Composition F474 shows greater potential as a disinfectant for applications disclosed herein given the significant log reduction in the number of pathogenic viruses observed.

Table 12. Viral Viability Assay

Formulation	Plaque Forming Unit Count Reduction[a,b]		
	$TCID_{50}$	Log Reduction	Percent Reduction
Coronavirus	1.5 log	3.88 log	≥ 99.93%
Adenovirus 5	1.55 log	6.53 log	≥ 99.99%

[a] A minimum of 3 log reduction in viral plaque forming units represents ≥ 99.9% kill of virus.
[b] Positive controls for all assays conducted exhibited 0 log reduction in viral plaque forming units.

[254] In closing, it is to be understood that although aspects of the present specification are highlighted by referring to specific embodiments, one skilled in the art will readily appreciate that these disclosed embodiments are only illustrative of the principles of the subject matter disclosed herein. Therefore, it

should be understood that the disclosed subject matter is in no way limited to a particular compound, composition, article, apparatus, methodology, protocol, and/or reagent, etc., described herein, unless expressly stated as such. In addition, those of ordinary skill in the art will recognize that certain changes, modifications, permutations, alterations, additions, subtractions and sub-combinations thereof can be made in accordance with the teachings herein without departing from the spirit of the present specification. It is therefore intended that the following appended claims and claims hereafter introduced are interpreted to include all such changes, modifications, permutations, alterations, additions, subtractions and sub-combinations as are within their true spirit and scope.

[255] Certain embodiments of the present invention are described herein, including the best mode known to the inventors for carrying out the invention. Of course, variations on these described embodiments will become apparent to those of ordinary skill in the art upon reading the foregoing description. The inventor expects skilled artisans to employ such variations as appropriate, and the inventors intend for the present invention to be practiced otherwise than specifically described herein. Accordingly, this invention includes all modifications and equivalents of the subject matter recited in the claims appended hereto as permitted by applicable law. Moreover, any combination of the above-described embodiments in all possible variations thereof is encompassed by the invention unless otherwise indicated herein or otherwise clearly contradicted by context.

[256] Groupings of alternative embodiments, elements, or steps of the present invention are not to be construed as limitations. Each group member may be referred to and claimed individually or in any combination with other group members disclosed herein. It is anticipated that one or more members of a group may be included in, or deleted from, a group for reasons of convenience and/or patentability. When any such inclusion or deletion occurs, the specification is deemed to contain the group as modified thus fulfilling the written description of all Markush groups used in the appended claims.

[257] Unless otherwise indicated, all numbers expressing a characteristic, item, quantity, parameter, property, term, and so forth used in the present specification and claims are to be understood as being modified in all instances by the term “about.” As used herein, the term “about” means that the characteristic, item, quantity, parameter, property, or term so qualified encompasses a range of plus or minus ten percent above and below the value of the stated characteristic, item, quantity, parameter, property, or term. Accordingly, unless indicated to the contrary, the numerical parameters set forth in the specification and attached claims are approximations that may vary. For instance, as mass spectrometry instruments can vary slightly in determining the mass of a given analyte, the term "about" in the context of the mass of an ion or the mass/charge ratio of an ion refers to +/-0.50 atomic mass unit. At the very least, and not as an attempt to limit the application of the doctrine of equivalents to the scope of the claims, each numerical indication should at least be construed in light of the number of reported significant digits and by applying ordinary rounding techniques.

[258] Use of the terms “may” or “can” in reference to an embodiment or aspect of an embodiment also carries with it the alternative meaning of “may not“ or “cannot.” As such, if the present specification

discloses that an embodiment or an aspect of an embodiment may be or can be included as part of the inventive subject matter, then the negative limitation or exclusionary proviso is also explicitly meant, meaning that an embodiment or an aspect of an embodiment may not be or cannot be included as part of the inventive subject matter. In a similar manner, use of the term "optionally" in reference to an embodiment or aspect of an embodiment means that such embodiment or aspect of the embodiment may be included as part of the inventive subject matter or may not be included as part of the inventive subject matter. Whether such a negative limitation or exclusionary proviso applies will be based on whether the negative limitation or exclusionary proviso is recited in the claimed subject matter.

[259] Notwithstanding that the numerical ranges and values setting forth the broad scope of the invention are approximations, the numerical ranges and values set forth in the specific examples are reported as precisely as possible. Any numerical range or value, however, inherently contains certain errors necessarily resulting from the standard deviation found in their respective testing measurements. Recitation of numerical ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate numerical value falling within the range. Unless otherwise indicated herein, each individual value of a numerical range is incorporated into the present specification as if it were individually recited herein.

[260] The terms "a," "an," "the" and similar references used in the context of describing the present invention (especially in the context of the following claims) are to be construed to cover both the singular and the plural, unless otherwise indicated herein or clearly contradicted by context. Further, ordinal indicators – such as "first," "second," "third," etc. – for identified elements are used to distinguish between the elements, and do not indicate or imply a required or limited number of such elements, and do not indicate a particular position or order of such elements unless otherwise specifically stated. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g., "such as") provided herein is intended merely to better illuminate the present invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the present specification should be construed as indicating any non-claimed element essential to the practice of the invention.

[261] When used in the claims, whether as filed or added per amendment, the open-ended transitional term "comprising" (and equivalent open-ended transitional phrases thereof like including, containing and having) encompasses all the expressly recited elements, limitations, steps and/or features alone or in combination with unrecited subject matter; the named elements, limitations and/or features are essential, but other unnamed elements, limitations and/or features may be added and still form a construct within the scope of the claim. Specific embodiments disclosed herein may be further limited in the claims using the closed-ended transitional phrases "consisting of" or "consisting essentially of" in lieu of or as an amended for "comprising." When used in the claims, whether as filed or added per amendment, the closed-ended transitional phrase "consisting of" excludes any element, limitation, step, or feature not expressly recited in the claims. The closed-ended transitional phrase "consisting essentially of" limits the scope of a claim to the expressly recited elements, limitations, steps and/or features and any other elements, limitations, steps

and/or features that do not materially affect the basic and novel characteristic(s) of the claimed subject matter. Thus, the meaning of the open-ended transitional phrase "comprising" is being defined as encompassing all the specifically recited elements, limitations, steps and/or features as well as any optional, additional unspecified ones. The meaning of the closed-ended transitional phrase "consisting of" is being defined as only including those elements, limitations, steps and/or features specifically recited in the claim whereas the meaning of the closed-ended transitional phrase "consisting essentially of" is being defined as only including those elements, limitations, steps and/or features specifically recited in the claim and those elements, limitations, steps and/or features that do not materially affect the basic and novel characteristic(s) of the claimed subject matter. Therefore, the open-ended transitional phrase "comprising" (and equivalent open-ended transitional phrases thereof) includes within its meaning, as a limiting case, claimed subject matter specified by the closed-ended transitional phrases "consisting of" or "consisting essentially of." As such embodiments described herein or so claimed with the phrase "comprising" are expressly or inherently unambiguously described, enabled and supported herein for the phrases "consisting essentially of" and "consisting of."

[262] All patents, patent publications, and other publications referenced and identified in the present specification are individually and expressly incorporated herein by reference in their entirety for the purpose of describing and disclosing, for example, the compositions and methodologies described in such publications that might be used in connection with the present invention. These publications are provided solely for their disclosure prior to the filing date of the present application. Nothing in this regard should be construed as an admission that the inventors are not entitled to antedate such disclosure by virtue of prior invention or for any other reason. All statements as to the date or representation as to the contents of these documents is based on the information available to the applicants and does not constitute any admission as to the correctness of the dates or contents of these documents.

[263] Lastly, the terminology used herein is for the purpose of describing particular embodiments only, and is not intended to limit the scope of the present invention, which is defined solely by the claims. Accordingly, the present invention is not limited to that precisely as shown and described.

CLAIMS

1. A composition comprising:

   (i) a) 50 ppm to 500 ppm of hypochlorous acid or 50 ppm to 500 ppm of free available chlorine,
   b) 10 ppm to 250 ppm of a copper chloride and 10 ppm to 250 ppm of a zinc chloride, and
   c) 10 ppm to 250 ppm of calcium oxide; or

   (ii) a) 200 ppm to 1,000 ppm of hypochlorous acid or 200 ppm to 1,000 ppm of free available chlorine,
   b) 50 ppm to 500 ppm of a copper chloride and 50 ppm to 500 ppm of a zinc chloride, and
   c) 50 ppm to 500 ppm of calcium oxide.

2. The composition according to Claim 1, wherein the composition comprises:
   a) 50 ppm to 500 ppm of the hypochlorous acid or 50 ppm to 500 ppm of the free available chlorine,
   b) 10 ppm to 250 ppm of the copper chloride and 10 ppm to 250 ppm of the zinc chloride, and
   c) 10 ppm to 250 ppm of the calcium oxide.

3. The composition according to Claim 2, wherein the composition comprises:
   a) 150 ppm to 450 ppm of the hypochlorous acid or 150 ppm to 450 ppm of the free available chlorine,
   b) 10 ppm to 160 ppm of the copper chloride and 10 ppm to 160 ppm of the zinc chloride, and
   c) 40 ppm to 200 ppm of the calcium oxide.

4. The composition according to Claim 2, wherein the composition comprises: a) 150 to 450 ppm of the hypochlorous acid or 150 to 450 ppm of the free available chlorine,
   b) 20 ppm to 220 ppm of the copper chloride and 20 to 220 ppm of the zinc chloride, and
   c) 80 ppm to 240 ppm of the calcium oxide.

5. The composition according to Claim 2, wherein the composition comprises:
   a) 200 ppm to 400 ppm of the hypochlorous acid or 200 ppm to 400 ppm of the free available chlorine,
   b) 20 ppm to 140 ppm of the copper chloride and 20 ppm to 140 ppm of the zinc chloride, and
   c) 60 ppm to 180 ppm of the calcium oxide.

6. The composition according to Claim 2, wherein the composition comprises:
   a) 260 ppm to 360 ppm of the hypochlorous acid or 260 ppm to 360 ppm of the free available chlorine,
   b) 40 ppm to 120 ppm of the copper chloride and 40 ppm to 120 ppm of the zinc chloride, and
   c) 80 ppm to 160 ppm of the calcium oxide.

7. The composition according to Claim 2, wherein the composition comprises:
   a) 75 ppm to 400 ppm of the hypochlorous acid or 75 ppm to 400 ppm of the free available chlorine,
   b) 20 ppm to 200 ppm of the copper chloride and 20 ppm to 200 ppm of the zinc chloride, and
   c) 20 ppm to 200 ppm of the calcium oxide.

8. The composition according to Claim 2, wherein composition comprises:
   a) 100 ppm to 350 ppm of the hypochlorous acid or 100 ppm to 350 ppm of the free available chlorine,
   b) 40 ppm to 160 ppm of the copper chloride and 40 ppm to 160 ppm of the zinc chloride, and
   c) 40 ppm to 160 ppm of the calcium oxide.

9. The composition according to any one of Claims 1-8, wherein the composition further comprises a phosphate buffer.

10. The composition according to Claim 9, wherein the phosphate buffer is calcium phosphate or sodium phosphate.

11. The composition according to any one of Claims 1-10, wherein the composition pH is at least pH 5.

12. The composition according to Claim 11, wherein the composition pH is pH 5 to 7.

13. The composition according to Claim 12, wherein the composition pH is pH 5 to 6.

14. The composition according to any one of Claims 1-10, wherein the composition pH is pH 4.5 to 8.

15. The composition according to Claim 2, wherein the composition comprises:
   a) 340 ppm of the hypochlorous acid or 340 ppm of the free available chlorine,
   b) 80 ppm of the copper chloride and 80 ppm of the zinc chloride, and
   c) 80 ppm of the calcium oxide.

16. The composition according to Claim 2, wherein the composition comprises:
   a) 310 ppm of the hypochlorous acid or 310 ppm of the free available chlorine,
   b) 40 ppm, 80 ppm or 120 ppm of the copper chloride and 40 ppm, 80 ppm or 120 ppm of the zinc chloride, and
   c) 80 ppm or 160 ppm of the calcium oxide.

17. The composition according to Claim 2, wherein the composition comprises:
   a) 310 ppm of the hypochlorous acid or 310 ppm of the free available chlorine,
   b) 40 ppm of the copper chloride and 40 ppm of the zinc chloride, and
   c) 160 ppm of the calcium oxide.

18. The composition according to Claim 2, wherein the composition comprises:
   a) 320 ppm of the hypochlorous acid or 320 ppm of the free available chlorine,
   b) 80 ppm of the copper chloride and 80 ppm of the zinc chloride, and
   c) 80 ppm of the calcium oxide.

19. The composition according to Claim 1, part (ii).

20. A method of cleaning or disinfecting a hard surface, the method comprising applying to the hard surface a composition as defined in any one of Claims 1-19.