

DISINFECTING COMPOSITION COMPRISING TARTARIC ACID AND LACTIC ACID

The invention relates to a new highly effective surface disinfecting composition which works under Annex 1 of the biocidal regulation, which means that it is safe for humans and for the environment.

Background

Contamination with microbes on various surfaces in for example food processing, production facilities, diagnostic laboratories, hygiene institutions, hospitals and in general household cause major problems. Several known disinfection solutions exist on the market but many of them use aggressive chemicals to kill the microorganisms. Many such products have the disadvantage of being both corrosive and irritating for the skin of the user and therefore more biocompatible solutions are wanted.

The European Chemical Agency (ECHA) have introduced into the Biocidal Product Regulations (BPR) a section comprising biocides that are considered safe or of little concern. This section of the BPR is called Annex I and comprises a list of 19 chemicals (at the time of filing this application). The listed chemicals in Annex I are outside the conventional biocides listed in Annex II of the BPR.

Annex I of the Biocidal Products Regulation (BPR) lists initially active substances identified as presenting a low risk under Regulation (EC) No 1907/2006 or Directive 98/8/EC, substances identified as food additives, pheromones and other substances considered to have low toxicity, such as weak acids, alcohols and vegetable oils used in cosmetics and food. To encourage the use of products with a more favourable environmental, human or animal health profile, biocidal products containing one or more of these active substance(s) are eligible for a simplified authorisation procedure.

WO 2012/101129 A1 discloses an anti-microbial composition comprising essential oils, metal ions, organic acids and detergents. Several of the ingredients of choice in WO 2012/101129 A1 are not listed in Annex I of the BPR and are therefore not as green and safe as the chemicals listed in Annex I.

So there is a need to develop disinfecting products that are safe for both humans and for the environment, but without compromising to the demand of performance.

5 Summary of the invention

The object of the present invention is to solve the above described problems by developing a new disinfecting composition that are completely safe for both humans and for the environment and which have a very high antimicrobial efficiency.

10 This may be accomplished by a disinfecting composition comprising the following biocides:

- a) Tartaric acid in concentrations from 1 mM to 70 mM;
- b) Lactic acid in concentrations from 1 mM to 70 mM.

15 The claimed composition has shown to be a broad-spectrum powerful disinfectant comprising the weak natural organic acids – tartaric acid and lactic acid - that are even approved for indirect contact with food. The composition works under Annex 1 of the Biocidal Products Regulation (BPR), which means it is safe for humans and environment so the composition won't have a hazard warning and it is effective in
20 killing bacteria and candida which is a yeast microorganism that lives in the body's intestinal tract.

In one embodiment, the disinfecting composition further comprises the following biocide:

25 c) at least one essential oil or oil extract in concentrations from 0.01 wt% to 1 wt% selected from lavender oil or oil extract and/or peppermint oil or oil extract.

This claimed composition has shown to be a broad-spectrum powerful disinfectant comprising the weak natural organic acids – tartaric acid and lactic acid - that are even approved for indirect contact with food. The composition works under Annex 1
30 of the Biocidal Products Regulation (BPR), which means it is safe for humans and environment so the composition won't have a hazard warning and it is effective in killing bacteria, fungi, viruses, mycobacteria and Clostridium difficile. In fact the claimed disinfecting composition will cover more than 93% of all situations replacing

several conventional disinfectants such as ethanol and carcinogenic PHMB.

In one embodiment the disinfecting composition comprising the following biocides:

- a) Tartaric acid in concentrations from 1 mM to 70 mM;
- 5 b) Lactic acid in concentrations from 1 mM to 70 mM,
- c) at least one essential oil or oil extract in concentrations from 0.01 wt% to 1 wt% selected from lavender oil or oil extract and/or peppermint oil or oil extract,
- d) copper-PCA (Cu-PCA) in concentrations from 1 mM to 10 mM,
- 10 Cu-PCA is an enhancer used in the cosmetic industry that conditions and clears the skin. Cu-PCA is an anti-irritant and skin conditioner which has positive effects on collagen and elastin in the skin, which helps cell regeneration and skin repair in wound healing.
- 15 In one embodiment the disinfecting composition comprising the following biocides:
 - a) Tartaric acid in concentrations from 1 mM to 70 mM;
 - b) Lactic acid in concentrations from 1 mM to 70 mM,
 - c) at least one essential oil or oil extract in concentrations from 0.01 wt% to 1 wt% selected from lavender oil or oil extract and/or peppermint oil or oil extract,
 - 20 d) copper-PCA in concentrations from 1 mM to 10 mM,
 - e) Vitamin C (L-ascorbic acid) in concentrations from 1 mM to 50 mM.

- For outbreaks the composition comprising L-ascorbic acid or vitamin C can replace chlorine, peroxide compounds, glutaraldehyde etc. When the disinfecting composition is boosted with Vitamin C it increases the kill power of the disinfecting composition and the composition is able to kill 100% of pathogens. It can be used in critical areas, i.e. by clinical outbreaks, lumened endoscope disinfection and virulent black mould.

- 30 This disinfecting composition comprising L-ascorbic acid or vitamin C has a very high antimicrobial efficiency and also works under Annex 1 of the Biocidal Products Regulation (BPR), which means it is safe for humans and the environment so the composition won't have a hazard warning. It is effective in killing bacteria, fungi,

viruses, mycobacteria and spores incl. *Aspergillus Brasiliensis*, *Clostridium difficile*, *Bacillus Subtilis* and *Bacillus Cereus*.

5 The present invention also concerns the use of the disinfecting composition according to the present disclosure and present claims for treating contaminated surfaces such as at children institutions, at hospitals, at nursing homes, at clinics, in food and beverage processing, in agricultural industry, in farming, in animal biosecurity, in consumer market, in food catering, in brewing industry, in oil industry, in pharmaceutical industry, in cleaning and disinfectant industry, in electronic
10 industry and in fishing industry.

The present invention also concerns a method for disinfecting a contaminated surface, said method may comprising:

- 15 - providing a disinfecting composition comprising tartaric acid in concentrations from 1 mM to 70 mM and lactic acid in concentrations from 1 mM to 70 mM;
- treating a contaminated surface with said disinfecting composition, wherein bacteria and yeast microorganism *Candida* on said surface is killed by denaturing, solubilising inactivating and degrading their
20 proteins and nucleic acids.

The present invention also concerns a method for disinfecting a contaminated surface, said method may comprising:

- 25 - providing a disinfecting composition comprising tartaric acid in concentrations from 1 mM to 70 mM; lactic acid in concentrations from 1 mM to 70 mM and at least one essential oil or oil extract in concentrations from 0.01 wt% to 1 wt% selected from lavender oil or oil extract and/or peppermint oil or oil extract;
- 30 - treating a contaminated surface with said disinfecting composition, wherein microorganisms on said surface is killed by denaturing, solubilising inactivating and degrading their proteins and nucleic acids.

The present invention also concerns a method for disinfecting a contaminated surface, said method may comprising:

- 5
- providing a disinfecting composition comprising tartaric acid in concentrations from 1 mM to 70 mM, lactic acid in concentrations from 1 mM to 70 mM, at least one essential oil or oil extract in concentrations from 0.01 wt% to 1 wt% selected from lavender oil or oil extract and/or peppermint oil or oil extract and copper-PCA in concentrations from 1 mM to 10 mM;
 - treating a contaminated surface with said disinfecting composition, wherein microorganisms on said surface is killed by denaturing, solubilising inactivating and degrading their proteins and nucleic acids.

10

The present invention also concerns a method for disinfecting a contaminated surface, said method may comprising:

- 15
- providing a disinfecting composition comprising tartaric acid in concentrations from 1 mM to 70 mM, lactic acid in concentrations from 1 mM to 70 mM, at least one essential oil or oil extract in concentrations from 0.01 wt% to 1 wt% selected from lavender oil or oil extract and/or peppermint oil or oil extract, copper-PCA in concentrations from 1 mM to 10 mM and L-ascorbic acid in concentrations from 1 mM to 50 mM;
 - 20 - treating a contaminated surface with said disinfecting composition, wherein microorganisms on said surface is killed by denaturing, solubilising inactivating and degrading their proteins and nucleic acids.

Brief description of the drawings

25 Figure 1 show that the composition of the present invention is able to target the following organisms: gram positive and gram negative bacteria, yeast and fungi, enveloped and non-enveloped viruses, mycobacteria and bacterial spores.

Figure 2 shows the contact time of the composition of the present invention against
30 varies type of bacteria, fungi viruses and spores.

Description of preferred embodiments

The present invention in a first aspect provides a disinfecting composition comprising the following biocides:

- a) Tartaric acid in concentrations from 1 mM to 70 mM;
- b) Lactic acid in concentrations from 1 mM to 70 mM.

5 It was surprisingly found that this composition, comprising the mixture of tartaric acid and lactic acid is effective in killing bacteria and candida - which is a yeast microorganism that lives in the body's intestinal tract and this new disinfecting composition is completely safe for both humans and for the environment

10 In one embodiment, the disinfecting composition further comprises the following biocide:

- c) at least one essential oil or oil extract in concentrations from 0.01 wt% to 1 wt% selected from lavender oil or oil extract and/or peppermint oil or oil extract.

15 It was surprisingly found that this composition, comprising the mixture of tartaric acid, lactic acid and at least one essential oil or oil extract selected from lavender oil and/or peppermint oil exhibit a high antimicrobial activity. This new disinfecting composition is completely safe for both humans and for the environment and has a very high antimicrobial efficiency.

20 The claimed composition has shown to be a broad-spectrum powerful disinfectant comprising the weak natural organic acids – tartaric acid and lactic acid - that are even approved for indirect contact with food. The composition works under Annex 1 of the Biocidal Products Regulation (BPR), which means it is safe for humans and environment so the composition won't have a hazard warning and it is effective in
25 killing bacteria, fungi, viruses, mycobacteria and Clostridium difficile. In fact the claimed disinfecting composition will cover more than 93% of all situations replacing several conventional disinfectants such as ethanol and carcinogenic PHMB.

In one embodiment the disinfecting composition comprising the following biocides:

- 30
- a) Tartaric acid in concentrations from 1 mM to 70 mM;
 - b) Lactic acid in concentrations from 1 mM to 70 mM,
 - c) at least one essential oil or oil extract in concentrations from 0.01 wt% to 1 wt% selected from lavender oil or oil extract and/or peppermint oil or oil extract,
 - d) copper-PCA (Cu-PCA) in concentrations from 1 mM to 10 mM,

Cu-PCA is an enhancer used in the cosmetic industry that conditions and clears the skin.

- 5 In one embodiment the disinfecting composition comprising the following biocides:
- a) Tartaric acid in concentrations from 1 mM to 70 mM;
 - b) Lactic acid in concentrations from 1 mM to 70 mM,
 - c) at least one essential oil or oil extract in concentrations from 0.01 wt% to 1 wt% selected from lavender oil or oil extract and/or peppermint oil or oil extract,
 - 10 d) copper-PCA (Cu-PCA) in concentrations from 1 mM to 10 mM,
 - e) Vitamin C (L-ascorbic acid) in concentrations from 1 mM to 50 mM.

- For outbreaks the composition comprising L-ascorbic acid or vitamin C can replace chlorine, peroxide compounds, glutaraldehyde etc. When the disinfecting
- 15 composition is boosted with Vitamin C it increases the kill power of the disinfecting composition and the composition is able to kill 100% of pathogens. It can be used in critical areas, i.e. by clinical outbreaks, lumened endoscope disinfection and virulent black mould.

- 20 This disinfecting composition comprising L-ascorbic acid or vitamin C has a very high antimicrobial efficiency and also works under Annex 1 of the Biocidal Products Regulation (BPR), which means it is safe for humans and the environment so the composition won't have a hazard warning. It is effective in killing bacteria, fungi, viruses, mycobacteria and spores incl. *Aspergillus Brasiliensis*, *Clostridium difficile*,
- 25 *Bacillus Subtilis* and *Bacillus Cereus*.

- The claimed disinfecting composition can be formulated into wipes or as a fluid. The microorganisms are killed with high efficiency by rubbing, wiping, spraying, soaking or immersion or in any other ways applying the composition solution to a
- 30 contaminated surface contaminated with unwanted microorganisms.

Advantages of the disinfecting composition according to the present invention are:

- High efficacy
- Can be used without gloves

- No hazard warnings – handle as regular waste: Environment friendly
- Safe transportation and storage (and not highly flammable as opposed to Ethanol)
- Approved for surfaces with indirect food-contact, which means no cleaning after disinfection
- 5 – Non-corrosive
- No discoloration
- Use on all impervious hard surfaces and equipment with a high frequency (and is safe enough to use several times a day)
- 10 – Can be used in all environments – i.e. hospitals, health institutions, food industry and animal farms
- No harmful residuals left on surfaces

15 The composition can be used on all kind of surfaces, including sensitive equipment i.e. fixed panel equipment and other kinds of non-rinse/washable equipment (i.e. control panels), medical instruments such as infusion pumps, stethoscopes, thermometers, blood pressure-apparatus, nanometres, flow meters, beds, nursing pillow etc., non-alcohol tolerant furniture surfaces, food preparation surfaces and equipment, walls, floors and many other hard surfaces.

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The composition can also be used on skin, hands, body, plants, fruits and other foods.

25 In one embodiment of the disinfecting composition the concentration of the at least one essential oil or oil extract is from 0.05 wt% to 2 wt%, or from 0.1 wt% to 1 wt%, or from 0.1 wt% to 0.5 wt%.

30 In one embodiment the composition comprises from 0.01 wt% to 0.5 wt%, or from 0.05 wt% to 0.2 wt%, or from 0.09 wt% to 0.1 wt% lavender oil or oil extract and from 0.01 wt% to 0.5 wt%, or from 0.05 wt% to 0.2 wt%, or from 0.09 wt% to 0.1 wt% peppermint oil or oil extract.

Some essential oils are known to exhibit an antiseptic activity; especially tea tree oil is known to work effectively against bacteria and fungi. But many essential oils are not approved and incorporated into the Annex I of the Biocidal Products Regulation (BPR). It is surprisingly found that both lavender oil and extract and peppermint oil
5 and extract have very good antimicrobial activity, and when combined the antimicrobial activity is enhanced.

Both tartaric acid and lactic acid are carboxylic acids and they may be used as either solid or liquid in their natural state and are readily soluble or dissolved in or
10 miscible with water or an aqueous solvent. In one embodiment tartaric acid is used as solid and lactic acid as liquid or solid.

In one embodiment of the disinfecting composition the concentration of the tartaric acid is from 10 mM to 50 mM, or from 20 mM to 50 mM, or from 30 mM to 50 mM, or
15 from 35 mM to 45 mM, or around 40 mM.

In one embodiment of the disinfecting composition the concentration of the tartaric acid is from 1 mM to 30 mM, or from 5 mM to 20 mM, or from 5 mM to 15 mM, or
20 from 5 mM to 10 mM.

In one embodiment of the disinfecting composition the concentration of the lactic acid is from 10 mM to 50 mM, or from 20 mM to 50 mM, or from 30 mM to 50 mM, or
from 35 mM to 45 mM, or around 40 mM.

25 In one embodiment of the disinfecting composition the concentration of the lactic acid is from 1 mM to 30 mM, or from 5 mM to 20 mM, or from 5 mM to 15 mM, or from 5 mM to 10 mM.

In one embodiment the disinfecting composition further comprises at least one
30 buffer substances. Usable buffer substance can be sodium acetate or sodium lactate. The buffer substances can be added to the composition solution to define a specific pH value.

In one embodiment the disinfecting composition further comprises alcohols. In one embodiment the alcohol is Ethanol. The concentration of the alcohol is low compared to other disinfecting compositions. In one embodiment the concentration of alcohol is below 10% wt%, such as below 8% wt% in relation to the total volume of the composition solution. The alcohol will ease a better solubility of the essential oil(s) and a better wetting of the surfaces to be treated.

In one embodiment the disinfecting composition further comprises an anionic surfactant which is stable at pH 2.5 to 4. In one embodiment the anionic surfactant is sodium dodecyl sulfate (SDS). SDS is a widely used detergent which is stable in the pH range of 2.5 to 4. The surface-active substance are preferably used in concentrations from 0.01 wt% to 10 wt%, or from 0.01 wt% to 2 wt%, or from 0.1 wt% to 1 wt%, or from 0.2 wt% to 0.8 wt%, or about 0.5 wt% in relation to the total volume of the composition solution.

In one embodiment the disinfecting composition further comprises glycerol in small amount, such as below 4% wt% or below 1% wt% in relation to the total volume of the composition solution. The glycerol will work as a softening agent. In one embodiment the disinfecting composition further comprises PnB (1-butoxypropan-2-ol) which is a water soluble solvent. If present, the PnB is preferably used in concentrations from 0.01 wt% to 10 wt%, or from 0.1 wt% to 6 wt%, or from 1 wt% to 5 wt% in relation to the total volume of the composition solution.

In one embodiment the disinfecting composition further comprises copper ions e.g. from copper salts.

In one embodiment the disinfecting composition further comprises Cu-PCA, which is an enhancer used in the cosmetic industry that conditions and clears the skin. If present, Cu-PCA is preferably used in concentrations from 1 mM to 10 mM, or from 2 mM to 5 mM, or from 2.5 mM to 3.5 mM, or around 3 mM in relation to the total volume of the composition solution. In another embodiment the disinfecting composition could comprise copper compounds besides Cu-PCA such as Cu-chlorid and/or Cu-sulphate.

In one embodiment, the combination of Cu-PCA and glycerol was found to be effective in regards to skin biocompatibility, without detracting from the overall efficacy performance, even in low concentrations.

- 5 In one embodiment the disinfecting composition is having a pH value in the range of 2 to 4, or from 2.5 to 4, or from 2.5 to 3. Within this range the disinfecting effect is optimal, so it is an advantage of the disinfecting composition to have an acidic pH value. In basic solutions, the disinfecting effect of the essential oils is reduced. The pH value can be adjusted within the above ranges by varying the concentration of
- 10 the organic acids or by adding a chemical suitable for pH adjustment.

In one embodiment the disinfecting composition comprises the following biocides:

- a) from 10 mM to 50 mM tartaric acid;
- b) from 10 mM to 50 mM lactic acid;
- 15 c) from 0.05 wt% to 0.2 wt% lavender oil or oil extract and from 0.05 wt% to 0.2 wt% peppermint oil or oil extract.

In one embodiment the disinfecting composition comprises the following biocides:

- a) from 30 mM to 50 mM tartaric acid;
- 20 b) from 30 mM to 50 mM lactic acid;
- c) from 0.05 wt% to 0.2 wt% lavender oil or oil extract and from 0.05 wt% to 0.2 wt% peppermint oil or oil extract.

In one embodiment the disinfecting composition comprises the following biocides:

- 25 a) from 30 mM to 50 mM tartaric acid;
- b) from 30 mM to 50 mM lactic acid;
- c) from 0.09 wt% to 0.1 wt% lavender oil or oil extract and from 0.09 wt% to 0.1 wt% peppermint oil or oil extract.

30 In one embodiment the disinfecting composition comprises the following biocides:

- a) about 40 mM tartaric acid;
- b) about 40 mM lactic acid;
- c) from 0.09 wt% to 0.1 wt% lavender oil or oil extract and from 0.09 wt% to 0.1 wt% peppermint oil or oil extract.

In one embodiment the disinfecting composition further comprises at least one water-soluble vitamin. The at least one water-soluble vitamin is included in concentrations from 1 mM to 50 mM. In one embodiment the at least one water-soluble vitamin is vitamin C (L-ascorbic acid). In one embodiment the disinfecting composition comprises vitamin C in concentrations from 1 mM to 50 mM.

So in one embodiment the disinfecting composition further comprises L-ascorbic acid. That is; the disinfecting composition can comprise L-ascorbic acid itself or vitamin C which comprises L-ascorbic acid. Hence, throughout the description; vitamin C and L-ascorbic acid are used interchangeably.

In one embodiment the disinfecting composition comprises L-ascorbic acid in concentrations from 1 mM to 50 mM.

In one embodiment the disinfecting composition further comprises the water-soluble vitamin C (L-ascorbic acid). In one embodiment the vitamin C is included in concentrations from 10 mM to 50 mM, or from 20 mM to 50 mM, or from 30 mM to 50 mM, or from 35 mM to 45 mM, or around 40 mM. In another embodiment the vitamin C is included in concentrations from 1 mM to 30 mM, or from 5 mM to 30 mM, or from 10 mM to 25 mM, or around 20 mM.

In one embodiment the disinfecting composition further comprises L-ascorbic acid. In one embodiment the L-ascorbic acid is included in concentrations from 10 mM to 50 mM, or from 20 mM to 50 mM, or from 30 mM to 50 mM, or from 35 mM to 45 mM, or around 40 mM. In another embodiment the L-ascorbic acid is included in concentrations from 1 mM to 30 mM, or from 5 mM to 30 mM, or from 10 mM to 25 mM, or around 20 mM.

In addition to the at least one water-soluble vitamin; vitamin C or L-ascorbic acid the composition may also comprise NaCl. In one embodiment the NaCl is included in concentrations from 1 mM to 30 mM, or from 5 mM to 20 mM, or from 8 mM to 12 mM, or around 10 mM. In another embodiment the NaCl is included in

concentrations from 1 mM to 20 mM, or from 2 mM to 15 mM, or from 3 mM to 10 mM, or around 5 mM.

5 For outbreaks the composition comprising L-ascorbic acid/vitamin C can replace chlorine, peroxide compounds, glutaraldehyde etc. When the disinfecting composition is boosted with L-ascorbic acid/Vitamin C it increases the kill power of the disinfecting composition and the composition is able to kill 100% of pathogens. It can be used in critical areas, i.e. by clinical outbreaks, lumened endoscope disinfection and virulent black mould.

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This disinfecting composition comprising L-ascorbic acid/vitamin C has a very high antimicrobial efficiency and also works under Annex 1 of the Biocidal Products Regulation (BPR), which means it is safe for humans and the environment so the composition won't have a hazard warning. It is effective in killing bacteria, fungi, 15 viruses, mycobacteria and spores incl. *Aspergillus Brasiliensis*, *Clostridium difficile*, *Bacillus Subtilis* and *Bacillus Cereus*.

20 The claimed disinfecting composition comprising L-ascorbic acid/vitamin C can be formulated into wipes or as a fluid. The microorganisms are killed with high efficiency by rubbing, wiping, spraying, soaking or immersion or in any other ways applying the composition solution to a contaminated surface contaminated with unwanted microorganisms.

In one embodiment the disinfecting composition comprises the following biocides:

25 a) from 10 mM to 50 mM tartaric acid;
b) from 10 mM to 50 mM lactic acid;
c) from 0.05 wt% to 0.2 wt% lavender oil or oil extract and from 0.05 wt% to 0.2 wt% peppermint oil or oil extract;
d) from 10 mM to 50 mM L-ascorbic acid or vitamin C.

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In one embodiment the disinfecting composition comprises the following biocides:

a) from 30 mM to 50 mM tartaric acid;
b) from 30 mM to 50 mM lactic acid;

- c) from 0.05 wt% to 0.2 wt% lavender oil or oil extract and from 0.05 wt% to 0.2 wt% peppermint oil or oil extract;
- d) from 30 mM to 50 mM L-ascorbic acid or Vitamin C.

5 In one embodiment the disinfecting composition comprises the following biocides:

- a) from 30 mM to 50 mM tartaric acid;
- b) from 30 mM to 50 mM lactic acid;
- c) from 0.09 wt% to 0.1 wt% lavender oil or oil extract and from 0.09 wt% to 0.1 wt% peppermint oil or oil extract;

10 d) from 35 mM to 45 mM L-ascorbic acid or vitamin C.

In one embodiment the disinfecting composition comprises the following biocides:

- a) about 40 mM tartaric acid;
- b) about 40 mM lactic acid;

15 c) from 0.09 wt% to 0.1 wt% lavender oil or oil extract and from 0.09 wt% to 0.1 wt% peppermint oil or oil extract;

d) about 40 mM L-ascorbic acid or vitamin C.

In one embodiment the disinfecting composition comprises the following biocides:

20 a) from 10 mM to 50 mM tartaric acid;

b) from 10 mM to 50 mM lactic acid;

c) from 0.05 wt% to 0.2 wt% lavender oil or oil extract and from 0.05 wt% to 0.2 wt% peppermint oil or oil extract;

d) from 1 mM to 30 mM L-ascorbic acid or vitamin C.

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In one embodiment the disinfecting composition comprises the following biocides:

- a) from 30 mM to 50 mM tartaric acid;
 - b) from 30 mM to 50 mM lactic acid;
 - c) from 0.05 wt% to 0.2 wt% lavender oil or oil extract and from 0.05 wt% to 0.2 wt% peppermint oil or oil extract;
- 30 d) from 5 mM to 30 mM L-ascorbic acid or Vitamin C.

In one embodiment the disinfecting composition comprises the following biocides:

- a) from 30 mM to 50 mM tartaric acid;

- b) from 30 mM to 50 mM lactic acid;
- c) from 0.09 wt% to 0.1 wt% lavender oil or oil extract and from 0.09 wt% to 0.1 wt% peppermint oil or oil extract;
- d) from 10 mM to 25 mM L-ascorbic acid or vitamin C.

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In one embodiment the disinfecting composition comprises the following biocides:

- a) about 40 mM tartaric acid;
- b) about 40 mM lactic acid;
- c) from 0.09 wt% to 0.1 wt% lavender oil or oil extract and from 0.09 wt% to 0.1 wt% peppermint oil or oil extract;
- d) about 20 mM L-ascorbic acid or vitamin C.

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In one embodiment the disinfecting composition further comprises Cu-PCA, which is an enhancer used in the cosmetic industry that conditions and clears the skin. If present, Cu-PCA is preferably used in concentrations from 1 mM to 10 mM, or from 2 mM to 5 mM, or from 2.5 mM to 3.5 mM, or around 3 mM in relation to the total volume of the composition solution. In another embodiment the disinfecting composition could comprise copper compounds besides Cu-PCA such as Cu-chlorid and/or Cu-sulphate.

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20 In one embodiment the disinfecting composition comprises the following biocides:

- a) from 10 mM to 50 mM tartaric acid;
- b) from 10 mM to 50 mM lactic acid;
- c) from 0.05 wt% to 0.2 wt% lavender oil or oil extract and from 0.05 wt% to 0.2 wt% peppermint oil or oil extract;
- d) from 1 mM to 10 mM copper-PCA.

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In one embodiment the disinfecting composition comprises the following biocides:

- a) from 30 mM to 50 mM tartaric acid;
- b) from 30 mM to 50 mM lactic acid;
- c) from 0.05 wt% to 0.2 wt% lavender oil or oil extract and from 0.05 wt% to 0.2 wt% peppermint oil or oil extract;
- d) from 1 mM to 10 mM copper-PCA.

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In one embodiment the disinfecting composition comprises the following biocides:

- a) from 30 mM to 50 mM tartaric acid;
b) from 30 mM to 50 mM lactic acid;
c) from 0.09 wt% to 0.1 wt% lavender oil or oil extract and from 0.09 wt% to 0.1 wt% peppermint oil or oil extract;
5 d) from 1 mM to 10 mM copper-PCA.

In one embodiment the disinfecting composition comprises the following biocides:

- a) about 40 mM tartaric acid;
b) about 40 mM lactic acid;
10 c) from 0.09 wt% to 0.1 wt% lavender oil or oil extract and from 0.09 wt% to 0.1 wt% peppermint oil or oil extract;
d) from 1 mM to 10 mM copper-PCA.

In one embodiment the disinfecting composition comprises the following biocides:

- 15 a) from 10 mM to 50 mM tartaric acid;
b) from 10 mM to 50 mM lactic acid;
c) from 0.05 wt% to 0.2 wt% lavender oil or oil extract and from 0.05 wt% to 0.2 wt% peppermint oil or oil extract;
d) from 1 mM to 10 mM copper-PCA.

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In one embodiment the disinfecting composition comprises the following biocides:

- a) from 30 mM to 50 mM tartaric acid;
b) from 30 mM to 50 mM lactic acid;
c) from 0.05 wt% to 0.2 wt% lavender oil or oil extract and from 0.05 wt% to 0.2 wt% peppermint oil or oil extract;
25 d) from 1 mM to 10 mM copper-PCA.

In one embodiment the disinfecting composition comprises the following biocides:

- a) from 30 mM to 50 mM tartaric acid;
30 b) from 30 mM to 50 mM lactic acid;
c) from 0.09 wt% to 0.1 wt% lavender oil or oil extract and from 0.09 wt% to 0.1 wt% peppermint oil or oil extract;
d) from 2 mM to 5 mM copper-PCA.

In one embodiment the disinfecting composition comprises the following biocides:

- a) about 40 mM tartaric acid;
- b) about 40 mM lactic acid;
- c) from 0.09 wt% to 0.1 wt% lavender oil or oil extract and from 0.09 wt% to 0.1 wt% peppermint oil or oil extract;
- d) from 2 mM to 5 mM copper-PCA.

In one embodiment the disinfecting composition comprises the following biocides:

- a) from 10 mM to 50 mM tartaric acid;
- b) from 10 mM to 50 mM lactic acid;
- c) from 0.05 wt% to 0.2 wt% lavender oil or oil extract and from 0.05 wt% to 0.2 wt% peppermint oil or oil extract;
- d) from 10 mM to 50 mM L-ascorbic acid or vitamin C
- e) from 1 mM to 10 mM copper-PCA.

In one embodiment the disinfecting composition comprises the following biocides:

- a) from 30 mM to 50 mM tartaric acid;
- b) from 30 mM to 50 mM lactic acid;
- c) from 0.05 wt% to 0.2 wt% lavender oil or oil extract and from 0.05 wt% to 0.2 wt% peppermint oil or oil extract;
- d) from 30 mM to 50 mM L-ascorbic acid or Vitamin C
- e) from 1 mM to 10 mM copper-PCA.

In one embodiment the disinfecting composition comprises the following biocides:

- a) from 30 mM to 50 mM tartaric acid;
- b) from 30 mM to 50 mM lactic acid;
- c) from 0.09 wt% to 0.1 wt% lavender oil or oil extract and from 0.09 wt% to 0.1 wt% peppermint oil or oil extract;
- d) from 35 mM to 45 mM L-ascorbic acid or vitamin C
- e) from 1 mM to 10 mM copper-PCA.

In one embodiment the disinfecting composition comprises the following biocides:

- a) about 40 mM tartaric acid;
- b) about 40 mM lactic acid;

- c) from 0.09 wt% to 0.1 wt% lavender oil or oil extract and from 0.09 wt% to 0.1 wt% peppermint oil or oil extract;
- d) about 40 mM L-ascorbic acid or vitamin C
- e) from 1 mM to 10 mM copper-PCA.

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In one embodiment the disinfecting composition comprises the following biocides:

- a) from 10 mM to 50 mM tartaric acid;
- b) from 10 mM to 50 mM lactic acid;
- c) from 0.05 wt% to 0.2 wt% lavender oil or oil extract and from 0.05 wt% to 0.2 wt% peppermint oil or oil extract;
- d) from 1 mM to 30 mM L-ascorbic acid or vitamin C
- e) from 1 mM to 10 mM copper-PCA.

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In one embodiment the disinfecting composition comprises the following biocides:

- a) from 30 mM to 50 mM tartaric acid;
- b) from 30 mM to 50 mM lactic acid;
- c) from 0.05 wt% to 0.2 wt% lavender oil or oil extract and from 0.05 wt% to 0.2 wt% peppermint oil or oil extract;
- d) from 5 mM to 30 mM L-ascorbic acid or Vitamin C
- e) from 1 mM to 10 mM copper-PCA.

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In one embodiment the disinfecting composition comprises the following biocides:

- a) from 30 mM to 50 mM tartaric acid;
- b) from 30 mM to 50 mM lactic acid;
- c) from 0.09 wt% to 0.1 wt% lavender oil or oil extract and from 0.09 wt% to 0.1 wt% peppermint oil or oil extract;
- d) from 10 mM to 25 mM L-ascorbic acid or vitamin C
- e) from 2 mM to 5 mM copper-PCA.

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In one embodiment the disinfecting composition comprises the following biocides:

- a) about 40 mM tartaric acid;
- b) about 40 mM lactic acid;
- c) from 0.09 wt% to 0.1 wt% lavender oil or oil extract and from 0.09 wt% to 0.1 wt% peppermint oil or oil extract;

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- d) about 20 mM L-ascorbic acid or vitamin C.
- e) from 2 mM to 5 mM copper-PCA.

5 The presently claimed disinfecting composition is aimed at targeting the following microorganisms: gram positive and gram negative bacteria, yeast and fungi, enveloped and non-enveloped viruses, mycobacteria and bacterial spores, please see figure 1.

10 The present invention also concerns the use of the disinfecting composition according to the present disclosure and present claims for treating contaminated surfaces such as at children institutions, at hospitals, at nursing homes, at clinics, in food and beverage processing, in agricultural industry, in farming, in animal biosecurity, in consumer market, in food catering, in brewing industry, in oil industry, in pharmaceutical industry, in cleaning and disinfectant industry, in electronic
15 industry and in fishing industry.

The composition can be used on all kind of surfaces, including sensitive equipment i.e. fixed panel equipment and other kinds of non-rinse/washable equipment (i.e. control panels), medical instruments such as infusion pumps, stethoscopes,
20 thermometers, blood pressure-apparatus, nanometres, flow meters, beds, nursing pillow etc., non-alcohol tolerant furniture surfaces, food preparation surfaces and equipment, walls, floors and many other hard surfaces.

25 The composition can also be used on skin, hands, body, plants, fruits and other foods.

The present invention also concerns a method for disinfecting a contaminated surface, said method may comprising:

- 30 - providing a disinfecting composition comprising tartaric acid in concentrations from 1 mM to 70 mM and lactic acid in concentrations from 1 mM to 70 mM;
- treating a contaminated surface with said disinfecting composition, wherein bacteria and yeast microorganism candida on said surface is

killed by denaturing, solubilising inactivating and degrading their proteins and nucleic acids.

The present invention also concerns a method for disinfecting a contaminated surface, said method may comprising:

- providing a disinfecting composition comprising tartaric acid in concentrations from 1 mM to 70 mM; lactic acid in concentrations from 1 mM to 70 mM and at least one essential oil or oil extract in concentrations from 0.01 wt% to 1 wt% selected from lavender oil or oil extract and/or peppermint oil or oil extract;
- treating a contaminated surface with said disinfecting composition, wherein microorganisms on said surface is killed by denaturing, solubilising inactivating and degrading their proteins and nucleic acids.

The present invention also concerns a method for disinfecting a contaminated surface, said method may comprising:

- providing a disinfecting composition comprising tartaric acid in concentrations from 1 mM to 70 mM, lactic acid in concentrations from 1 mM to 70 mM, at least one essential oil or oil extract in concentrations from 0.01 wt% to 1 wt% selected from lavender oil or oil extract and/or peppermint oil or oil extract and copper-PCA in concentrations from 1 mM to 10 mM;

treating a contaminated surface with said disinfecting composition, wherein microorganisms on said surface is killed by denaturing, solubilising inactivating and degrading their proteins and nucleic acids.

The present invention also concerns a method for disinfecting a contaminated surface, said method may comprising:

- providing a disinfecting composition comprising tartaric acid in concentrations from 1 mM to 70 mM, lactic acid in concentrations from 1 mM to 70 mM, at least one essential oil or oil extract in concentrations from 0.01 wt% to 1 wt% selected from lavender oil or oil extract and/or peppermint oil or oil extract, copper-PCA in

concentrations from 1 mM to 10 mM and L-ascorbic acid in concentrations from 1 mM to 50 mM;

- treating a contaminated surface with said disinfecting composition, wherein microorganisms on said surface is killed by denaturing, solubilising inactivating and degrading their proteins and nucleic acids.

The microorganisms are killed with high efficiency by rubbing, wiping, spraying, soaking or immersion or in any other ways applying the composition solution to a contaminated surface contaminated with unwanted microorganisms. The solution should be applied to a surface at room temperature, and that surface to remain wet for the stated time period in order to kill the particular living microorganism being targeted from the surface being disinfected. In one embodiment the solution should be applied for about 1 minute. In one embodiment the solution should be applied for about 2 minutes. In one embodiment the solution should be applied for about 5 minutes. In one embodiment the solution should be applied for about 10 minutes. In one embodiment the solution should be applied for about 15 minutes. In one embodiment the solution should be applied for about 30 minutes. In one embodiment the solution should be applied for about 60 minutes. Depending on the surface and the specific task the applying method and applying time can be varied and adjusted.

In the following, exemplary disinfecting compositions according to the present invention will be described with reference to the figures and tables.

Figure 1 show that the present invention is able to targeting the following organisms: gram positive and gram negative bacteria, yeast and fungi, enveloped and non-enveloped viruses, mycobacteria and bacterial spores. "No efficacy" is indicated with a "no" and "full efficacy" is indicated with a "yes". The "Composition of the invention without Vitamin C" comprises 40 mM tartaric acid (CAS-No.: 87-69-4), 40 mM lactic acid (CAS-No.: 50-21-5), 3 mM CU-PCA (CAS-No.: 15454-74-7), 0.5% SDS (CAS-No.: 151-21-3), 7.9% EtOH (CAS-No.: 64-17-5), 4.4% PnB (CAS-No.: 5131-66-8), 0.99% glycerol (CAS-No.: 56-81-5), 0.099% Peppermint oil (CAS-No.: 8006-90-4) and 0.099% lavender oil (CAS-No.: 8000-28-0). The "Composition of the invention comprising Vitamin C" further comprises 40 mM L-ascorbic (CAS-No.: 50-81-7) acid

and 10 mM NaCl (CAS-No.: 7647-14-5) (wipes) or 20 mM L-ascorbic (CAS-No.: 50-81-7) acid and 5 mM NaCl (CAS-No.: 7647-14-5) (fluid).

5 Efficacy tests of the present compositions were performed at around 20°C and the results are shown in figure 1 and the contact times are shown in figure 2.

Low level disinfectants like PHMB and DDAC are used on surfaces as a hygiene measure to prevent transmission of disease promoted by skin contact with contaminated surfaces.

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Intermediate level disinfectants like ethanol, are used on surfaces as a preventing measure against organisms which cannot be killed by soap and surface active disinfectant like PHMB and DDAC.

15 High-level disinfectants are used on surfaces during outbreak or visible contamination of organic matter i.e. blood and vomit. Some important target organisms are *Aspergillus* b., *Bacillus* S., *Cereus* and *Clostridium* spores, which can't be killed by alcohol, PHMB and DDAC.

20 EN 13727 is the *quantitative suspension test* for the evaluation of bactericidal activity in the medical area (phase 2, step 1), where the contact time is 1 minute.

EN 14561 is the *quantitative carrier test* for the evaluation of bactericidal activity of chemical disinfectants for instruments used in the medical area (phase 2, step 2)
25 where the contact time is 1 minute.

EN 13624 is the *chemical disinfectants and antiseptics - quantitative suspension test* for the evaluation of fungicidal or yeasticidal activity in the medical area (phase 2, step 1), where the contact time is 5 minute for candida and 30 minutes for
30 *Aspergillus brasiliensis*.

EN 14562 is the *quantitative carrier test* for the evaluation of fungicidal or yeasticidal activity for instruments used in the medical area (phase 2, step 2), where the contact time is 5 minutes for candida and 30 minutes for *Aspergillus brasiliensis*.

EN 14476 is the *chemical disinfectants and antiseptics – virucidal quantitative suspension test* for chemical disinfectants and antiseptic used in human medicine – Test method and requirements (phase 2, step 1), where the contact time is 2
5 minutes.

For the evaluation of the virucidal activity according to EN 14476 suspensions of 8 parts by volume of a 1.25% fold concentrated solution of the disinfectant solution (product test solution) with one volume of an interfering substance (0.3% in the test
10 with dirty conditions and 0.03% for clean conditions) and one volume of virus suspension with a titer of at least 10⁷ TC ID₅₀ / ml. To obtain a concentration of 97% 0,1ml virus, 0,2ml 5-fold concentrated loading and 9,7ml product were mixed. After the contact time the effect of the disinfectant will be stopped by diluting (or gel filtration). For the determination of residual virus content, a dilution series according
15 to the progression of 1:10 / 1:100 / 1:1000 etc. will be performed. The titration is carried out in microtitre 96-well plates. In addition, the following controls are performed: virus control, cytotoxicity control, susceptibility control and a reference activation with 0.7% formaldehyde. The calculation is based on the method of Spearman and Kärber and is calculated as the difference between the titre of the virus
20 control and the titre of product test solution including a 95% confidence interval.

EN 14348 is the *quantitative suspension test* for the evaluation of mycobactericidal activity of chemical disinfectants in the medical area including instrument disinfectants (phase 2, step 1), where the contact time is 10 minutes.
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EN 14563 is the *quantitative carrier test* for the evaluation of mycobactericidal or tuberculocidal activity of chemical disinfectants used for instruments in the medical area (phase 2, step 2), where the contact time is 10 minutes.

30 EN 13704 is the *quantitative suspension test* for the evaluation of sporicidal activity of chemical disinfectants used in food, industrial, domestic and institutional areas (phase 2, step 1), where the contact time is 15 minutes for bacillus subtilis and cereus and 10 minutes for Clostridium difficile.

Claims

- 5 1. Disinfecting composition comprising the following biocides:
- a) Tartaric acid in concentrations from 1 mM to 70 mM;
 - b) Lactic acid in concentrations from 1 mM to 70 mM,
 - c) at least one essential oil or oil extract in concentrations from 0.01 wt% to 1 wt% selected from lavender oil or oil extract and/or peppermint oil or oil extract,
 - 10 d) copper-PCA in concentrations from 1 mM to 10 mM.
2. Disinfecting composition according to claim 1, wherein the composition further comprises L-ascorbic acid.
- 15 3. Disinfecting composition according to claim 2, wherein L-ascorbic acid is included in concentrations from 1 mM to 50 mM.
4. Disinfecting composition according to any of the preceding claims, wherein the concentration of the at least one essential oil or oil extract is from 0.05 wt% to 2 wt%, or from 0.1 wt% to 1 wt%, or from 0.1 wt% to 0.5 wt%.
- 20 5. Disinfecting composition according to any of the preceding claims, wherein the composition comprises from 0.01 wt% to 0.5 wt%, or from 0.05 wt% to 0.2 wt%, or from 0.09 wt% to 0.1 wt% lavender oil or oil extract and from 0.01 wt% to 0.5 wt%, or from 0.05 wt% to 0.2 wt%, or from 0.09 wt% to 0.1 wt% peppermint oil or oil extract.
- 25 6. Disinfecting composition according to any of the preceding claims, wherein the concentration of the tartaric acid is from 10 mM to 50 mM, or from 20 mM to 50 mM, or from 30 mM to 50 mM, or from 35 mM to 45 mM, or around 40 mM.
- 30 7. Disinfecting composition according to any of the preceding claims, wherein the concentration of the lactic acid is from 10 mM to 50 mM, or from 20 mM to 50 mM, or from 30 mM to 50 mM, or from 35 mM to 45 mM, or around 40 mM.

8. Disinfecting composition according to any of the preceding claims, further comprising at least one buffer substances.
- 5 9. Disinfecting composition according to any of the preceding claims, further comprising alcohols.
10. Disinfecting composition according to claim 9, where the alcohol is Ethanol.
- 10 11. Disinfecting composition according to any of the preceding claims, further comprising an anionic surfactant which is stable at pH 2.5 to 4.
12. Disinfecting composition according to any of the preceding claims, having a pH value in the range of 2 to 4, or from 2.5 to 4, or from 2.5 to 3.
- 15 13. Use of the disinfecting composition according to any one of claims 1 to 12 for treating contaminated surfaces such as at children institutions, at hospitals, at nursing homes, at clinics, in food and beverage processing, in agricultural industry, in farming, in animal biosecurity, in consumer market, in food catering, in brewing industry, in oil industry, in pharmaceutical industry, in cleaning and
- 20 disinfectant industry, in electronic industry and in fishing industry.
14. Method for disinfecting a contaminated surface, said method comprising:
- 25 - providing a disinfecting composition comprising tartaric acid in concentrations from 1 mM to 70 mM, lactic acid in concentrations from 1 mM to 70 mM, at least one essential oil or oil extract in concentrations from 0.01 wt% to 1 wt% selected from lavender oil or oil extract and/or peppermint oil or oil extract and copper-PCA in
- 30 concentrations from 1 mM to 10 mM;
- treating a contaminated surface with said disinfecting composition, wherein microorganisms on said surface is killed by denaturing, solubilising inactivating and degrading their proteins and nucleic acids.

15. Method for disinfecting a contaminated surface, said method comprising:

- 5 - providing a disinfecting composition comprising tartaric acid in concentrations from 1 mM to 70 mM, lactic acid in concentrations from 1 mM to 70 mM, at least one essential oil or oil extract in concentrations from 0.01 wt% to 1 wt% selected from lavender oil or oil extract and/or peppermint oil or oil extract, copper-PCA in concentrations from 1 mM to 10 mM and L-ascorbic acid in concentrations from 1 mM to 50 mM;
- 10 - treating a contaminated surface with said disinfecting composition, wherein microorganisms on said surface is killed by denaturing, solubilising inactivating and degrading their proteins and nucleic acids.

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