CLAIMS

What is claimed:

1. A pharmaceutical composition comprising aqueous anhydrous sodium thiosulfate, one or more buffers, and a solvent.

2. The composition of claim 1, wherein the composition comprises about 20 mg/mL to 320 mg/mL of aqueous anhydrous sodium thiosulfate.

3. The composition of claim 1 or 2, wherein the composition comprises about 8% by mass to about 32% by mass of aqueous anhydrous sodium thiosulfate.

4. The composition of any one of claims 1–3, wherein the composition comprises about 0.1 M to about 2 M of aqueous anhydrous sodium thiosulfate.

5. The composition of any one of claims 1–4, wherein the composition comprises about 0.001 M to about 0.5 M of the one or more buffers.

6. The composition of any one of claims 1–5, wherein the one or more buffers comprise phosphate, borate, sulfate, carbonate, formate, acetate, propionate, butanoate, lactate, glycine, maleate, pyruvate, citrate, aconitate, isocitrate, α-ketoglutarate, succinate, fumarate, malate, oxaloacetate, aspartate, glutamate, tris(hydroxymethyl)aminomethane (tromethamine), combinations thereof, or salts thereof.

7. The composition of any one of claims 1–6, wherein the composition has a pH of about 5 to about 9.5.

8. The composition of any one of claims 1–7, wherein the composition has a pH of about 6.5 or about 8.9.

9. The composition of any one of claims 1–8, wherein the one or more buffers comprise borate or a salt thereof, glycine or a salt thereof, tris(hydroxymethyl)aminomethane (tromethamine) or a salt thereof, or phosphate or a salt thereof.

10. The composition of any one of claims 1–9, wherein the one or more buffers comprise boric acid, glycine, tris(hydroxymethyl)aminomethane (tromethamine), or sodium phosphate.

11. The composition of any one of claims 1–10, wherein the solvent comprises water.

12. The composition of any one of claims 1–11, wherein the composition is sterile.

13. A pharmaceutical composition comprising about 0.1 M to about 2 M of aqueous anhydrous sodium thiosulfate, 0.001 M to about 0.5 M of sodium phosphate, boric acid, glycine, or tris(hydroxymethyl)aminomethane (tromethamine).

14. The composition of claim 13, wherein the composition comprises about 0.5 M of aqueous anhydrous sodium thiosulfate, and about 0.01 M of sodium phosphate, pH 6.5.

15. The composition of claim 13 or 14 wherein the composition comprises about 0.5 M of aqueous anhydrous sodium thiosulfate, and about 0.004 M of borate or a salt thereof, pH 8.6–8.8.

16. The composition of any one of claims 13–15, wherein the composition comprises about 0.5 M of aqueous anhydrous sodium thiosulfate, and about 0.01 M to about 0.05 M of glycine or a salt thereof, pH 8.5–8.9.

17. The composition of any one of claims 13–16, wherein the composition comprises about 0.5 M of aqueous anhydrous sodium thiosulfate, and about 0.01 M to about 0.05 M of tris(hydroxymethyl)aminomethane (tromethamine) or a salt thereof, pH 8.5–8.9.

18. A pharmaceutical composition comprising about 0.5 M of aqueous anhydrous sodium thiosulfate, about 0.01 M of sodium phosphate, pH 6.5, and water.

19. A pharmaceutical composition comprising about 0.5 M of aqueous anhydrous sodium thiosulfate, about 0.004 M of borate or a salt thereof, pH 8.6–8.8, and water.

20. A pharmaceutical composition comprising about 0.5 M of aqueous anhydrous sodium thiosulfate, about 0.01 M to about 0.05 M of glycine or a salt thereof, pH 8.5–8.9, and water.

21. A pharmaceutical composition comprising about 0.5 M of aqueous anhydrous sodium thiosulfate, about 0.01 M to about 0.05 M of tris(hydroxymethyl)aminomethane (tromethamine) or a salt thereof, pH 8.5–8.9, and water.

22. A method for preparing a pharmaceutical formulation comprising anhydrous sodium thiosulfate, the method comprising combining anhydrous sodium sulfate with one or more buffers and a solvent.

23. The method of claim 22, further comprising filtering and sterilizing the formulation.

24. The method of claim 22 or 23, wherein the formulation comprises about 20 mg/mL to 320 mg/mL of aqueous anhydrous sodium thiosulfate.

25. The method of any one of claims 22–24, wherein the formulation comprises about 8% by mass to about 32% by mass of aqueous anhydrous sodium thiosulfate.

26. The method of any one of claims 22–25, wherein the formulation comprises about 0.1 M to about 2 M of aqueous anhydrous sodium thiosulfate.

27. The method of any one of claims 22–26, wherein the formulation comprises about 0.001 M to about 0.5 M of the one or more buffers.

28. The method of any one of claims 22–27, wherein the one or more buffers comprise phosphate, borate, sulfate, carbonate, formate, acetate, propionate, butanoate, lactate, glycine, maleate, pyruvate, citrate, aconitate, isocitrate, α-ketoglutarate, succinate, fumarate, malate, oxaloacetate, aspartate, glutamate, tris(hydroxymethyl)aminomethane (tromethamine), combinations thereof, or salts thereof.

29. The method of any one of claims 22–28, wherein the formulation has a pH of about 5 to about 9.5.

30. The method of any one of claims 22–29, wherein the formulation has a pH of about 6.5 or about 8.9.

31. The method of any one of claims 22–30, wherein the one or more buffers comprise glycine or a salt thereof, borate or a salt thereof, tris(hydroxymethyl)aminomethane (tromethamine) or a salt thereof, or phosphate or a salt thereof.

32. The method of any one of claims 22–31, wherein the one or more buffers comprise sodium phosphate, glycine, tris(hydroxymethyl)aminomethane (tromethamine), or boric acid.

33. The method of any one of claims 22–32, wherein the solvent comprises water.

34. The method of any one of claims 22–33, wherein the formulation comprises about 0.5 M of aqueous anhydrous sodium thiosulfate, about 0.01 M of sodium phosphate, pH 6.5, and water.

35. The method of any one of claims 22–33, wherein the formulation comprises about 0.5 M of aqueous anhydrous sodium thiosulfate, about 0.004 M of boric acid, pH 8.6–8.9, and water.

36. The method of any one of claims 22–33, wherein the formulation comprises about 0.5 M of aqueous anhydrous sodium thiosulfate, about 0.01 M to about 0.05 M of glycine, pH 8.5–8.9, and water.

37. The method of any one of claims 22–33, wherein the formulation comprises about 0.5 M of aqueous anhydrous sodium thiosulfate, about 0.01 M to about 0.05 M of tris(hydroxymethyl)aminomethane (tromethamine), pH 8.5–8.9, and water.

38. A pharmaceutical formulation comprising about 0.5 M of aqueous anhydrous sodium thiosulfate, about 0.01 M of sodium phosphate, pH 6.5, and water made by the method of claim 22.

39. A pharmaceutical formulation comprising about 0.5 M of aqueous anhydrous sodium thiosulfate, about 0.004 M of boric acid, pH 8.6–8.8, and water made by the method of claim 22.

40. A pharmaceutical formulation comprising about 0.5 M of aqueous anhydrous sodium thiosulfate, about 0.01 M to about 0.05 M of glycine, pH 8.5–8.9, and water made by the method of claim 22.

41. A pharmaceutical formulation comprising about 0.5 M of aqueous anhydrous sodium thiosulfate, about 0.01 M to about 0.05 M of tris(hydroxymethyl)aminomethane (tromethamine), pH 8.5–8.9, and water made by the method of claim 22.

42. Means for preparing a pharmaceutical formulation comprising anhydrous sodium thiosulfate, the method comprising combining anhydrous sodium sulfate with one or more buffers and a solvent.

43. The formulation prepared by the means of claim 42.

44. A pharmaceutical composition comprising a sterile aqueous solution of about 0.2 M to about 2 M of sodium thiosulfate, about 0.001 M to about 0.05 M of a pharmaceutically acceptable buffer, and about 0.005 M to about 0.05 M of a pharmaceutically acceptable salt, and a pH of about 5 to about 9.5.

45. A kit comprising a sterile aqueous sodium thiosulfate formulation comprising one or more receptacles comprising aqueous sodium thiosulfate; and documents comprising prescribing information or instructions for use.

46. The kit of claim 45, further comprising one or more syringes, hypodermic needles, and packaging.

47. A kit comprising one or more receptacles comprising dry or lyophilized sodium thiosulfate; and optionally: one or more sterile solvents appropriate for reconstitution; a needle and syringe; and documents comprising prescribing information or instructions for use.

48. A pharmaceutical formulation comprising aqueous anhydrous sodium thiosulfate for injection that is stable and does not precipitate after sterilization and storage.

49. The pharmaceutical formulation of claim 48, wherein the formulation comprises about 0.1 M to about 2 M of aqueous anhydrous sodium thiosulfate, 0.001 M to about 0.5 M of sodium phosphate, glycine, tris(hydroxymethyl)aminomethane (tromethamine), or boric acid.

50. A method for preventing or reducing the incidence of by cisplatin (CIS) chemotherapy induced ototoxicity in patients 1 month to <18 years of age with localized, non-metastatic, solid tumors comprising administering sodium thiosulfate for injection as a 15-minute infusion, about 6 hours after the completion of each CIS administration, when CIS is infused for no longer than 6 hours.

CLAIMS

1. A pharmaceutical composition comprising sodium thiosulfate at a concentration of about 0.5 M and further comprising about 0.004 M boric acid wherein the pharmaceutical composition has a pH between about 6.5 and about 8.9.

2. The pharmaceutical composition of claim 1, wherein the pharmaceutical composition has a total volume of about 100 mL.

3. The pharmaceutical composition of claim 1, wherein the pharmaceutical composition further comprises hydrochloric acid.

4. The pharmaceutical composition of claim 2, wherein the pharmaceutical composition further comprises hydrochloric acid.

5.The pharmaceutical composition of claim 1, wherein the pharmaceutical composition further comprises sodium hydroxide.

6. The pharmaceutical composition of claim 2, wherein the pharmaceutical composition further comprises sodium hydroxide.

7. The pharmaceutical composition of claim 1, wherein the pharmaceutical composition has a pH between about 8.6 and about 8.8.

8. The pharmaceutical composition of claim 2, wherein the pharmaceutical composition has a pH between about 8.6 and about 8.8.