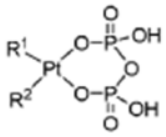
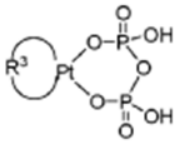
CLAIMS

What is claimed is:

1. A liquid pharmaceutical composition comprising a phosphaplatin compound of formula (I) or (II), or a pharmaceutically acceptable salt thereof, and an aqueous buffer solution having pH at about or above 7:



(I),



(II),

wherein $R^1$ and $R^2$ are each independently selected from the group consisting of substituted or unsubstituted aliphatic amines and substituted or unsubstituted aromatic amines; $R^3$ is selected from the group consisting of substituted or unsubstituted aliphatic 1,2-diamines and substituted or unsubstituted aromatic 1,2-diamines; and wherein the buffer solution comprises a pyrophosphate salt to stabilize the phosphaplatin compound, and the liquid pharmaceutical composition is a ready-to-use liquid formulation suitable for parenteral administration.

2. The liquid pharmaceutical composition of claim 1, wherein concentration of the phosphaplatin compound is about 20 mg/mL or less.

3. The liquid pharmaceutical composition of claim 2, wherein the concentration of the phosphaplatin compound is about 5 mg/mL.

4. The liquid pharmaceutical composition of claim 1, wherein the buffer comprises a sodium or potassium salt of phosphate or bicarbonate / carbonate.

5. The liquid pharmaceutical composition of claim 4, wherein the buffer salt concentration is between about 1 mM and about 100 mM.

6. The liquid pharmaceutical composition of claim 1, wherein the pH is in the range of about 7.0 to about 9.0.

7. The liquid pharmaceutical composition of claim 6, wherein the buffer is potassium phosphate; the concentration of the phosphaplatin compound is about 5 mg/mL and the pH is between about 7.0 and about 8.0.

8. The liquid pharmaceutical composition of claim 7, wherein the buffer concentration is about 10 mM.

9. The liquid pharmaceutical composition of claim 1, wherein the pyrophosphate salt is sodium pyrophosphate.

10. The liquid pharmaceutical composition of claim 9, wherein the molar ratio of pyrophosphate anion to the phosphaplatin compound is at least about 0.1 to about 1.

11. The liquid pharmaceutical composition of claim 9, wherein the concentration of the phosphaplatin compound is about 5 mg/mL, the pyrophosphate concentration is about 5.2 mM, and the pH is in the range of about 7.0 to about 8.0.

12. The liquid pharmaceutical composition of claim 1, wherein the phosphaplatin compound is a trans-l,2-cyclohexanediamine-(dihydrogen pyrophosphato)platinum(II) ("trans-pyrodach-2") complex.

13. The liquid pharmaceutical composition of claim 1, wherein the phosphaplatin compound is (R,R)-trans-l,2-cyclohexanediamine-(dihydrogen pyrophosphato)platinum(II) ("(R,R)-trans-pyrodach-2").

14. The liquid pharmaceutical composition of claim 1, wherein the phosphaplatin compound is (S,S)-trans-l,2-cyclohexanediamine-(dihydrogen pyrophosphato)platinum(II) ("(S,S)-trans-pyrodach-2").

15. The liquid pharmaceutical composition of claim 1, wherein the phosphaplatin compound is cis-l ,2-cyclohexanediamine-(dihydrogen pyrophosphato)-platinum(II) ("cis-pyrodach-2").

16. A liquid pharmaceutical composition of claim 1 for use in the treatment of a cancer selected from the group consisting of gynecological cancers, genitourinary cancers, lung cancers, head-and-neck cancers, skin cancers, gastrointestinal cancers, breast cancers, bone and chondroital cancers, and hematological cancers.

17. Use of a liquid pharmaceutical composition of claim 1 in the manufacture of a medicament for the treatment of a cancer selected from the group consisting of gynecological cancers, genitourinary cancers, lung cancers, head-and-neck cancers, skin cancers, gastrointestinal cancers, breast cancers, bone and chondroital cancers, and hematological cancers.

18. A process of preparing a liquid pharmaceutical composition of phosphaplatin compound according to claim 1, the process comprising: a) dissolving a phosphaplatin compound in an aqueous buffer to obtain a solution comprising a sufficient amount of hydroxide base such that the pH remains at or above 7; b) adding a pyrophosphate salt to the solution to stabilize the phosphaplatin compound; c) optionally adding a hydroxide base to adjust the pH to a desired range; and d) filtering the solution to obtain a liquid formulation

under sterile conditions, wherein the aqueous buffer is a phosphate buffer, a carbonate / bicarbonate buffer, or a combination thereof.

19. The process of claim 18, wherein the pH of the liquid formulation is in the range of about 7.0 to about 9.0.

20. The process of claim 18, wherein the pyrophosphate salt is sodium pyrophosphate.

21. The process of claim 18, further comprising e) filling the solution into a vial, stoppering and capping the vial in a sterile environment so that the formulation is ready for use.