Chemistry: Solutions Review

Directions: Using your notes, your textbook, the given balanced equations, and stoichiometry, solve the following problems. Show your work and include units for full credit.

Solution Properties
1. What is a solution?

2. What is the difference between soluble/insoluble and miscible/immiscible?

3. What is the difference between saturated, unsaturated, supersaturated?
   Draw a picture of each one to help your explanation.

Polarity
4. What is a polar molecule? A nonpolar molecule?

5. What is meant by the phrase, “like dissolves like”?

6. What is an emulsifier?

7. How does an emulsifier work?

8. Give two examples of emulsifiers.
**Solubility Curves**

9. Explain how you would make a 100g solution of NaNO₃ at 25°C, that is unsaturated, then saturated, and supersaturated.
   
   a. *Unsaturated*—

   b. *Saturated*—

   c. *Supersaturated*—

10. What is the minimum temperature needed to dissolve 130g of KNO₃ in 100g of water?

11. How many grams of KClO₃ can be dissolved in 35g H₂O at 50°C?

12. If you have a 100g saturated solution of KCl at 90°C and it is cooled to 30°C, how much salt would precipitate out of solution?

13. If you have 35g of NaCl in 100g of water at 10°C, how much must be added for it to be saturated at 80°C?

**Molarity**

14. What mass of ammonium phosphate, (NH₄)₃PO₄, is need to make 2.0L of 1.5M solution?

15. Calculate the molarity of 198 g of barium iodide (BaI₂) in 2.0 L of solution.

16. Calculate the volume of 1.0 M solution containing 156 g of silver nitrate (AgNO₃).
**Molarity & Stoich**

17. Zinc and hydrochloric acid react according to the following balanced equation:

\[
\text{Zn(s) + 2 HCl(aq) } \rightarrow \text{ ZnCl}_2(aq) + \text{ H}_2(g)
\]

a. What volume of 0.25 M hydrochloric acid will react with 102 grams of zinc?

b. What mass of zinc will react with 1.5 liters of 0.50 M hydrochloric acid?

c. How many liters of hydrogen will you make (at STP) if you react 3.51 L of 0.97 M hydrochloric acid with excess zinc?

**Dilutions**

18. What volume of 2.0 M phosphoric acid can be made from 300 mL of concentrated phosphoric acid (14.8M)?

19. What volume of 3.0 M ammonium hydroxide is required to neutralize 10 mL of concentrated nitric acid (15.9M)?

**Electrolytes**

20. What is an electrolyte? A non-electrolyte?

21. Why do we need electrolytes?

22. What is the difference between a strong and weak electrolyte? (besides the light bulb)

23. Why do solutions with ions allow electricity to flow?