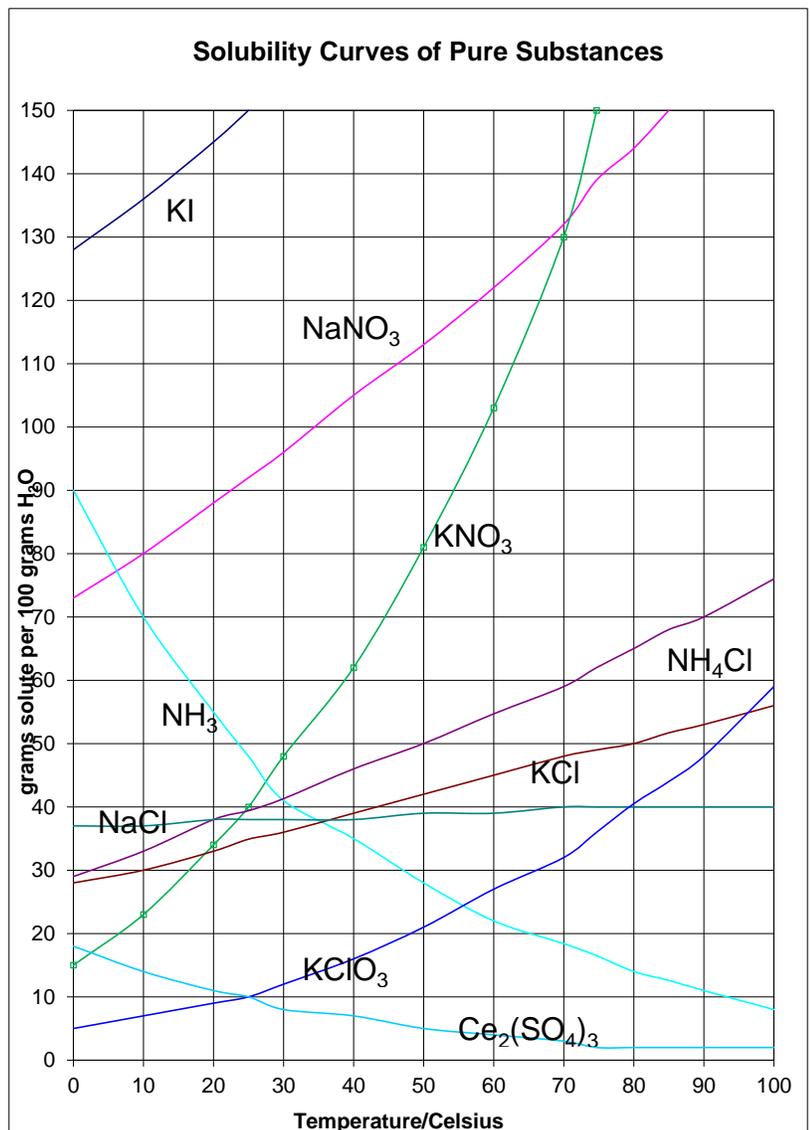## Chapter 16 – Solutions

SOLUTIONS & SOLUBILITY VOCABULARY & CONCEPTS

1. _____ is the substance that is dissolved.

2. _____ is the substance that does the dissolving.

3. _____ is a homogeneous solution.

4. A _____ solution has the maximum amount of solute dissolved in a given amount of solvent.

5. A _____ solution can dissolve more solute.

6. Opposite of soluble is _____.

7. _____ is how many grams of solute dissolves in 100 mL of water.

8. For most <u>solid</u> solutes, as temperature goes up, solubility goes _____.

9. For most <u>gas</u> solutes, as temperature goes up solubility goes _____.

10. What are the three factors that an increase the rate of dissolving of a solute? Explain how they aid a substance in dissolving on a molecular level.

11. Why must you keep a carbonated beverage cool to prevent it from going "flat"?

12. Explain the difference among saturated, unsaturated, and supersaturated solutions.

SOLUBILITY CHARTS

13. What is the solubility of NaCl at 25 ºC?

14. What is the solubility of KNO_3 at 70 ºC?

15. At what temperature is the solubility of $NaNO_3$ 90g/100mL H_2O?

16. How many grams of $KClO_3$ dissolve in 200 mL H_2O at 30ºC?

17. How many grams of KCl would dissolve in 40 mL H_2O at 80ºC?

18. How many grams of NH_3 would dissolve in 500 mL H_2O at 80ºC?

19. If 30 grams of KNO_3 are dissolved in 100 mL H_2O at 20ºC, will the solution be saturated or unsaturated? Explain why.

20. If a solution of $NaNO_3$ was cooled from 60ºC to 10ºC, how much solute would precipitate out of solution?

Solubility Curves of Pure Substances

grams solute per 100 grams H_2O vs Temperature/Celsius

Curves: KI, $NaNO_3$, KNO_3, NH_4Cl, NH_3, KCl, NaCl, $KClO_3$, $Ce_2(SO_4)_3$

MOLARITY

21. What is the molarity of a solution of Na_3PO_4 with 0.75 mol of solute in 950 mL of solution?

22. What is the molarity of a solution containing 10.00 g of H_3PO_4 dissolved in 500.0 mL of solution?

23. What mass of sodium chloride is needed to make 300 mL of a 0.50 M solution?

24. What is the molarity of a solution that contains 212.5 g of sodium nitrate ($NaNO_3$) in 3.0 L of solution?

25. How many liters of solution are needed to dissolve 25.5 g sodium chloride if a concentration of 0.25 M is needed?

MOLAR DILUTIONS

26. You add 500 mL to 100 mL of a stock solution of 12 M HCl. What is the final concentration?

27. To make 1000 mL of a 1 M dilution of phosphoric acid solution (H_3PO_4), what volume of 6 M stock solution should you use?

28. If a 1000 mL dilute solution of $CaCl_2$ is made from 550 mL of 6 M stock solution, what is the concentration of dilute $CaCl_2$ solution?

29. How would you prepare 90 mL of 2.0 M sulfuric acid from 18 M stock solution?

Chapter 19 – Acids, Bases & Salts

VOCABULARY & CONCEPTS

1. An ionic compound that forms from an acid-base neutralization reaction is a(n) _____.

2. A(n) _____ is a substance that conducts electricity.

3. The reaction between an acid and a base is called a(n) _____.

4. According to Arrhenius, a compound containing hydrogen that ionizes to yield hydrogen ions in an aqueous solution is called a(n) _____.

5. According to Arrhenius, a compound that ionizes to yield hydroxide ions (OH^-) in an aqueous solution is called a(n) _____.

Write "A" if the statement is a property of an acidic solution. Write "B" if the statement is a property of a base, and "X" if it is a property of both a basic and acidic solution.

6. Feels smooth and slippery _____

7. Reacts vigorously with metals _____

8. Has a bitter taste _____

9. Is an electrolyte _____

10. Has a sour taste _____

11. Turns litmus paper from blue to red _____

12. Turns litmus paper from red to blue _____

13. Usually does not react with metals _____

State "A" for acid, "B" for base and "S" for salt. In addition, write the name for the compound.

14. HCl _____

15. $CaCl_2$ _____

16. Na_2SO_4 _____

17. HNO_3 _____

18. NaOH _____

19. H_3PO_4 _____

20. $Mg(OH)_2$ _____

21. LiOH _____

ACID & BASE PROBLEMS

22. What is the hydrogen ion concentration in a wheat flour and water solution if the pH is 8? Is the wheat flour and water acidic, basic or neutral?

23. What is the pH of peaches if the $[H^+] = 3.16 \times 10^{-4}M$? Are peaches acidic, basic or neutral?

24. What is the pH in eggs if the hydrogen ion concentration is $1.67 \times 10^{-8}M$? Are eggs acidic, basic or neutral?

25. An aqueous solution contains a hydrogen ion concentration of $2.77 \times 10^{-13}M$. Calculate the pH and determine if the solution is acidic or basic.

26. Lake Ontario has water with an $[H^+]$ of approximately 1.1×10^{-6} M. Determine whether the water is slightly acidic or slightly basic.

27. If the pH of a diet soda is 3.21 at 25°C, what is the hydrogen ion concentration in the soda?

28. Most fish species die in water with a $[H^+]$ of between 3.16×10^{-5} M and 1.0×10^{-5} M. What is the pH range where most fish species die?

TITRATION PROBLEMS

29. What is the molarity of carbonic acid if 25.0 mL of the solution is neutralized by 48.3 mL of 0.20 M NaOH?

30. What is the molarity of sodium hydroxide if 30.0 mL of the solution is neutralized by 40.0 mL of 0.50 M H_3PO_4?

31. How many milliliters of 1.0 M sulfuric acid are needed to neutralize 55 mL of a 0.75 M sodium hydroxide solution?