AP Chemistry – Factors Affecting Solubility – 36

/50

Name _____Per ___

1. List the strongest intermolecular force involved with each situation and whether that force is relatively strong, moderate or weak.
(a) KCl in water

(b) CH_2Cl_2 in benzene (C_6H_6)

(c) methanol (CH_3OH) in water

2. The enthalpy of solution of KBr in water is about 19.8 kJ/mole. Nevertheless, the solubility of KBr in water is relatively high. Why does the solution process occur even though it is endothermic?

3. The solubility of $MnSO_4·H_2O$ in water at $20^{\circ C}$ is 70 g per 100 mL of water. Is a 1.22 M solution of $MnSO_4·H_2O$ in water at $20^{\circ C}$ saturated, supersaturated or unsaturated?

4. Which of the following in each pair is likely to be the more soluble in hexane (C_6H_{14})? Explain.
(a) cyclohexane (C_6H_{12})   or   glucose ($C_6H_{12}O_6$)

(b) propionic acid (CH_3CH_2COOH)   or   sodium propionate (CH_3CH_2COONa)

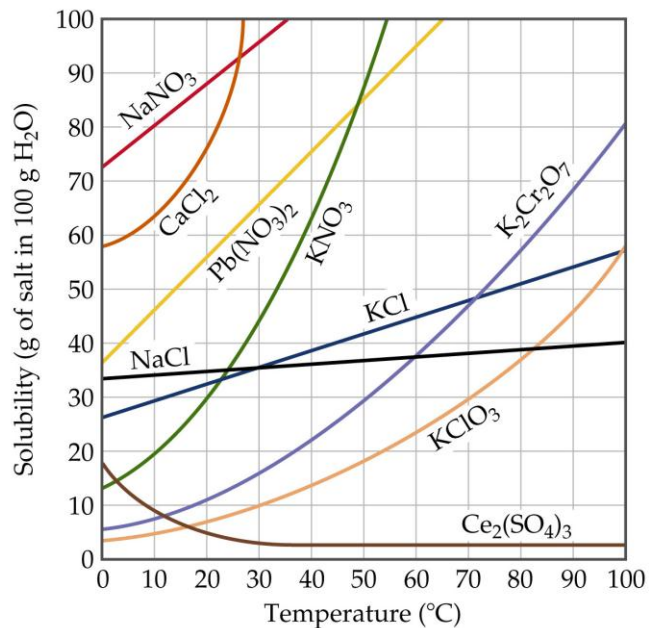
(c) HCl   or   ethyl chloride (CH_3CH_2Cl)

5. Determine the mass of each of the following salts required to form a saturated solution in 250 g of water at 30°C:

(a) $KClO_3$

(b) $Pb(NO_3)_2$

(c) $Ce_2(SO_4)_3$

6. The partial pressure of O_2 in air at sea level is 0.21 atm. The solubility of O_2 in water at 20°C with 1 atm pressure is 1.38×10^{-3} M. Use Henry's Law to calculate the molar concentration of O_2 in the surface water of a mountain lake saturated with air at 20°C and an atmospheric pressure of 665 torr.

7. What is the mass percentage of I_2 in a solution containing 0.045 mole I_2 in 115 g of CCl_4?

8. Acetone, CH_3COCH_3 is a nonelectrolyte; hypochlorous acid, $HClO$ is a weak electrolyte; and ammonium chloride, NH_4Cl is a strong electrolyte. (a) What are the solute particles present in aqueous solutions of each compound? Write a reaction.

(b) If 0.1 moles of each compound is dissolved in solution, which one contains 0.2 moles of solute particles?

(c) If 0.1 moles of each compound is dissolved in solution, which one contains 0.1 moles of solute particles?

(d) If 0.1 moles of each compound is dissolved in solution, which contains somewhere between 0.1 and 0.2 moles of solute particles?

9. Identify the precipitate (if any) that forms when the following solutions are mixed, and write a balanced equation for each reaction.
(a) Tin(II) nitrate with Sodium hydroxide

(b) Sodium hydroxide with Potassium sulfate

(c) Sodium sulfide with Copper(II) acetate

10. Write balanced net ionic equations for the reactions that occur in each of the following aqueous solutions. Identify the spectator ion(s) in each reaction.
(a) Chromium(III) sulfate with Ammonium carbonate

(b) Silver nitrate with Potassium sulfate

(c) Lead(II) nitrate with Potassium hydroxide