CHEMISTRY 12 – UNIT III – Solubility Equilibrium

H: Solubility Equilibrium (Applications of Solubility) *It is expected that students will be able to…*

H1: Solubility and the Equilibrium Constant

1) What is the specific difference between the **solubility** of a low solubility compound (ex. $AgI_{(s)}$) and its **Ksp value**?

2) James Bond asked for his usual beverage but instead the enemy tried to poison him with a solution of lead(II)bromide which was shaken, not stirred. Calculate the [bromide] and the solubility of the salt in **g/L**. *Place a box around each of your final answers.*

3) If 500.0g of solid calcium carbonate are added to 5.0 L of distilled water; how many grams of the salt will remain as a solid at the bottom of the beaker?

H2: Calculating if a precipitate will form

1) Sketch the following situations using a beaker as your starting point: *(use $BaCO_3$ in your answers)*

a) Trial K_{sp} (Q) > K_{sp} **b)** Trial K_{sp} (Q) < K_{sp}

2) Will a precipitate form if 100.0mL of a 2.0 x 10^{-4}M iron(II)nitrate is added to 50.0mL of a 1.0 x 10^{-7}M strontium hydroxide solution? *Use calculations to prove your answer.*

3) An extremely low concentration of silver nitrate solution is added dropwise into two test tubes. Test tube A contained a 0.20M solution of chromium(III)chloride and test tube B contained a 0.50M solution of ammonium chloride. Which test tube formed a precipitate first? Explain your answer. *Use calculations to prove your answer.*

H3: Hard Water and its Effects

1) Give three undesirable properties of hard water.

2) You have been given 3 beakers which contain either: permanently hard water, temporary hard water and Rockridge water. Give a two step procedure to determine what is in each beaker.

H4: Solubility and Le Chatelier

1) In general, what are the **two** ways that low solubility salts can have their solubility increased?

2) Joey Joe Joe has several saturated solutions of barium sulphate. What will be the effect on the barium sulphate solutions if the following stresses are completed: *Sketch a [conc] vs time graph for each of the following situations.*

a) The temperature is set to 5°C
b) The pressure is decreased
c) Some of the salt, $Na_2SO_{4(s)}$ is added
d) Some of the salt, $Na_3PO_{4(s)}$ is added
e) Some of the salt, $NaNO_{3(s)}$ is added