Chemistry 11 Review

Dissolving Chemicals in Water

1.) Write the equation for the equilibrium reaction existing in each of the following saturated aqueous solutions.

a.) K_3PO_4 b.) NH_4Cl c.) $Al(NO_3)_3$

2.) Write the **crystallization reaction** involving $MgBr_{2\,(s)}$.

3.) Write the **dissolving reaction** involving $C_6H_{12}O_{6\,(s)}$.

4.) A container containing a saturated solution of NaCl is carefully picked up and $100\ mL$ of the solution is poured into a second container. If you are careful not to transfer any of the crystals will the second containers salt solution be saturated?

5.) A student half filled a $100\ mL$ container with water and added a few grams of NaCl crystals. Seeing the crystals sink and settle on the bottom, the student said the solution must be saturated. Was the student correct? Why?

6.) Aluminum fluoride has a solubility of $5.59\ g/L$ at 20°C. Express this solubility in $\frac{mol}{L}$ $or\ M$.

7.) Lead (II) chloride has a solubility of $0.99\frac{g}{100.0}mL$ at 20°C. Calculate the molar solubility.

8.) The molar solubility of Ag_2CO_3 is $1.2 \times 10^{-4}\ M$ at 25°C. Express this value in $\frac{g}{100.0\ mL}$.

9.) Manganese (II) chloride has a molar solubility of $5.75\ M$ at 0°C. If $125\ mL$ of the saturated solution is evaporated to dryness, what mass of the chemical will be left?

10.) Calculate the concentration of each ion in each of the following solutions.

a.) $0.25\ M\ FeCl_3$ b.) $1.5\ \times 10^{-3} M\ Al_2(SO_4)_3$ c.) $12.0\ g\ (NH_4)_2CO_3$ in $2.50\ L$

d.) $0.41\ g\ Ca(OH)_2$ in $500\ mL$ of aqueous solution

11.) a.) Write an equation showing the equilibrium in a saturated solution of lead (II) bromide.

b.) The solubility of $PbBr_2$ is $0.844\frac{g}{100\ mL}$. What is its molar solubility?

c.) Calculate the concentration of $Pb^{+2}{}_{(aq)}$ and $Br^{-}{}_{(aq)}$ in a saturated solution of $PbBr_2$.

12.) Calculate the concentration of each of the following ions present when

a.) $25.0\ mL$ of water is added to $20.0\ mL$ of $0.35\ M\ Fe^{+3}$.

b.) $50.0\ mL$ of $0.25\ M\ Ag^{+}$ is mixed with $100.0\ mL$ of $0.10\ M\ NO_3{}^{-}$.

c.) $55.0\ mL$ of $0.185\ M\ MgCl_2$ is mixed with $25.0\ mL$ of $4.8 \times 10^{-2}\ M\ CaBr_2$.

d.) $95.0\ mL$ of $8.65 \times 10^{-4} M\ Al(NO_3)_3$ is mixed with $15.0\ mL$ of $7.50 \times 10^{-6}\ M\ Ag_2SO_4$.

e.) $25.0\ mL$ of $0.360\ M\ NH_4Br$ is mixed with $75.0\ mL$ of $0.160\ M\ (NH_4)_2SO_4$.

f.) $10.0\ mL$ of $0.100\ M\ Ba(NO_3)_2$ is mixed with $40.0\ mL$ of $0.300\ M\ AgNO_3$.

13.) For each of the following combinations of equal volumes of $0.20\ M$ aqueous solutions,

i.) Identify possible products by formula

ii.) State which (if any) product has a low solubility.

iii.) If there **is** a precipitate write the formula equation, total ionic equation, and net ionic equation for the reaction.

a.) $MgS + Sr(OH)_2$

b.) $CuBr_2 + Pb(NO_3)_2$

c.) $K_3PO_4 + CuCl_2$

d.) $(NH_4)_2SO_3 + Al_2(SO_4)_3$

e.) silver nitrate and sodium phosphate

f.) zinc sulphate and iron (II) chloride

g.) beryllium sulphate and ammonium carbonate

h.) magnesium sulphate and strontium hydroxide

14.) Solubility can be used in the field of **Qualitative Analysis.** This field of chemistry involves the use of experimental procedures to determine which elements or ions are present in a substance.

A solution contains Al^{+3} and Ag^{+}. What **compounds** could be added, and in what order, to separate these ions?

15.) A solution contains Fe^{+3}, Ca^{+2}, Ag^{+}, and Be^{+2}. What **compounds** could be added, and in what order, to separate out these ions?