Name:_____
Blk:_____Date:_____

Chemistry 12
Solubililty Lesson #4
Writing Formula, Complete and Net Ionic Equations

In this unit, every reaction that produces a precipitate wil be a double replacement rxn ! Recall from Chemistry 11 that this is a situation in which the ions switch !!!

Example 1: Write the reaction occuring when 0.2 M solutions of $Ca(NO_3)_2$ and Na_3PO_4 are mixed.

Step 1. Identify the REACTANTS

$Ca(NO_3)_2(aq) + Na_3PO_4(aq) \longrightarrow ?$

Step 2. Identify the IONS present in solution

Ca^{2+} NO_3^- Na^+ PO_4^{3-}

Step 3. Identify the PRODUCTS, by switching partners

$NaNO_3$ (?) $Ca_3(PO_4)_2$ (?)

Step 4. Look on table to identify product STATES

(aq) (s)

Step 5. BALANCE the equation

$3Ca(NO_3)_2(aq) + 2Na_3PO_4(aq) \longrightarrow 6NaNO_3(aq) + 2Ca_3(PO_4)_2(s)$

Once the balanced equation is detemind there are THREE POSSIBLE ways to WRITE THE BALANCED CHEMICAL REACTION

1. FORMULA EQUATION: all reactants and products are written in their chemical formulas

$2AgNO_3(aq) + Na_2CO_3(aq) \longrightarrow 2NaNO_3(aq) + Ag_2CO_3(s)$

2. COMPLETE IONIC EQUATION: all SOLUBLE species are broken up into their respective IONS

$2Ag^+(aq) + 2NO_3^-(aq) + 2Na^+(aq) + CO_3^{2-}(aq) \longrightarrow 2Na^+(aq) + 2NO_3^-(aq) + Ag_2CO_3(s)$

3. NET IONIC EQUATION: eliminate common ions from the chemical rxn; places solid on the reactant side (convention)

$2Ag^+(aq) + CO_3^{2-}(aq) \rightleftharpoons Ag_2CO_3(s)$

$\therefore$ $Ag_2CO_3(s) \rightleftharpoons 2Ag^+(aq) + CO_3^{2-}(aq)$

Example 2.
Write a formula equation, complete ionic equation and a net ionic equation for the following reactions in which:

a. 0.2 M $Pb(NO_3)_2$ and 0.2 M $FeCl_3$ are mixed

F.E.

$$3Pb(NO_3)_2(aq) + 2FeCl_3(aq) \longrightarrow 3PbCl_2(s) + 2Fe(NO_3)_3(aq)$$

C.I.E

$$3Pb^{2+}(aq) + 6NO_3^-(aq) + 2Fe^{3+}(aq) + 6Cl^-(aq) \longrightarrow 3PbCl_2(s) + 2Fe^{3+}(aq) + 6NO_3^-(aq)$$

N.I.E

$$3Pb^{2+}(aq) + 6Cl^-(aq) \rightleftharpoons 3PbCl_2(s)$$

$$\therefore\ PbCl_2(s) \rightleftharpoons 3Pb^{2+}(aq) + Cl^-(aq)$$

b. 0.2 M Silver nitrate and 0.2 M Sodium phosphate

F.E

$$3AgNO_3(aq) + Na_3PO_4(aq) \longrightarrow Ag_3PO_4(s) + 3NaNO_3(aq)$$

C.I.E

$$3Ag^+(aq) + 3NO_3^-(aq) + 3Na^+(aq) + PO_4^{3-}(aq) \longrightarrow Ag_3PO_4(s) + 3Na^+(aq) + 3NO_3^-(aq)$$

N.I.E

$$3Ag^+(aq) + PO_4^{3-}(aq) \rightleftharpoons Ag_3PO_4(s)$$

$$\therefore\ Ag_3PO_4(s) \rightleftharpoons 3Ag^+(aq) + PO_4^{3-}(aq)$$

SEAT WORK/ HOMEWORK: Exercise 25 (odd letters only)
PLO's: G7, H1, H2 AND H3