***Solubility Rules***

**Soluble Compounds Important Exceptions (thus insoluble)\_\_\_**\_\_\_\_\_

*Compounds containing*

 **NO31-** None

 **C2H3O21-**None

 **Cl1-** Compounds with Ag+, Hg22+, and Pb2+

 **Br1-** Compounds with Ag+, Hg22+, and Pb2+

 **I1-** Compounds with Ag+, Hg22+, and Pb2+

 **SO42-**  Compounds of Sr2+, Ba2+, Hg22+, and Pb2+

**Insoluble compounds**  **Important exceptions (thus soluble)\_\_\_\_\_\_\_\_\_\_**

*Compounds containing*

 **S2-** Compounds with NH4+, alkali metals, and Ca2+, Sr2+, and Ba2+

 **CO32-** Compounds with NH4+ and alkali metals

 **PO43-** Compounds with NH4+and alkali metals

 **OH1-** Compounds with NH4+ and alkali metals

 **CrO42-** Compounds with NH4+ and alkali metals

 **O2-** Compounds with NH4+ and alkali metals.

1) Using the solubility rules, indicate whether the following compounds are soluble in water.

 a. K2SO4  \_\_\_\_\_\_\_\_\_ b. CaCl2  \_\_\_\_\_\_\_\_\_ c. Na2S \_\_\_\_\_\_\_\_\_ d. Al(OH)3 \_\_\_\_\_\_\_\_\_

 e. CsOH \_\_\_\_\_\_\_\_\_ f. Mg3(PO4)2  \_\_\_\_\_\_\_\_\_

**Use state symbols to indicate if the products are either a precipitate or an aqueous solution.**

2) MgCl2 + Li2CO3  🡪 MgCO3 **( \_\_\_\_\_)** + 2 LiCl**( \_\_\_\_\_)**

3) 2 AgNO3 + BeCl2  🡪 Be(NO3)2 **( \_\_\_\_\_)** + 2 AgCl **( \_\_\_\_\_)**

4) Na3PO4  + 3 KOH 🡪 3 NaOH **( \_\_\_\_\_)** + K3PO4 **( \_\_\_\_\_)**

\*RECALL\* (s) = solid (l) = liquid (g) = gas (aq) = aqueous solution

*\* Remember the group of elements that are always written in pairs* ***(Br2, I2, N2, Cl2, H2, O2, F2)*** *with a subscript of two when they are alone (diatomics). They do NOT have to be in pairs when they are in a compound. These diatomics usually exist as gases.\**

***Using state symbols when writing chemical reactions.***

Use the solubility rules to determine any precipitates formed, then write balance chemical equations (with state symbols) for each of the following reactions. Then write net ionic equations for these reactions.

***Example problem:***

*Determine the net ionic equation for the reaction:*

 strontium bromide(aq) + potassium sulfate(aq) 🡪 strontium sulfate(s) + potassium bromide(aq)

*a. Balanced chemical equation: SrBr2 (aq) + K2SO4 (aq) 🡪 SrSO4 (s) + 2 KBr (aq)*

*b. Complete Ionic equation: Sr2+ + 2Br - + 2K + + SO42- 🡪 SrSO4 + 2K+ + 2Br –*

*c. Net ionic equation: Sr2+ (aq) + SO42 – (aq) 🡪 SrSO4 (s)*

*Spectator ions watch, but don’t participate in the chemical reaction!*

5.) Write the complete ionic and then the net ionic equation for:

a. BeI2 (aq) + Cu2SO4 (aq) 🡪 BeSO4 (aq) + 2 CuI (s)

b. Ni(NO3)3 (aq) + 3 KBr (aq) 🡪 NiBr3 (aq) + 3 KNO3 (aq)

6.) An aqueous solution of sodium chloride reacts with a solution of lead (II) nitrate to form lead (II) chloride and sodium nitrate.

1. Balanced chemical equation:
2. Complete Ionic equation:
3. Net Ionic equation:

7.) Aqueous solutions of sodium hydrogen carbonate and phosphoric acid (do not ionize) react to form sodium phosphate, carbon dioxide and water

8.) Aqueous solutions of ammonium sulfide and a solution of mercuric bromide (HgBr) form ammonium bromide and mercuric sulfide.

9.) An aqueous solution of hydrobromic acid (ionize) and a solution of calcium hydroxide form calcium bromide and water.

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