Announcements

Monday, March 09, 2009

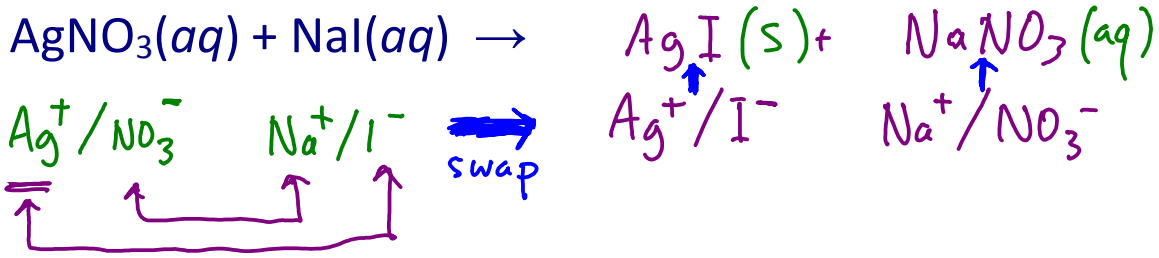
Ch 7 and 8 MC will be available Tuesday

- Ch 7 due Wed Mar 25
- Ch 8 due Mon Mar 30

Exp 8 is this week.

Discussion assignment 1 will close March 30 - replies due then. Discussion assignment 2 will start after spring break.

<u>Double displacement reaction</u>: two ionic reactants swap their ions



1. Write ion pairs for reactants
2. Swap ions, make new +/- pairs, writing + ion first
3. Make formulas for possible products from new ion pairs
4. Balance if necessary
5. Predict phase labels of products

Solubility of ionic compounds

Some ionic compounds easily dissolve in water (**soluble**)

ex. NaCl (aq)

Some never dissolve in water (**insoluble**)

ex. $CaCO_3$: chalk dust $CaCO_3(s)$

Solubility Rules for Ionic Compounds

The following table will be given on the exam exactly as shown here.

(ammonia : NH_3)

Compounds Containing the Following Ions Are Mostly Soluble	**Exceptions**
Li^+, Na^+, K^+, NH_4^+ (aq) ammonium	None
nitrate, acetate	None
chloride, bromide, iodide (Cl^- Br^- I^-)	When any of these ions pairs with Ag^+, Hg_2^{2+}, or Pb^{2+}, the compound is insoluble (s)
sulfate (SO_4^{2-})	When sulfate pairs with Sr^{2+}, Ba^{2+}, Pb^{2+}, or Ca^{2+} the compound is insoluble

Compounds Containing the Following Ions Are Mostly Insoluble	**Exceptions**
hydroxide, sulfide (OH^- S^{2-}) (s)	When either of these ions pairs with Li^+, Na^+, K^+, or NH_4^+, the compound is soluble (aq)
	When sulfide pairs with Ca^{2+}, Sr^{2+}, or Ba^{2+}, the compound is soluble
	When hydroxide pairs with Ca^{2+}, Sr^{2+}, or Ba^{2+}, the compound is slightly soluble (for ~~many~~ purposes, these may be considered insoluble) (s) our in this chapter
carbonate, phosphate (CO_3^{2-})	When either of these ions pairs with Li^+, Na^+, K^+, or NH_4^+, the compound is soluble

AgI (s) $NaNO_3$ (aq) PbI_2 (s)

Na_3PO_4 soluble (aq) $Ca_3(PO_4)_2$ insol. (s)

CaI (aq) PbI_2 (s)

$Fe(OH)_3$ (s) $Ca(OH)_2$ (s)

K_2CO_3 (aq) $CuCO_3$ (s)

copper (II) carbonate

Precipitate: insoluble (*s*) product of a chemical reaction

$AgNO_3(aq) + NaI(aq) \rightarrow$ $AgI(s)$ + $NaNO_3(aq)$

precipitate

Write the balanced chemical equation for the reaction of lead(II) nitrate and sodium iodide solutions. If a precipitate forms, what is its name?

1) ion pairs (reactants)
2) swap ions
3) new formulas (pdts)
4) bal
5) phase labels

Balanced chem. eqn w/ phase labels

Pb^{2+}/NO_3^- Na^+/I^- Pb^{2+}/I^- Na^+/NO_3^-

$Pb(NO_3)_2(aq) + 2NaI(aq) \rightarrow PbI_2(s) + 2NaNO_3(aq)$

precipitate: lead(II) iodide

Write the balanced chemical equation for the reaction of potassium sulfate and sodium phosphate solutions.

K^+/SO_4^{2-} Na^+/PO_4^{3-} K^+/PO_4^{3-} Na^+/SO_4^{2-}

$3K_2SO_4(aq) + 2Na_3PO_4(aq) \rightarrow 2K_3PO_4(aq) + 3Na_2SO_4(aq)$

NR

if all pdts and reactants are (aq)

NO REACTION occurs - cross out products!

Other reaction types

1. **Combustion reaction** (fire or flame are produced)

carbon-containing compound + $O_2 \rightarrow CO_2 + H_2O$ (complete combustion)

Write a balanced chemical equation for the complete combustion of propane, C_3H_8.

$C_3H_8 + 5O_2 \longrightarrow 3CO_2(g) + 4H_2O(g)$

2. **Decomposition reaction**: 1 reactant decomposes into 2 or more products

$H_2O_2(aq) \rightarrow$

catalysts speed up reactions but are not consumed by the reaction - they are common in decomposition reactions

$H_2O_2(aq) \rightarrow$