Homework - #13-16, 20,21

COMBUSTION

20.a) $2HCOOH_{(\ell)} + O_{2(g)} \rightarrow 2H_2O_{(g)} + 2CO_{2(g)}$

21. $C_6H_{12}O_{6(s)} + 6O_{2(g)} \rightarrow 6CO_{2(g)} + 6H_2O_{(g)}$

Chemical Reactions

IV. Single Replacement Reaction

Reaction of an element with a compound to produce a new element and an ionic compound.

⇒usually occurs in aqueous solution

⇒reaction will only occur if the element is replacing a less reactive element (see table 11.2)

Cu^{2+} $Ag^+ NO_3^-$

$Cu_{(s)} + 2\,AgNO_{3(aq)} \longrightarrow 2Ag_{(s)} + Cu(NO_3)_{2(aq)}$

metal **compound** **metal** **compound**

Cl^- $Na^+ I^-$

$Cl_{2(aq)} + 2\,NaI_{(aq)} \longrightarrow I_{2(s)} + 2NaCl_{(aq)}$

nonmetal **compound** **nonmetal** **compound**

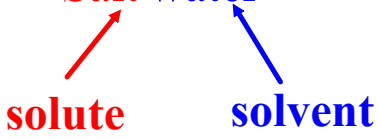
Chemical Reactions in Solution

Solution - homogeneous (uniform) mixture of a solute and a solvent.

⇒solute - substance dissolved

⇒solvent - substance doing dissolving (liquid)

Ex. Salt water



If the amount of solute that can dissolve in a solvent is large, then the solute is said to have a*high solubility*.

If the amount of solute that can dissolve in a solvent is small, then the solute is said to have a*low solubility*.

Solid substances formed from reactions in solutions are known as **precipitates**.

Solubility Rules

- Group 1 Compounds have a high solubility
- Compounds containing ammonium (NH_4^+) have a high solubility
- All acids have a high solubility
- Elements have a low solubility (except chlorine)
- Solubility varies for molecular compounds

$CaBr_{2(aq)}$ $Al_2S_{3(s)}$

Table 11.2

Activity Series of Metals

	Name	Symbol
Decreasing reactivity ↓	Lithium	Li
	Potassium	K
	Calcium	Ca
	Sodium	Na
	Magnesium	Mg
	Aluminum	Al
	Zinc	Zn
	Iron	Fe
	Lead	Pb
	(Hydrogen)	(H)*
	Copper	Cu
	Mercury	Hg
	Silver	Ag

Practice Problems

Zn^{2+} Pb^{2+} NO_3^-

$Zn_{(s)} + Pb(NO_3)_{2(aq)} \longrightarrow Pb_{(s)} + Zn(NO_3)_{2(aq)}$

metal

F^- H^+ Cl^-

$F_{2(g)} + 2HCl_{(aq)} \longrightarrow Cl_{2(aq)} + 2HF_{(aq)}$

nonmetal

$Al_{(s)} + CuSO_{4(aq)} \longrightarrow$

p. 334 #17

p. 335 #18, 19

Chemical Reactions

V. Double Replacement Reaction

Reaction that occurs between two ionic compounds in solution. Ions will "change partners".

$\Rightarrow$if one of the products has low solubility, it may form a precipitate (solid). This double replacement reaction is called **precipitation**.

Ca^{2+} Cl^- Na^+ CO_3^{2-}

$$CaCl_{2(aq)} + Na_2CO_{3(aq)} \longrightarrow CaCO_{3(s)} + 2NaCl_{(aq)}$$

compound **compound** **compound** **compound**

A second type of double replacement reaction is a **neutralization** reaction, which is a reaction between an acid and a base, to form water and an ionic compound.

$$HCl_{(aq)} + KOH_{(aq)} \longrightarrow$$

acid **base** **water** **ionic compound**