Decomposition Reactions

Decomposition reaction: A chemical reaction in which a compound breaks down into elements or simpler compounds.

Binary Compound Decomposition into Elements

- A binary compound will usually break into its elements.
- ***Electrolysis*** is the process that uses electrical energy to cause a chemical reaction, and is often used in decomposition reactions.

Example: Electrolysis of molten sodium chloride

- Heat can also be used to decompose an compound into its elements. This process is called ***thermal decomposition.***

Example: Decomposition of mercury (II) oxide

Decomposition of a Metal Nitrate

- Compounds that are composed of two elements do generally not decompose into single elements.
- Metal nitrates decompose to a metal nitrite and oxygen gas.

Example: Thermal decomposition of sodium nitrate

Decomposition of a Metal Carbonate

- Metal carbonates are always going to decompose to carbon dioxide gas and a solid metal oxide.

Example: Decomposition of calcium carbonate

Decomposition of a Metal Chlorate

- Metal chlorates are always going to decompose into oxygen gas and an ionic compound including chlorine.

Example: Decomposition of sodium chlorate

Decomposition of Metal Hydroxides

- When heated, a metal hydroxide will generally form a metal oxide and water.

Example: Decomposition of calcium hydroxide

Homework: p. 134 #31-40

21) Lithium + Oxygen

$2Li_{(s)} + O_{2\,(g)} \rightarrow Li_2O_{(s)}$

22) Strontium + Fluorine

$Sr_{(s)} + F_{2(g)} \rightarrow SrF_{2\,(s)}$

23) Iron + Bromine

$Fe_{(s)} + Br_{2\,(l)} \rightarrow FeBr_{2\,(s)}$

$2Fe_{(s)} + 3Br_{2\,(l)} \rightarrow 2FeBr_{3\,(s)}$

24) Phosphorous + Hydrogen, gaseous phosphorous trihydride

$2P_{(s)} + 3H_{2\,(g)} \rightarrow 2PH_{3\,(g)} + H_{2\,(g)}$

25) Calcium + Iodine

$Ca_{(s)} + I_{2\,(g)} \rightarrow CaI_{2\,(s)}$

26) Tin + Oxygen

$2Sn_{(s)} + O_{2\,(g)} \rightarrow 2SnO_{(s)}$
$Sn_{(s)} + O_{2\,(g)} \rightarrow SnO_{2\,(s)}$

27) Bismuth + Sulfur

$2Bi_{(s)} + 3S_{(s)} \rightarrow Bi_2S_{3\,(s)}$
$2Bi_{(s)} + 5S_{(s)} \rightarrow Bi_2S_{5\,(s)}$

28) Aluminum + Iodine

$2Al_{(s)} + 3I_{2\,(g)} \rightarrow 2AlI_{3\,(s)}$

29) Silver + Oxygen

$4Ag_{(s)} + O_{2\,(g)} \rightarrow 2Ag_2O_{(s)}$

30) Nitrogen + Oxygen, Nitrogen Dioxide

$N_{2\,(g)} + 2O_{2\,(g)} \rightarrow 2NO_{2s)}$