Reaction Prediction — 3

Write formulas for the reactants and predicted products for the chemical reactions that follow. Assume that in all cases a reaction occurs. The equation does not need to be balanced. Descriptive symbols do not need to be included. Write all substances in their proper form—as ions if appropriate—and cancel any spectator ions. Assume that the reactions are in aqueous solution unless otherwise stated.

a) A piece of aluminum metal is added to a solution of silver nitrate.

$Al(s) + Ag^+(aq) \longrightarrow Al^{3+}(aq) + Ag(s)$

b) A piece of solid bismuth is heated strongly in oxygen.

$Bi(s) + O_2(g) \longrightarrow Bi_2O_3(s)$

c) Solid ammonium carbonate is heated.

$(NH_4)_2CO_3(s) \longrightarrow NH_3(g) + CO_2(g) + H_2O(g)$

d) Propanol is burned completely in air.

$C_3H_7OH(l) + O_2(g) \longrightarrow CO_2(g) + H_2O(g)$

e) Equal volumes of 0.1 M sulfuric acid and 0.1 M potassium hydroxide are mixed.

$H^+(aq) + OH^-(aq) \longrightarrow HOH(l)$

f) An excess of sodium hydroxide solution is added to a solution of magnesium nitrate.

$OH^-(aq) + Mg^{2+}(aq) \longrightarrow Mg(OH)_2(s)$

g) Solid lithium hydride is added to water.

$LiH(s) + HOH(l) \longrightarrow Li^+(aq) + OH^-(aq) + H_2(g)$

h) A concentrated solution of ammonia is added to a solution of zinc iodide.

$Zn^{2+}(aq) + NH_3(aq) \longrightarrow [Zn(NH_3)_4]^{2+}(aq)$ *or*

$Zn^{2+}(aq) + NH_3(aq) + H_2O(l) \longrightarrow Zn(OH)_2(s) + NH_4^+(aq)$

Note: The reactions written above include descriptive symbols. This is simply a teaching aid and may be useful when "discussing" the answers. Remember–descriptive symbols are not necessary and are not graded on the AP Examination.

Reaction Prediction — 4

Write formulas for the reactants and predicted products for the chemical reactions that follow. Assume that in all cases a reaction occurs. The equation does not need to be balanced. Descriptive symbols do not need to be included. Write all substances in their proper form—as ions if appropriate—and cancel any spectator ions. Assume that the reactions are in aqueous solution unless otherwise stated.

a) Concentrated hydrochloric acid is added to solid manganese(II) sulfide.

$$H^+(aq) + MnS(s) \longrightarrow H_2S(g) + Mn^{2+}(aq)$$

b) Excess chlorine gas is passed over hot iron filings.

$$Fe(s) + Cl_2(g) \longrightarrow FeCl_3(s)$$

c) Water is added to a sample of solid magnesium nitride.

$$Mg_3N_2(s) + HOH(l) \longrightarrow NH_3(g) + Mg(OH)_2(s) \quad [or\ Mg^{2+}(aq) + OH^-(aq)]$$

d) A solid sample of magnesium carbonate is heated strongly.

$$MgCO_3(s) \longrightarrow MgO(s) + CO_2(g)$$

e) Ethene (ethylene) gas is bubbled through a solution of bromine.

$$C_2H_4(g) + Br_2(aq) \longrightarrow C_2H_4Br_2(l)$$

f) Dilute hydrochloric acid is added to a solution of potassium sulfite.

$$H^+(aq) + SO_3^{2-}(aq) \longrightarrow HSO_3^-(aq)$$

g) An excess of nitric acid solution is added to a solution of tetraamminecopper(II) sulfate.

$$H^+(aq) + Cu(NH_3)_4^{2+}(aq) \longrightarrow Cu^{2+}(aq) + NH_4^+(aq)$$

h) A piece of nickel metal is immersed in a solution of copper(II) sulfate.

$$Ni(s) + Cu^{2+}(aq) \longrightarrow Ni^{2+}(aq) + Cu(s)$$

Note: The reactions written above include descriptive symbols. This is simply a teaching aid and may be useful when "discussing" the answers. Remember–descriptive symbols are not necessary and are not graded on the AP Examination.