Chemistry Ch 9
Wkst 9 E2 Double Replacement

REACTION CATEGORY	**DOUBLE REPLACEMENT REACTION**
REACTION DESCRIPTION	During double replacement, the cations and anions of two different compounds switch places.
REACTION FORMAT	AB + CD -----> AD + CB
REACTION GUIDELINES	1. It is important that the formulas of the products be written correctly. If they are correct, balancing the equation is a simple task; if not, the equation will probably never balance. 2. In these reactions, there is never a change in oxidation state. 3. Sometimes you must determine if a reaction actually takes place? For example : Does a mixture of NaCl and H_2SO_4 react to give Na_2SO_4 and HCl, or rather, does a mixture of Na_2SO_4 and HCl react to give NaCl and H_2SO_4. Obviously we cannot test every reaction before we write the equation, but fortunately, there are certain conditions under which a reaction goes to completion (i.e goes in one direction only). These are summarized below. A reaction takes place or tends to go to completion if: a. One of the products is a gas and is allowed to escape. b. An unionized substance such as H_2O or NH_3 is formed. c. An insoluble substance is formed. The first two of these are obvious if we are able to recognize which substances are gases. The most common inorganic gases are H_2, Cl_2, O_2, N_2, H_2S, HF, HCl, HBr, HI, CO, CO_2, SO_2, SO_3, NH_3, NO, N_2O, NO_2 and HCN. The most difficult aspect of reactions of this type is the ability to recognize insoluble substances. Look at the solubility guidelines:

1) $3\,Ca(OH)_{2\,(s)} + 2H_3PO_{4\,(aq)} \longrightarrow Ca_3(PO_4)_{2\,(s)} + 6H_2O_{(l)}$

2) $K_2CO_{3\,(aq)} + BaCl_{2\,(aq)} \longrightarrow 2KCl_{(aq)} + BaCO_{3\,(s)}$

3) $Cd_3(PO_4)_{2\,(s)} + 3(NH_4)_2S_{(aq)} \longrightarrow 3CdS_{(s)} + 2(NH_4)_3PO_{4\,(aq)}$

4) $Co(OH)_{3\,(s)} + 3HNO_{3\,(aq)} \longrightarrow 3H_2O_{(l)} + Co(NO_3)_{3\,(aq)}$

5) $AgNO_{3\,(aq)} + KCl_{(aq)} \longrightarrow AgCl_{(s)} + KNO_{3\,(aq)}$

6) $Na_2CO_{3\,(aq)} + H_2SO_{4\,(aq)} \longrightarrow H_2O_{(l)} + CO_{2\,(g)} + Na_2SO_{4\,(aq)}$

7) $Al(OH)_{3(s)} + 3HC_2H_3O_{2(aq)} \rightarrow 3H_2O_{(l)} + Al(C_2H_3O_2)_{3(aq)}$

8) $Al_2(SO_4)_{3(aq)} + Ca_3(PO_4)_{2(s)} \rightarrow 3CaSO_{4(s)} + 2AlPO_{4(s)}$

9) $Cr_2(SO_3)_{3(s)} + 3H_2SO_{4(aq)} \rightarrow 3H_2O_{(l)} + 3SO_{2(g)} + Cr_2(SO_4)_{3(aq)}$

10) $2AgC_2H_3O_{2(aq)} + K_2CrO_{4(aq)} \rightarrow Ag_2CrO_{4(s)} + 2KC_2H_3O_{2(aq)}$

11) $FeBr_{2(aq)} + K_2CO_{3(aq)} \rightarrow FeCO_{3(s)} + 2KBr_{(aq)}$

12) $Ag_2S_{(s)} + CuCl_{2(s)} \rightarrow 2AgCl_{(s)} + CuS_{(s)}$

13) $Pb(NO_3)_{2(aq)} + 2HI_{(aq)} \rightarrow 2HNO_{3(aq)} + PbI_{2(s)}$

14) $Ba(ClO_3)_{2(aq)} + H_2SO_{4(aq)} \rightarrow BaSO_{4(s)} + 2HClO_{3(aq)}$

15) $CuS_{(s)} + 2KCl_{(aq)} \rightarrow K_2S_{(aq)} + CuCl_{2(s)}$

16) $2Na_3PO_{4(aq)} + 3MgSO_{4(aq)} \rightarrow 3Na_2SO_{4(aq)} + Mg_3(PO_4)_{2(s)}$

17) $Pb(NO_3)_{2(aq)} + H_2SO_{4(aq)} \rightarrow PbSO_{4(s)} + 2HNO_{3(aq)}$

18) $FeCl_{2(aq)} + H_2S_{(aq)} \rightarrow FeS_{(s)} + 2HCl_{(aq)}$

19) $KCl_{(aq)} + H_2SO_{4(aq)} \rightarrow NR$

20) $HCl_{(aq)} + NaOH_{(aq)} \rightarrow H_2O_{(l)} + NaCl_{(aq)}$

21) $2FeBr_{3(aq)} + 3Ba(OH)_{2(aq)} \rightarrow 3BaBr_{2(aq)} + 2Fe(OH)_{3(s)}$

22) $FeCl_{3(aq)} + Na_3PO_{4(aq)} \rightarrow FePO_{4(s)} + 3NaCl_{(aq)}$

~~23)~~ $Hg_2Cl_2 + HCl \rightarrow$

24) $CaS + HCl \rightarrow NR$

25) $H_2O_{(l)} + K_2SO_{4(aq)} \rightarrow NR$

26) $NH_4Cl + KOH \rightarrow NR$

27) $NaNO_3 + KC_2H_3O_2 \rightarrow NR$

28) $Pb(C_2H_3O_2)_{2(aq)} + 2KI_{(aq)} \rightarrow PbI_{2(s)} + 2KC_2H_3O_{2(aq)}$

29) $NH_4OH + BaCl_2 \rightarrow NR$

30) $Ca(NO_3)_{2(aq)} + Na_2SO_{4(aq)} \rightarrow CaSO_{4(s)} + 2NaNO_{3(aq)}$