REDOX VARIATIONS:

1. Specify which of the following are redox rxns, and identify the oxidizing agent, the reducing agent, the substance being oxidized and the substance being reduced.
a. $CH_4(g) + 2O_2(g)$ ----------> $CO_2(g) + 2H_2O(g)$
b. $Zn(s) + 2HCl(aq)$ ----------> $ZnCl_2(aq) + H_2(g)$
c. $Cr_2O_7^{2-}(aq) + 2OH^-(aq)$ ----------> $2CrO_4^{2-}(aq) + H_2O(l)$
d. $O_3(g) + NO(g)$ ----------> $O_2(g) + NO_2(g)$
e. $2H_2O_2(aq)$ ----------> $2H_2O(l) + O_2(g)$
f. $2CuCl(aq)$ ----------> $CuCl_2(aq) + Cu(s)$
2. Specify which of the following are redox rxns, and identify the oxidizing agent, the reducing agent, the substance being oxidized and the substance being reduced.
a. $Cu(s) + 2Ag^+(aq)$ ----------> $2Ag(s) + Cu^{2+}(aq)$
b. $HCl(g) + NH_3(g)$ ----------> $NH_4Cl(s)$
c. $SiCl_4(l) + 2H_2O(l)$ ----------> $4HCl(aq) + SiO_2(s)$
d. $SiCl_4(l) + 2Mg(s)$ ----------> $2MgCl_2(s) + Si(s)$
e. $Al(OH)_4^-(aq)$ ----------> $AlO_2^-(aq) + 2H_2O(l)$

ANSWER KEY TO REDOX VARIATIONS:

1.
a. Yes, Redox. C in methane is Oxidized. O_2 is reduced. O is the oxidizer. C is the reducer.
b. Yes, Redox. Zn is oxidized. H in acid is reduced. Zn is the reducer. H is the oxidizer.
c. Not Redox.
d. Yes, Redox. N in NO is oxidized. Some of the O in O_3 is reduced. N is the reducer. O_3 is the oxidizer.
e. Yes, Redox. O in peroxide is simultaneously oxidized and reduced so it is also the oxidizer and the reducer.
f. Yes, Redox. Cu in CuCl is simultaneously oxidized and reduced so it is also the oxidizer and the reducer.
2.
a. Yes, Redox. Cu is being oxidized. Ag^+ is being reduced.
b. Not Redox.
c. Not Redox.
d. Si in $SiCl_4$ is reduced. Mg is oxidized. Si is the oxidizer. Mg is the reducer.
e. Not Redox.

REDOX PRACTICE PROBLEMS (IN ACID BASE MEDIA)

1. Balance the following oxidation-reduction reactions that occur in acidic solution using the half-reaction method.
a. $Cu(s) + NO^{3-}(aq) \rightarrow Cu^{2+}(aq) + NO(g)$
b. $Cr_2O_7^{2-}(aq) + Cl^-(aq) \rightarrow Cr^{3+} + Cl_2(g)$
c. $Pb(s) + PbO_2(s) + H_2SO_4(aq) \rightarrow PbSO_4(s)$
d. $Mn^{2+}(aq) + NaBiO_3(s) \rightarrow Bi^{3+}(aq) + MnO_4^-(aq)$
e. $H_3AsO_4(aq) + Zn(s) \rightarrow AsH_3(g) + Zn^{2+}(aq)$

2. Balance the following oxidation-reduction reactions that occur in basic solution using the half-reaction method.
a. $Al(s) + MnO_4^- \rightarrow MnO_2(s) + Al(OH)_4^-(aq)$
b. $Cl_2(g) \rightarrow Cl^-(aq) + OCl^-(aq)$
c. $NO_2^-(aq) + Al(s) \rightarrow NH_3(g) + AlO_2^-(aq)$

3. Balance the following oxidation-reduction reactions that occur in basic solution using the half-reaction method.
a. $Cr(s) + CrO_4^{2-}(aq) \rightarrow Cr(OH)_3(s)$
b. $MnO_4^-(aq) + S^{2-}(aq) \rightarrow MnS(s) + S(s)$

ANSWER KEY FOR REDOX PRACTICE PROBLEMS (IN ACID BASE MEDIA)
1.
a. $8H^+ + 2NO_3^- + 3Cu \rightarrow 2NO + 4H_2O + 3Cu^{2+}$
b. $Cr_2O_7^{2-} + 14H^+ + 6Cl^- \rightarrow 2Cr^{3+} + 7H_2O + 3Cl_2$
c. $PbO_2 + Pb + 4H^+ + 2SO_4^{2-} \rightarrow 2PbSO_4 + 2H_2O$

d. $14H^+ + 5NaBiO_3 + 2Mn^{2+} \rightarrow 5Bi^{3+} + 5Na^+ + 7H_2O + 2MnO_4^-$
e. $H_3AsO_4 + 8H^+ + 4Zn \rightarrow AsH_3 + 4H_2O + 4Zn^{2+}$
2.
a. $MnO_4^- + Al + 2H_2O \rightarrow MnO_2 + Al(OH)_4^-$
b. $Cl_2 + 2OH^- \rightarrow ClO^- + H_2O + Cl^-$
c. $NO_2^- + H_2O + 2Al + OH^- \rightarrow NH_3 + 2AlO_2^-$
3.
a. $4H_2O + Cr + CrO_4^{2-} \rightarrow 2Cr(OH)_3 + 2OH^-$
b. $7S^{2-} + 8H_2O + 2MnO_4^- \rightarrow 2MnS + 5S + 16OH^-$