Name_____ Date_____ Period____

Determining Oxidation Numbers

Write the correct oxidation number above each element in the following compounds or ions.

1)

a. $\overset{+2\ -2}{CO}$

b. $\overset{+4\ -2}{CO_2}$

c. $\overset{+7\ -1}{IF_7}$

d. $\overset{+1\ -3}{Li_3N}$

e. $\overset{+1\ -2}{K_2S}$

f. $\overset{+4\ -1}{SnCl_4}$

g. $\overset{+2\ +6\ -2}{BaSO_4}$

h. $\overset{+2\ -1}{OF_2}$

i. $\overset{+2\ +5\ -2}{Ca(NO_3)_2}$

j. $\overset{+3\ -2}{Fe_2O_3}$

k. $\overset{+1\ +1\ -2}{HClO}$

l. $\overset{+1\ +5\ -2}{HClO_3}$

2)

a. $\overset{+5\ -2}{PO_4}^{3-}$

b. $\overset{+3\ -2}{BO_3}^{3-}$

c. $\overset{+2\ -1}{ZrI_3}^{-}$

d. $\overset{+5\ -2}{IO_3}^{-}$

e. $\overset{+3\ -2}{AsO_3}^{3-}$

f. $\overset{+1\ +4\ -2}{HCO_3}^{-}$

g. $\overset{-3\ +1}{NH_4}^{+}$

h. $\overset{+5\ -2}{NO_3}^{-}$

i. $\overset{+6\ -2}{SO_4}^{2-}$

j. $\overset{+5\ -2}{P_3O_{10}}^{5-}$

k. $\overset{+2\ -2}{S_2O_3}^{2-}$

l. $\overset{+4\ -2}{CO_3}^{2-}$

3)

a. $\overset{+3\ -1}{PCl_3}$

b. $\overset{+5\ -1}{PCl_5}$

c. $\overset{+4\ -2\ -1}{POCl_2}$

d. $\overset{+4\ -2}{SO_2}$

e. $\overset{+6\ -2}{SO_3}$

f. $\overset{+2\ -1}{SCl_2}$

g. $\overset{+3\ -1}{CrCl_3}$

h. $\overset{+1\ +6\ -2}{K_2CrO_4}$

i. $\overset{+3\ -2}{Cr_2O_3}$

j. $\overset{+4\ -2}{MnO_2}$

k. $\overset{+1\ +7\ -2}{KMnO_4}$

l. $\overset{+7\ -2}{Mn_2O_7}$

Balance the following redox reactions.

1. $MnO_4^- + Cl^- \rightarrow Cl_2 + Mn^{2+}$

+7 -2 LEO 0 GER

$2[5e^- + 8H^+ + MnO_4^- \xrightarrow{GER} Mn^{+2} + 4H_2O]$

$5[2Cl^- \rightarrow Cl_2 + 2e^-]$

$10e^- + 16H^+ + 2MnO_4^- \rightarrow 2Mn^{+2} + 8H_2O$

$10Cl^- \rightarrow 5Cl_2 + 10e^-$

$16H^+ + 2MnO_4^- + 10Cl^- \rightarrow 2Mn^{+2} + 8H_2O + 5Cl_2$

+16 -2 -10 +4

4 = 4 ✓

2. $NiO_2 + Ag \rightarrow Ni^{2+} + Ag^+$

+4 -2 0 LEO GER

$2e^- + 4H^+ + NiO_2 \xrightarrow{GER} Ni^{+2} + 2H_2O$

$2[Ag \xrightarrow{LEO} Ag^+ + 1e^-]$

$2Ag \rightarrow 2Ag^+ + 2e^-$

$4H^+ + NiO_2 + 2Ag \rightarrow Ni^{+2} + 2H_2O + 2Ag^+$

+4 0 0 +2 0 +2

4 = 4 ✓

3. $TcO_4^- + Ti \rightarrow Tc^{2+} + Ti^{3+}$

+7 -2 0 GER LEO

$3[5e^- + 8H^+ + TcO_4^- \rightarrow Tc^{+2} + 4H_2O]$

$5[Ti \rightarrow Ti^{+3} + 3e^-]$

$15e^- + 24H^+ + 3TcO_4^- \rightarrow 3Tc^{+2} + 12H_2O$

$5Ti \rightarrow 5Ti^{+3} + 15e^-$

$24H^+ + 3TcO_4^- + 5Ti \rightarrow 3Tc^{+2} + 12H_2O + 5Ti^{+3}$

+24 -3 0 +6 0 +15

21 = 21 ✓