CHEM 121 – Worksheet 28 – Fall 2015

Your Name: _____

You must have your own copy of this worksheet. Failure to not have your own copy results in a "0" for this worksheet.

Directions: Usual directions: first 40 minutes without notes, with non-programmable calculator and partners; next 10 minutes with notes. Last 25 minutes on the board.
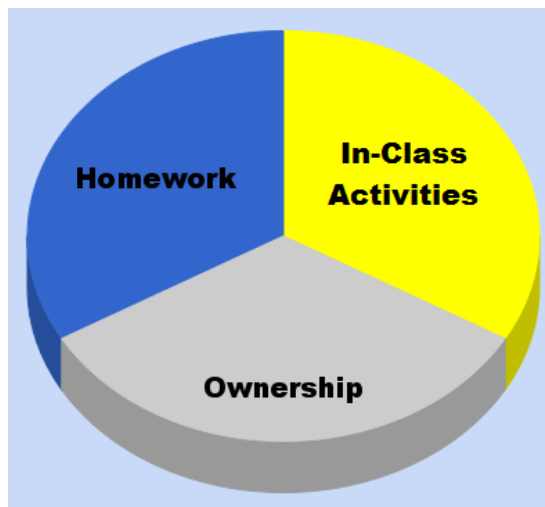
1) Determine what is oxidized and what is reduced in each reaction. Identify the oxidizing agent and the reducing agent, also.

A) $2Sr + O_2 \rightarrow 2SrO$

B) $2Li + S \rightarrow Li_2S$

C) $2Cs + Br_2 \rightarrow 2CsBr$
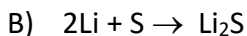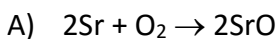
D) $3Mg + N_2 \rightarrow Mg_3N_2$

E) $4Fe + 3O_2 \rightarrow 2Fe_2O_3$

F) $Cl_2 + 2NaBr \rightarrow 2NaCl + Br_2$

G) $Si + 2F_2 \rightarrow SiF_4$

H) $2Ca + O_2 \rightarrow 2CaO$

I) $Mg + 2HCl \rightarrow MgCl_2 + H_2$

J) $2Na + 2H_2O \rightarrow 2NaOH + H_2$
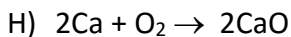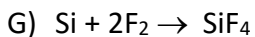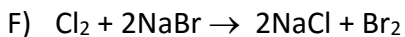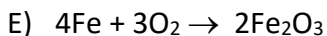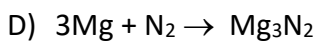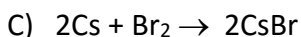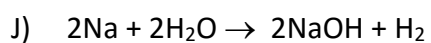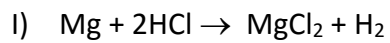
2) Give the oxidation number of each kind of atom or ion.

a. sulfate

b. Sn

c. S^{2-}

d. Fe^{3+}

e. Sn^{4+}

f. nitrate

g. ammonium

3) Calculate the oxidation number of chromium in each of the following.
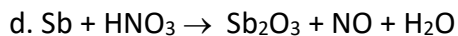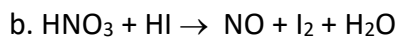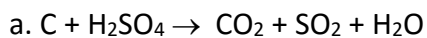
a. Cr_2O_3

b. $Na_2Cr_2O_7$

c. $CrSO_4$

d. chromate

e. dichromate

4) Use the changes in oxidation numbers to determine which elements are oxidized and which are reduced in these reactions. (Note: it is not necessary to use balanced equations):

a. $C + H_2SO_4 \rightarrow CO_2 + SO_2 + H_2O$

b. $HNO_3 + HI \rightarrow NO + I_2 + H_2O$

c. $KMnO_4 + HCl \rightarrow MnCl_2 + Cl_2 + H_2O + KCl$

d. $Sb + HNO_3 \rightarrow Sb_2O_3 + NO + H_2O$

5) For each reaction in problem 4, identify the oxidizing agent and reducing agent.

6) Write half-reactions for the oxidation and reduction process for each of the following.

a. $Fe^{2+} + MnO_4^{-1} \rightarrow Fe^{3+} + Mn^{2+}$

b. $Sn^{2+} + IO_3^{-1} \rightarrow Sn^{4+} + I_2$

c. $S^{2-} + NO_3^{-1} \rightarrow S + NO$

d. $NH_3 + NO_2 \rightarrow N_2 + H_2O$
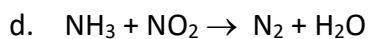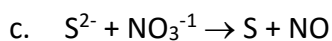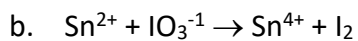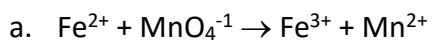
7) Complete and balance each reaction by whichever method you prefer (note that there are no half reactions in this worksheet).

a. $Fe^{2+} + MnO_4^{-1} \rightarrow Fe^{3+} + Mn^{2+}$

b. $Sn^{2+} + IO_3^{-1} \rightarrow Sn^{4+} + I_2$

c. $S^{2-} + NO_3^{-1} \rightarrow S + NO$

d. $NH_3 + NO_2 \rightarrow N_2 + H_2O$

e. $Mn^{2+} + BiO_3^{-1} \rightarrow Bi^{2+} + MnO_4^{-1}$

f. $I_2 + Na_2S_2O_3 \rightarrow Na_2S_2O_4 + NaI$
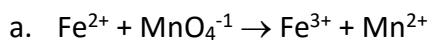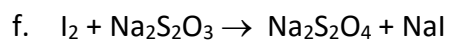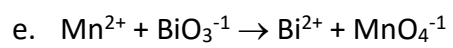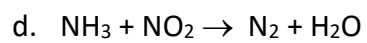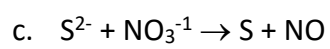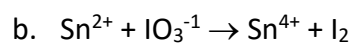
7) Assign **oxidation numbers** to each of the atoms in the following compounds:

Na_2CrO_4 Na =   O =   Cr =

$K_2Cr_2O_7$ K =   O =   Cr =

CO_2 O =   C =

CH_4 H =   C =

$HClO_4$ O =   H =   Cl =

MnO_2 O =   Mn =

SO_3^{2-} O =   S =

SF_4 F =   S =
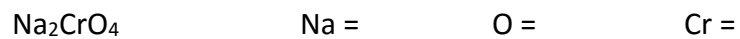
8) Nitrogen has 5 valence electrons (Group V). It can gain up to 3 electrons (-3 oxidation state), or lose up to 5 (+5 oxidation state) electrons. Fill in the missing names or formulas and assign an oxidation state to each of the following nitrogen containing compounds:

name	formula	oxidation state of N
	NH_3	
nitrogen		
nitrite		
	NO_3^-	
dinitrogen monoxide		
	NO_2	
hydroxylamine	NH_2OH	
nitrogen monoxide		
hydrazine	N_2H_4	