Chemical Reactions

Name - _____

1.) Give an example of a system which is closed with respect to light.

2.) Give an example of a system which is open with respect to light but closed in respect to mass.

3.) You rip a piece of paper into several pieces.

a.) What is conserved with respect to the paper?

b.) What is not conserved with respect to the paper?

c.) One piece of paper is taken away. What is conserved now?

d.) One piece of paper is taken away. What is **NOT** conserved now?

4.) Which conservation laws, if any, are being broken in the following situations?

a.) $Fe + S \rightarrow CuS$

b.) $7.0\ g$ of nitrogen are reacted with $8.0\ g$ of oxygen to make $16.0\ g$ of nitrogen monoxide.

c.) $2\ Ag^{+} + SO_4^{-2} \rightarrow Ag_2SO_4$

d.) 3 Cr + O_2 → Cr_2O_3

e.) $71.0\ g$ of chlorine gas and $64.0\ g$ of oxygen gas produce $135\ g$ of chlorine dioxide gas.

5.) Which of the following are conserved in a chemical reaction?

a.) phase b.) number of atoms c.) volume

6.) Do the following reactions obey the laws of conservation of atoms and mass? Explain.

a.) ___ CH_4 + _2_ O_2 → ___ CO_2 + _2_ H_2O

b.) ___ NaOH + ___ HCl → ___ NaCl + ___ H_2O

7.) Balance the following chemical equations:

a.) ___ Sn + ___ O_2 → ___ SnO

b.) ___ H_2 + ___ Cl_2 → ___ HCl

c.) ___ N_2 + ___ H_2 → ___ NH_3

d.) ___ Na + ___ H_2O → ___ NaOH + ___ H_2

e.) ___ NH_3 + ___ O_2 → ___ N_2 + ___ H_2O

f.) ___ C_6H_{14} + ___ O_2 → ___ CO_2 + ___ H_2O

g.) ___ KNO_3 → ___ KNO_2 + ___ O_2

h.) ___ CaC_2 + ___ O_2 → ___ Ca + ___ CO_2

i.) ___ C_5H_{12} + ___ O_2 → ___ CO_2 + ___ H_2O

j.) ___ K_2SO_4 + ___ $BaCl_2$ → ___ KCl + ___ $BaSO_4$

k.) ___ KOH + ___ H_2SO_4 → ___ K_2SO_4 + ___ H_2O

l.) ___ $Ca(OH)_2$ + ___ NH_4Cl → ___ NH_3 + ___ $CaCl_2$ + ___ H_2O

m.) ___ C + ___ SO_2 → ___ CS_2 + ___ CO

n.) ___ Mg_3N_2 + ___ H_2O → ___ $Mg(OH)_2$ + ___ NH_3

o.) ___ V_2O_5 + ___ Ca → ___ CaO + ___ V

p.) ___ Na_2O_5 + ___ H_2O → ___ NaOH + ___ O_2

q.) ___Fe_3O_4 + ___ H_2 → ___ Fe + ___ H_2O

r.) ___ Cu + ___ H_2SO_4 → ___ $CuSO_4$ + ___ H_2O + ___ SO_2

s.) ___ Al + ___ H_2SO_4 → ___ H_2 + ___ $Al_2(SO_4)_3$

t.) ___Si_4H_{10} + ___ O_2 → ___SiO_2 + ___ H_2O

u.) ___ NH_3 + ___ O_2 → ___ N_2H_4 + ___ H_2O

v.) ___ $C_{15}H_{30}$ + ___ O_2 → ___ CO_2 + ___ H_2O

w.) ___ BN + ___ F_2 → ___ N_2 + ___ BF_3

x.) ___ $CaSO_4 \cdot 2H_2O$ + ___ SO_3 → ___ $CaSO_4$ + ___ H_2SO_4

y.) ___ $C_3H_7N_2O_7$ + ___ O_2 → ___ CO_2 + ___ H_2O + ___ N_2

z.) ___ $C_7H_{16}O_4S_2$ + ___ O_2 → ___ CO_2 + ___ H_2O + ___ SO_2

a1.) ___ Na + ___ ZnI_2 → ___ NaI + ___ $NaZn_4$

b1.) ___ $HBrO_3$ + ___ HBr → ___ Br_2 + ___ H_2O

c1.) ___ Al_4C_3 + ___ H_2O → ___ $Al(OH)_3$ + ___ CH_4

d1.) ___ $Ca(NO_3)_2 \cdot 3H_2O$ + ___ LaC_2 → ___ $Ca(NO_3)_2$ + ___ $La(OH)_2$ + ___ C_2H_2

e1.) ___ CH_3NO_2 + ___ Cl_2 → ___ CCl_3NO_2 + ___ HCl

f1.) ___ $Ca_3(PO_4)_2$ + ___ SiO_2 + ___ C → ___ $CaSiO_3$ + ___ CO + ___ P

g1.) ___ Al_2C_6 + ___ H_2O → ___ $Al(OH)_3$ + ___ C_2H_2

h1.) ___ NaF + ___ CaO + ___ H_2O → ___ CaF_2 + ___ NaOH

i1.) ___ LiH + ___ $AlCl_3$ → ___ $LiAlH_4$ + ___ LiCl

j1.) ___ CaF_2 + ___ H_2SO_4 + ___ SiO_2 → ___ $CaSO_4$ + ___ SiF_4 + ___ H_2O

k1.) ___ $CaSi_2$ + ___ $SbCl_3$ → ___ Si + ___ Sb + ___ $CaCl_2$

l1.) ___ TiO_2 + ___ B_4C + ___ C → ___ TiB_2 + ___ CO

m1.) ___ NH_3 + ___ O_2 → ___ NO + ___ H_2O

n1.) ___ SiF_4 + ___ NaOH → ___ Na_4SiO_4 + ___ NaF + ___ H_2O

o1.) ___ NH_4Cl + ___ CaO → ___ NH_3 + ___ $CaCl_2$ + ___ H_2O

p1.) ___ NaPb + ___ C_2H_5Cl → ___ $Pb(C_2H_5)_4$ + ___ Pb + ___ NaCl

q1.) ___ Be_2C + ___ H_2O → ___ $Be(OH)_2$ + ___ CH_4

r1.) ___ NpF_3 + ___ O_2 + ___ HF → ___ NpF_4 + ___ H_2O

s1.) ___ NO_2 + ___ H_2O → ___ HNO_3 + ___ NO

t1.) ___ $LiAlH_4$ + ___ BF_3 → ___ LiF + ___ AlF_3 + ___ B_2H_6

<u>Optional</u> – The tough ones that A students should try.

u1.) ___ Cu + ___ HNO_3 → ___ $Cu(NO_3)_2$ + ___ + NO + ___ H_2O

v1.) ___ $FeCl_2$ + ___ KNO_3 + ___ HCl → ___ $FeCl_3$ + ___ H_2O + ___ NO + ___ KCl

w1.) ___ $KMnO_4$ + ___ HBr → ___ $MnBr_2$ + ___ Br_2 + ___ KBr + ___ H_2O

x1.) ___ $K_2Cr_2O_7$ + ___ HCl → ___ Cl_2 + ___ H_2O + ___ KCl + ___ $CrCl_3$