Name:_____

Period:_____

Limiting Reactants and Percent Yield

1) Chlorine can replace bromine in bromide compounds forming a chloride compound and elemental bromine. The following equation is an example of this reaction.

$$2\,KBr + Cl_2 \longrightarrow 2\,KCl + Br_2$$

When 0.855 mole of Cl_2 and 3.305 g of KBr are mixed in solution, which is the limiting reactant? How many grams of Br_2 are formed?

KBr = limiting

$3.305\text{ g KBr} \left|\frac{1\text{ mol KBr}}{119\text{ g KBr}}\right|\left|\frac{1\text{ mol } Br_2}{2\text{ mol KBr}}\right| = \boxed{0.0139\text{ mol } Br_2}$

$0.855\text{ mol } Cl_2 \left|\frac{1\text{ mol } Br_2}{1\text{ mol } Cl_2}\right| = \boxed{0.855\text{ mol } Br_2}$

$0.0139\text{ mol } Br_2 \left|\frac{159.8\text{ g } Br_2}{1\text{ mol } Br_2}\right| = \boxed{2.22\text{ g } Br_2}$

2) Heating zinc sulfide in the presence of oxygen yields zinc oxide and sulfur dioxide: If 1.72 mol of ZnS is heated in the presence of 3.04 mol O_2, which reactant will get used up first ad which one would will be left over?

$2\,ZnS + 3O_2 \longrightarrow 2\,ZnO + 2SO_2$

1.72 mol 3.04 mol

$1.72\text{ mol ZnS} \left|\frac{1\text{ mol ZnO}}{1\text{ mol ZnS}}\right| = \boxed{1.72\text{ mol ZnS}}$

$3.04\text{ mol } O_2 \left|\frac{2\text{ mol ZnS}}{3\text{ mol } O_2}\right| = \boxed{2.07\text{ mol ZnS}}$

ZnS = limiting

O_2 = Excess

3) In the production of copper from ore containing copper(II) sulfide and reacting it with oxygen gas producing copper (II) oxide and sulfur dioxide. If 100 g of CuS and 56 g of O_2 are available, which reactant is limiting, and which is the excess reactant? What is the mass of CuO produced?

$2\,CuS + 3O_2 \longrightarrow 2\,CuO + 2SO_2$

$100\text{ g CuS} \left|\frac{1\text{ mol CuS}}{95.5\text{ CuS}}\right|\left|\frac{1\text{ mol CuO}}{1\text{ mol CuS}}\right| = \boxed{1.23\text{ mol CuO}}$

Limiting = CuS

Excess = O_2

$56\text{g } O_2 \left|\frac{1\text{ mol } O_2}{32\text{ g } O_2}\right|\left|\frac{2\text{ mol CuO}}{3\text{ mol } O_2}\right| = \boxed{1.167\text{ mol CuO}}$

$1.67\text{ mol CuO} \left|\frac{79.5}{1\text{ mol CuO}}\right| = \boxed{132.8\text{ g CuO}}$

4)

$$2\,AgNO_3 + Ni \longrightarrow 2Ag + Ni(NO_3)_2$$

When 3.3 moles of Ni react with 159.3 grams of $AgNO_3$, which is the limiting and which is the excess reactant?

$159.3\text{ g } AgNO_3 \left|\frac{1\text{ mol } AgNO_3}{137.8\text{ g } AgNO_3}\right|\left|\frac{1\text{ mol Ag}}{1\text{ mol } AgNO_3}\right| = \boxed{1.15\text{ mol Ag}}$

$3.3\text{ mol Ni} \left|\frac{2\text{ Ag}}{1\text{ mol Ni}}\right| = \boxed{6.6\text{ mol Ag}}$

$AgNO_3$ = Limiting

Ni = Excess