Name _____   Block: _____   Date: _____

Chemistry 11
Stoichiometry #1

1. Tetraethyl lead, $Pb(C_2H_5)_4$, is an "antiknock" ingredient which was added to some gasolines ("leaded" gas). Tetraethyl lead burns according to the equation:

$$2Pb(C_2H_5)_4(l) + 27O_2(g) \rightarrow 2PbO(s) + 16CO_2(g) + 20H_2O(l)$$

   a) What volume of $O_2(g)$ at STP is consumed when 100.0 g of $PbO(s)$ are formed?

   b) How many molecules of $CO_2(g)$ are formed when 1.00×10^{-6} g of tetraethyl lead is burned?

   c) How many molecules of H_2O are formed when 135 molecules of O_2 react?

   d) What volume of $O_2(g)$ at STP, in millilitres, is required to react with 1.00×10^{15} molecules of tetraethyl lead?

2. Nitromethane, a fuel occasionally used in some drag racers, burns according to the reaction:

$$4CH_3NO_2(l) + 3O_2(g) \rightarrow 4CO_2(g) + 6H_2O(l) + 2N_2(g)$$

a. What mass of H_2O is produced when 0.150 g of CH_3NO_2 is burned?

b. What **combined** volume of gas at STP is produced if 0.316 g of CH_3NO_2 is burned?

c. What volume of $O_2(g)$ at STP is required to produce 0.250 g of CO_2?

d. What mass of H_2O is produced when 0.410 g of CO_2 is produced?

3. A sample of high purity silicon is prepared by strongly heating a mixture of hydrogen and silicon tetrachloride in a sealed tube:

$$SiCl_4(g) + 2H_2(g) \rightarrow Si(s) + 4HCl(g)$$
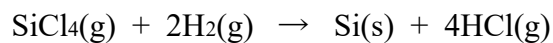
If exactly 1.00 g of silicon is required, what mass of each of $SiCl_4$ and H_2 must react?