

1 mole = 6.02×10^{23} , H = 1.008, C = 12.01, N = 14.01, O = 16.00, F = 19.00, Al = 26.98, S = 32.06, Cl = 35.45, Mn = 54.94, U = 238.0,

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1. (4 Pts) What is the molar mass of acetaminophen, $C_8H_9NO_2$?

$$\begin{array}{l} 2 \times 16.00 = \\ 1 \times 14.01 = \\ 9 \times 1.008 = \\ 8 \times 12.01 = \end{array}$$

$$151.162 \text{ g/mol}$$

2. (4 Pts) How many moles of CF_4 are there in 171 g of CF_4 ?

$$\frac{171 \text{ g } CF_4}{88.01 \text{ g/mol}} = 1.94 \text{ mol } CF_4$$

3. (5 Pts) The empirical formula of a compound of uranium and fluorine that is composed of 67.6% uranium and 32.4% fluorine is

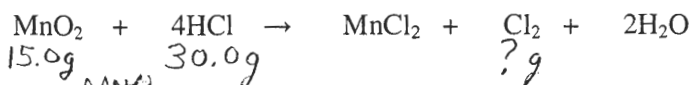
Assume 100 g

$$U: \frac{67.6 \text{ g}}{238 \text{ g/mol}} = 0.2815 \div 0.2815 = 1$$

$$F: \frac{32.4 \text{ g}}{19.00 \text{ g/mol}} = 1.7053 \div 0.2815 = 6$$



4. (8 Pts) How many grams of Cl_2 can be prepared from the reaction of 15.0 g of MnO_2 and 30.0 g of HCl according to the following chemical equation?

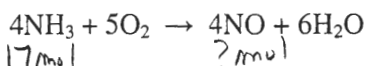


$$15.0 \text{ g} \quad 30.0 \text{ g} \quad ? \text{ g}$$

$$\text{Based on } MnO_2: \frac{15.0 \text{ g } MnO_2}{86.94 \text{ g/mol}} \times \frac{1 \text{ mol } Cl_2}{1 \text{ mol } MnO_2} \times \frac{70.9 \text{ g } Cl_2}{1 \text{ mol } Cl_2} = 12.2 \text{ g } Cl_2$$

$$\text{Based on } HCl: \frac{30.0 \text{ g } HCl}{36.46 \text{ g/mol}} \times \frac{1 \text{ mol } Cl_2}{4 \text{ mol } HCl} \times \frac{70.9 \text{ g } Cl_2}{1 \text{ mol } Cl_2} = 14.5 \text{ g } Cl_2$$

5. (4 Pts) Ammonia reacts with diatomic oxygen to form nitric oxide and water vapor:



$$17 \text{ mol} \quad ? \text{ mol}$$

When 17 moles of NH_3 are allowed to react with an excess of O_2 , how many moles of NO can be produced?

$$\frac{17 \text{ mol } NH_3}{4 \text{ mol } NH_3} \times \frac{4 \text{ mol } NO}{4 \text{ mol } NH_3} = 17 \text{ mol } NO$$