UNIT 8 HW#2 Name _____ Block #____

Stoichiometry – 2 Step Conversions

[Must Show All Work]

1) How many grams are in 1.23×10^{24} molecules of CO_2?

C: 1 x 12 = 12
O: 2 x 16 = 32
Total Mass = 44g

$$\frac{1.23 \times 10^{24}\ \text{molecules}\ CO_2}{1} \left| \frac{1\ \text{mole}\ CO_2}{6.022 \times 10^{23}\ \text{molecules}} \right| \frac{44\ \text{grams}\ CO_2}{1\ \text{mole}\ CO_2} = 89.9\ \text{grams}\ CO_2$$

2) How many liters are in 1.23×10^{24} molecules of CO_2?

$$\frac{1.23 \times 10^{24}\ \text{molecules}\ CO_2}{1} \left| \frac{1\ \text{mole}\ CO_2}{6.022 \times 10^{23}\ \text{molecules}} \right| \frac{22.4\ \text{liters}\ CO_2}{1\ \text{mole}\ CO_2} = 45.8\ \text{liters}\ CO_2$$

3) How many atoms are in 3.25 grams of sodium?

$$\frac{3.25\ \text{grams}\ Na}{1} \left| \frac{1\ \text{mole}\ Na}{23.0\ \text{grams}\ Na} \right| \frac{6.022 \times 10^{23}\ \text{atoms}\ Na}{1\ \text{mole}\ Na} = 8.51 \times 10^{22}\ \text{atoms}\ Na$$

4) How many molecules are in 7.50 grams of water vapor? H_2O

H: 2 x 1= 2
O: 1 x 16= 16
Total Mass = 18g

$$\frac{7.50\ \text{grams}\ H_2O}{1} \left| \frac{1\ \text{mole}\ H_2O}{18\ \text{grams}\ H_2O} \right| \frac{6.022 \times 10^{23}\ \text{molecules}}{1\ \text{mole}\ H_2O} = 2.51 \times 10^{23}\ \text{molecules}\ H_2O$$

UNIT 10 HW#2 Name_____ Block #____

Stoichiometry – 2 Step Conversions

[Must Show All Work]

5) How many grams are in 0.448 liters of neon gas? **Ne**

Total Mass = Atomic Mass Ne = 20.179 g

$$\frac{0.448\ \text{liters Ne}}{1} \left| \frac{1\ \text{mole Ne}}{22.4\ \text{liters}} \right| \frac{20.179\ \text{grams Ne}}{1\ \text{mole Ne}} = 0.404\ \text{grams Ne}$$

6) How many liters are in 25.0 grams of methane gas? **CH_4**

C: 1 x 12 = 12
H: 4 x 1 = 4
Total Mass = 16g

$$\frac{25.0\ \text{grams } CH_4}{1} \left| \frac{1\ \text{mole } CH_4}{16\ \text{grams } CH_4} \right| \frac{22.4\ \text{liters}}{1\ \text{mole } CH_4} = 35.0\ \text{liters } CH_4$$

7) **Challenge:** How many atoms are in 10.0 liters of oxygen gas? **O_2**

$$\frac{10.0\ \text{liters } O_2}{1} \left| \frac{1\ \text{mole } O_2}{22.4\ \text{liters } O_2} \right| \frac{6.022 \times 10^{23}\ \text{molecules}}{1\ \text{mole } O_2} = 2.69 \times 10^{23}\ \text{molecules } O_2$$

The reason this is a challenge question is that oxygen gas is a molecule. So you need to convert liters to molecules. Then you need to realize that the oxygen gas molecule is diatomic so it contains 2 atoms. Therefore, you must multiply the number of molecules by 2 to get the number of atoms.

2.69×10^{23} molecules x 2 = 5.38×10^{23} atoms oxygen

8) **Challenge:** List all the diatomic gases and write their chemical formulas?

Hydrogen gas	H_2
Nitrogen gas	N_2
Oxygen gas	O_2
Fluorine gas	F_2
Chlorine gas	Cl_2
Bromine gas	Br_2
Iodine gas	I_2