THE MOLE AND AVOGADRO'S NUMBER

One mole of a substance contains Avogadro's Number (6.02×10^{23}) of molecules.

How many molecules are in the quantities below?

1. 2.0 moles
2. 1.5 moles
3. 0.75 mole
4. 15 moles
5. 0.35 mole

How many moles are in the number of molecules below?

1. 6.02×10^{23}
2. 1.204×10^{24}
3. 1.5×10^{20}
4. 3.4×10^{26}
5. 7.5×10^{19}

MOLES AND MASS

Name _____

Determine the number of moles in each of the quantities below.

1. 25 g of NaCl
2. 125 g of H_2SO_4
3. 100. g of $KMnO_4$
4. 74 g of KCl
5. 35 g of $CuSO_4 \cdot 5H_2O$

Determine the number of grams in each of the quantities below.

1. 2.5 moles of NaCl
2. 0.50 moles of H_2SO_4
3. 1.70 moles of $KMnO_4$
4. 0.25 moles of KCl
5. 3.2 moles of $CuSO_4 \cdot 5H_2O$

THE MOLE AND VOLUME

For gases at STP (273 K and 1 atm pressure), one mole occupies a volume of 22.4 L. What volume will the following quantities of gases occupy at STP?

1. 1.00 mole of H_2
2. 3.20 moles of O_2
3. 0.750 mole of N_2
4. 1.75 moles of CO_2
5. 0.50 mole of NH_3
6. 5.0 g of H_2
7. 100. g of O_2
8. 28.0 g of N_2
9. 60. g of CO_2
10. 10. g of NH_3

MIXED MOLE PROBLEMS

Name _____

Solve the following problems.

1. How many grams are there in 1.5×10^{25} molecules of CO_2?
2. What volume would the CO_2 in Problem 1 occupy at STP?
3. A sample of NH_3 gas occupies 75.0 liters at STP. How many molecules is this?
4. What is the mass of the sample of NH_3 in Problem 3?
5. How many atoms are there in 1.3×10^{22} molecules of NO_2?
6. A 5.0 g sample of O_2 is in a container at STP. What volume is the container?
7. How many molecules of O_2 are in the container in Problem 6? How many atoms of oxygen?

PERCENTAGE COMPOSITION

Determine the percentage composition of each of the compounds below.

1. $KMnO_4$
   - K = _____
   - Mn = _____
   - O = _____

2. HCl
   - H = _____
   - Cl = _____

3. $Mg(NO_3)_2$
   - Mg = _____
   - N = _____
   - O = _____

4. $(NH_4)_3PO_4$
   - N = _____
   - H = _____
   - P = _____
   - O = _____

5. $Al_2(SO_4)_3$
   - Al = _____
   - S = _____
   - O = _____

Solve the following problems.

6. How many grams of oxygen can be produced from the decomposition of 100. g of $KClO_3$? _____
7. How much iron can be recovered from 25.0 g of Fe_2O_3? _____
8. How much silver can be produced from 125 g of Ag_2S? _____

DETERMINING EMPIRICAL FORMULAS

Name _____

What is the empirical formula (lowest whole number ratio) of the compounds below?

1. 75% carbon, 25% hydrogen

2. 52.7% potassium, 47.3% chlorine

3. 22.1% aluminum, 25.4% phosphorus, 52.5% oxygen

4. 13% magnesium, 87% bromine

5. 32.4% sodium, 22.5% sulfur, 45.1% oxygen

6. 25.3% copper, 12.9% sulfur, 25.7% oxygen, 36.1% water