THE MOLE AND AVOGADRO'S NUMBER

Name _____

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}

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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 $CuSO_4 \cdot 5H_2O$ _____

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THE MOLE AND VOLUME

Name _____

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

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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

Name _____

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? _____

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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

_____

DETERMINING MOLECULAR FORMULAS (TRUE FORMULAS)

Name _____

Solve the problems below.

1. The empirical formula of a compound is NO_2. Its molecular mass is 92 g/mol. What is its molecular formula?

_____

2. The empirical formula of a compound is CH_2. Its molecular mass is 70 g/mol. What is its molecular formula?

_____

3. A compound is found to be 40.0% carbon, 6.7% hydrogen and 53.5% oxygen. Its molecular mass is 60. g/mol. What is its molecular formula?

_____

4. A compound is 64.9% carbon, 13.5% hydrogen and 21.6% oxygen. Its molecular mass is 74 g/mol. What is its molecular formula?

_____

5. A compound is 54.5% carbon, 9.1% hydrogen and 36.4% oxygen. Its molecular mass is 88 g/mol. What is its molecular formula?

_____

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