GENERAL

molecular mass and percent composition worksheet answers

Published: September 3, 2026 | Index ID: #-

Understanding Molecular Mass and Percent Composition: A Complete Guide with Worksheet Answers

In chemistry, mastering the concepts of molecular mass and percent composition is essential for students, teachers, and anyone who wants to excel in the subject. These topics form the backbone of stoichiometry, chemical analysis, and many real world applications. However, many learners find the calculations confusing and often struggle to find reliable worksheet answers. This article provides a comprehensive, step by step explanation, practical examples, and a collection of worksheet answers that will help you master both molecular mass and percent composition.

Why Molecular Mass and Percent Composition Matter

When you learn how to calculate the **molecular mass** (also called the molecular weight) of a compound, you gain insight into how atoms combine to form molecules. Knowing the **percent composition**tells you how much each element contributes to a compound's mass, which is crucial in analytical chemistry, pharmaceuticals, and environmental science.

These skills are also foundational for:

- Determining empirical and molecular formulas
- Balancing chemical equations accurately
- Predicting reaction yields
- Designing new materials and drugs
- Interpreting mass spectrometry data

Because of their importance, many teachers provide **worksheet answers**so students can check their work. The following sections will walk you through the theory, show you how to solve problems, and give you ready made worksheet answers for practice.

1. The Basics of Molecular Mass

1.1 What Is Molecular Mass?

Molecular mass is the sum of the masses of all atoms in a molecule. It is typically expressed in atomic mass units (amu) or daltons (Da). The atomic mass of each element is available on the periodic table; it is the weighted average of the masses of all naturally occurring isotopes.

1.2 How to Calculate Molecular Mass

1. Write the chemical formula of the compound.
2. Identify each element and count how many atoms of each element are present.
3. Multiply the number of atoms by the atomic mass of the corresponding element.
4. Add the partial sums together to obtain the total molecular mass.

Example:

Compound: *H₂O* (water)

- Hydrogen (H): 1.008 /amu × 2 = 2.016 /amu
- Oxygen (O): 15.999 /amu × 1 = 15.999 /amu
- Total = 2.016 /amu + 15.999 /amu = 18.015 /amu

Thus, the molecular mass of water is 18.015 /amu.

1.3 Common Mistakes to Avoid

- Using the wrong atomic mass (e.g., using the relative atomic mass instead of the exact mass).
- Forgetting to account for all atoms in the formula.
- Mixing up the order of operations—always multiply before adding.
- Failing to round to the appropriate number of significant figures.

2. Percent Composition: What It Is and Why It Matters

2.1 Definition

The percent composition of a compound is the mass percentage of each element that makes up the compound. It is calculated by dividing the mass contributed by a particular element by the total mass of the compound and then multiplying by 100.

2.2 Formula for Percent Composition

For an element X in a compound:

Percent X = (Mass of X in the compound ÷ Total mass of the compound) × 100%

2.3 Step by Step Calculation

1. Determine the molecular mass of the compound (see Section /1).
2. Calculate the mass contributed by each element (number of atoms × atomic mass).
3. Divide each element's mass by the total molecular mass.
4. Multiply the result by 100 to get the percent composition.

Example:

Compound: *C₂H₅OH* (ethanol)

- Carbon (C): 12.011 /amu × 2 = 24.022 /amu
- Hydrogen (H): 1.008 /amu × 6 = 6.048 /amu
- Oxygen (O): 15.999 /amu × 1 = 15.999 /amu
- Total molecular mass = 24.022 + 6.048 + 15.999 = 46.069 /amu
- Percent C = (24.022 ÷ 46.069) × 100 "H 52.1%
- Percent H = (6.048 ÷ 46.069) × 100 "H 13.1%
- Percent O = (15.999 ÷ 46.069) × 100 "H 34.8%

2.4 Common Pitfalls

- Not converting the formula into the correct number of atoms (e.g., forgetting that OH contains one oxygen).
- Using an approximate atomic mass that is too far from the actual value.
- Failing to use the same number of significant figures in the final answer.

3. Putting It All Together: Sample Worksheet Problems with Answers

Below, you'll find a series of practice problems that cover both molecular mass and percent composition. Each

problem is followed by a detailed solution and the final answer. Use these as a study aid or to test your knowledge.

Problem 1: Molecular Mass of Calcium Carbonate

Calculate the molecular mass of *CaCO₃*.

Answer:

- Calcium (Ca): 40.078 /amu × 1 = 40.078 /amu
- Carbon (C): 12.011 /amu × 1 = 12.011 /amu
- Oxygen (O): 15.999 /amu × 3 = 47.997 /amu
- Total = 40.078 + 12.011 + 47.997 = 100.086 /amu
- Result: 100.086 /amu

Problem 2: Percent Composition of Glucose

Determine the percent composition of *C₆H₁₂O₆*.

Answer:

- Carbon: 12.011 /amu × 6 = 72.066 /amu
- Hydrogen: 1.008 /amu × 12 = 12.096 /amu
- Oxygen: 15.999 /amu × 6 = 95.994 /amu
- Total molecular mass = 72.066 + 12.096 + 95.994 = 180.156 /amu
- Percent C = (72.066 ÷ 180.156) × 100 "H 40.0%
- Percent H = (12.096 ÷ 180.156) × 100 "H 6.7%
- Percent O = (95.994 ÷ 180.156) × 100 "H 53.3%
- Result: C /"H /40.0%, H /"H /6.7%, O /"H /53.3%

Problem 3: Molecular Mass of Sulfuric Acid

Find the molecular mass of *H₂SO₄*.

Answer:

- Hydrogen: 1.008 /amu × 2 = 2.016 /amu
- Sulfur: 32.065 /amu × 1 = 32.065 /amu
- Oxygen: 15.999 /amu × 4 = 63.996 /amu
- Total = 2.016 + 32.065 + 63.996 = 98.077 /amu
- Result: 98.077 /amu

Problem 4: Percent Composition of Sodium Chloride

Calculate the percent composition of *NaCl*.

Answer:

- Sodium (Na): 22.990 /amu × 1 = 22.990 /amu
- Chlorine (Cl): 35.453 /amu × 1 = 35.453 /amu
- Total = 22.990 + 35.453 = 58.443 /amu
- Percent Na = (22.990 ÷ 58.443) × 100 "H 39.3%
- Percent Cl = (35.453 ÷ 58.443) × 100 "H 60.7%
- Result: Na /"H /39.3%, Cl /"H /60.7%

Problem 5: Molecular Mass of Ammonium Nitrate

Determine the molecular mass of *(NH₄)NO₃*.

Answer:

- Ammonium (NH4):

N: 14.007 /amu × 1 = 14.007 /amu

- N: 14.007 /amu × 1 = 14.007 /amu
- O: 15.999 /amu × 3 = 47.997 /amu

Problem 6: Percent Composition of Potassium Permanganate

Find the percent composition of *KMnO₄*.

Answer:

- Potassium (K): 39.098 /amu × 1 = 39.098 /amu
- Manganese (Mn): 54.938 /amu × 1 = 54.938 /amu
- Oxygen (O): 15.999 /amu × 4 = 63.996 /amu
- Total = 39.098 + 54.938 + 63.996 = 158.032 /amu
- Percent K = (39.098 ÷ 158.032) × 100 "H 24.8%
- Percent Mn = (54.938 ÷ 158.032) × 100 "H 34.8%
- Percent O = (63.996 ÷ 158.032) × 100 "H 40.4%
- Result: K /"H /24.8%, Mn /"H /34.8%, O /"H /40.4%

Baca Juga (Artikel Terkait)

• **advanced engineering electromagnetics solution manual edition hardcover by balanis constantine a published by wiley**

URL: http://www.denniswildberger.com/advanced-engineering-electromagnetics-solution-manual-edition-hardcover-by-balanis-constantine-a-published-by-wiley.pdf

• **advanced engineering electromagnetics solutions manual**

URL: http://www.denniswildberger.com/advanced-engineering-electromagnetics-solutions-manual.pdf

• **advanced engineering electromagnetics wiley 1989 grading**

URL: http://www.denniswildberger.com/advanced-engineering-electromagnetics-wiley-1989-grading.pdf

• **advanced engineering fluid mechanics by biswas**

URL: http://www.denniswildberger.com/advanced-engineering-fluid-mechanics-by-biswas.pdf

Tags: #molecular #mass #percent #composition #worksheet #answers