Chemistry Molecular Formula Worksheet Answers

Name: KEY ⁄ 15 Pts.

Chemistry Practice: Writing Chemical Formulas

Write a chemical formula for each substance.

1.	$NaCl$	sodium chloride	39.	$Ca(NO_2)_2$	calcium nitrate
2.	N_2O_5	dinitrogen pentoxide	40.	SO_3	sulfur trioxide
3.	H_2S	hydrosulfuric acid	41.	KCN	potassium cyanide
4.	K_2SO_4	potassium sulfate	42.	$Pb(NO_3)_2$	lead(II) nitrate
5.	$H_2C_2O_4$	oxalic acid	43.	H_2S	hydrogen sulfide
6.	$Ag_2C_2H_3O_2$	silver acetate	44.	$CoCl_3$	cobalt(III) chloride
7.	$Cr(NO_3)_2$	chromium(III) nitrate	45.	SF_6	sulfur hexafluoride
8.	$HC_2H_3O_2$	acetic acid	46.	Ca_3N_2	calcium nitride
9.	$(NH_4)_2CO_3$	ammonium carbonate	47.	CuI	copper(I) iodide
10.	$Ca(OH)_2$	calcium hydroxide	48.	SiO_2	silicon dioxide
11.	$H_2C_4H_4O_6$	tartaric acid	49.	$Sn(C_2H_3O_2)_4$	tin(IV) acetate
12.	$Hg(NO_3)_2$	mercury(II) nitrate	50.	CCl_4	carbon tetrachloride
13.	N_2O	dinitrogen monoxide	51.	CuS	copper(II) sulfide
14.	Fe_2O_3	iron(III) oxide	52.	$Pb_3(PO_4)_2$	lead(II) phosphate
15.	$Pb(ClO_3)_2$	lead(II) chlorate	53.	$XeCl_4$	xenon tetrachloride
16.	$(NH_4)_3PO_4$	ammonium phosphate	54.	Rb_2O	rubidium oxide
17.	$ZnCl_2$	zinc chloride	55.	$MgSe$	magnesium selenide
18.	$Ca_3(PO_4)_2$	calcium phosphate	56.	NH_4Cl	ammonium chloride
19.	OF_2	oxygen difluoride	57.	$Fe(C_2H_3O_2)_3$	iron(III) acetate
20.	NaN_3	sodium azide	58.	$K_2Cr_2O_7$	potassium dichromate
21.	$Fe_2(SO_4)_3$	iron(III) sulfate	59.	PBr_3	phosphorous tribromide
22.	H_3AsO_3	arsenous acid	60.	Na_3PO_3	sodium phosphite
23.	Cr_2O_3	chromium(III) oxide	61.	Na_3PO_4	sodium phosphate
24.	N_2O_4	dinitrogen tetroxide	62.	$Hg_2(NO_3)_2$	mercury(II) nitrate
25.	NH_4NO_3	ammonium nitrate	63.	$LiHCO_3$	lithium bicarbonate
26.	$AuBr_3$	gold(III) bromide	64.	CrF_3	chromium(III) fluoride
27.	CO	carbon monoxide	65.	PbI_2	lead(II) iodide
28.	K_2CO_3	potassium carbonate	66.	H_2SO_3	sulfurous acid
29.	HIO_3	iodic acid	67.	SnF_2	tin(II) fluoride
30.	$CsCl$	cesium chloride	68.	Hg_2CrO_4	mercury(II) chromate
31.	$Ni(MnO_4)_2$	nickel(II) permanganate	69.	KNO_3	potassium nitrate
32.	$Al_2(SO_4)_3$	aluminum sulfate	70.	$SrCl_2$	strontium chloride
33.	$Al_2(SO_3)_3$	aluminum sulfite	71.	P_4O_{10}	tetraphosphorous decoxide
34.	$Ba(C_2H_3O_2)_2$	barium acetate	72.	KNO_3	potassium nitrate
35.	$Mn(OH)_3$	manganese(III) hydroxide	73.	KNO_2	potassium nitrite
36.	KH_2PO_4	potassium dihydrogen phosphate	74.	K_3N	potassium nitride
37.	HF	hydrofluoric acid	75.	CaO	calcium oxide
38.	$Al(BrO_3)_3$	aluminum bromate	76.	$Fe(IO_4)_2$	iron(II) periodate

Chemistry molecular formula worksheet answers are essential resources for students and educators alike, helping to clarify the often complex concepts surrounding molecular formulas in chemistry. Understanding molecular formulas is fundamental in various fields, including organic chemistry, biochemistry, and materials science. This article will delve into the significance of molecular formulas, how to derive them, and provide guidance on solving related worksheet problems, with a focus on interpreting the answers effectively.

Understanding Molecular Formulas

Molecular formulas provide a way to represent the composition of a substance at the molecular level. They indicate the types and numbers of atoms present in a molecule. For example, the molecular formula for water is H_2O, which reveals that each molecule consists of two hydrogen atoms and one oxygen atom.

Components of Molecular Formulas

1. Symbols: Each type of atom in a molecule is represented by its chemical symbol, derived from the periodic table (e.g., H for hydrogen, O for oxygen).
2. Subscripts: Numbers written below and to the right of each symbol indicate the number of atoms of that element in the molecule. In H_2O, the "2" indicates there are two hydrogen atoms.
3. Coefficients: If a formula includes a coefficient (e.g., $3H_2O$), it indicates that there are three molecules of water.

In some cases, molecular formulas can also include parentheses to denote groups of atoms bonded together, especially in larger molecules. For example, in calcium hydroxide, the formula is written as $Ca(OH)_2$, indicating that there are two hydroxide ions (OH^-) for each calcium ion (Ca^{2+}).

Steps to Determine Molecular Formulas

Determining the molecular formula of a compound often involves several steps:

1. Identify the Compound: Determine the name or structure of the compound in question.
2. Determine the Empirical Formula: This is the simplest ratio of atoms in the compound. For example, the empirical formula for glucose ($C_6H_{12}O_6$) is CH_2O.
3. Calculate the Molar Mass: Find the molar mass of both the empirical formula and the molecular formula.
4. Use Molar Mass to Find Molecular Formula: Divide the molar mass of the compound by the molar mass of the empirical formula to find a multiplier. Multiply the subscripts in the empirical formula by this number to get the molecular formula.

Example Problem

Let’s illustrate this process with an example:

1. Find the empirical formula: Suppose you have a compound with a composition of 40% carbon, 6.7%

hydrogen, and 53.3% oxygen. The empirical formula can be calculated based on the mole ratio of each element.
2. Calculate the molar mass of the empirical formula: If the empirical formula is CH_2O, the molar mass is approximately 30 g/mol.
3. Given molar mass: If the molar mass of the compound is 180 g/mol, divide this by the empirical formula mass (180 g/mol ÷ 30 g/mol = 6).
4. Determine the molecular formula: Multiply the subscripts in the empirical formula by 6, resulting in $C_6H_{12}O_6$.

Worksheet Answers for Molecular Formulas

When solving molecular formula worksheets, answers typically require a combination of understanding and calculation. Here are some common types of questions you might find on worksheets, along with their solutions.

Common Worksheet Questions

- Determine the molecular formula from the empirical formula.
- Identify the molecular formula given a percentage composition of elements.
- Convert a structural formula into a molecular formula.
- Identify the number of moles of each element in a given mass of a compound.

Example Worksheet Problems and Solutions

1. Given the empirical formula CH_3, what is the molecular formula if the molar mass is 78 g/mol?
- Empirical formula mass = 12 + (3 x 1) = 15 g/mol.
- 78 g/mol ÷ 15 g/mol = 5.2 (round to 5).
- Molecular formula = C_5H_{15}.

2. A compound contains 52% carbon, 13% hydrogen, and 35% oxygen. Calculate the molecular formula.
- Convert percentages to grams (assume 100 g total).
- Moles of C = 52 g / 12 g/mol = 4.33; H = 13 g / 1 g/mol = 13; O = 35 g / 16 g/mol = 2.19.
- Divide by the smallest number of moles (2.19) to find the ratio:
- C = 1.98 ≈ 2; H = 5.94 ≈ 6; O = 1.
- Empirical formula = C_2H_6O.
- If molar mass is 46 g/mol, empirical mass = 46 g/mol.
- Molecular formula = C_2H_6O.

Resources for Molecular Formula Practice

To enhance understanding and practice solving molecular formula problems, several resources are available:

1. Online Interactive Tutorials: Websites like Khan Academy and Coursera offer courses on chemistry topics, including molecular formulas.
2. Chemistry Textbooks: Many textbooks provide practice problems and explanations. Look for those that include answer keys.
3. Worksheet Generators: Websites that generate custom chemistry worksheets can be beneficial for additional practice.
4. Study Groups and Tutoring: Collaborating with peers or seeking help from a tutor can reinforce concepts and problem-solving techniques.

Conclusion

In conclusion, mastering the concept of molecular formulas is crucial for students studying chemistry. Understanding how to derive and interpret molecular formulas not only aids in completing worksheets but also lays the groundwork for more advanced chemistry topics. By utilizing various resources and practicing problem-solving techniques, students can enhance their skills and confidence in this essential area of science. Remember, the key to success is consistent practice and seeking clarification on complex topics when needed.

Frequently Asked Questions

What is a molecular formula, and how is it different from an empirical formula?

A molecular formula indicates the actual number of each type of atom in a molecule, while an empirical formula shows the simplest ratio of the elements. For example, the molecular formula for glucose is C6H12O6, and its empirical formula is CH2O.

How can I determine the molecular formula from a given empirical formula?

To determine the molecular formula from an empirical formula, you need to know the molar mass of the compound. Divide the molar mass by the empirical formula mass and multiply the subscripts in the empirical formula by this ratio.

What are some common mistakes to avoid when calculating molecular formulas?

Common mistakes include forgetting to convert grams to moles, miscalculating the molar mass, and incorrectly applying the ratio when deriving the molecular formula from the empirical formula.

Where can I find practice worksheets for molecular formulas?

Practice worksheets for molecular formulas can be found on educational websites, chemistry textbooks, and online resources like Khan Academy or Quizlet, which offer a variety of exercises and answer keys.

What is the significance of understanding molecular formulas in chemistry?

Understanding molecular formulas is crucial for predicting the properties of substances, balancing chemical equations, and conducting experiments, as they provide essential information about the composition and structure of molecules.

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