

Counting Atoms Worksheet Answer Key PDF

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Part 1: Building a Foundation

What does the subscript '2' indicate in the chemical formula H_2O ?

undefined. A) Two molecules of water

undefined. B) Two atoms of hydrogen ✓

undefined. C) Two atoms of oxygen

undefined. D) Two moles of water

The subscript '2' indicates that there are two atoms of hydrogen in the molecule.

Which of the following are polyatomic ions?

undefined. A) NO_3^- ✓

undefined. B) Cl^-

undefined. C) SO_4^{2-} ✓

undefined. D) H_2O

Polyatomic ions are ions that consist of more than one atom. NO_3^- and SO_4^{2-} are examples.

Explain the role of coefficients in a chemical equation and how they differ from subscripts.

Coefficients indicate the number of molecules or moles of a substance, while subscripts indicate the number of atoms in a molecule.

List the chemical symbols for the following elements:

1. Oxygen

O

2. Sodium

Na

3. Carbon

C

4. Iron

Fe

The chemical symbols for the elements are O for Oxygen, Na for Sodium, C for Carbon, and Fe for Iron.

Part 2: Understanding and Interpretation

In the formula $\text{Ca}(\text{OH})_2$, how many oxygen atoms are present?

undefined. A) 1

undefined. B) 2 ✓

undefined. C) 3

undefined. D) 4

There are 2 oxygen atoms present in the formula $\text{Ca}(\text{OH})_2$.

Which statements are true about the formula $2\text{H}_2\text{O}$?

undefined. A) It contains two molecules of water. ✓

undefined. B) It contains four hydrogen atoms in total. ✓

undefined. C) It contains two oxygen atoms in total. ✓

undefined. D) It represents two moles of water.

The formula $2\text{H}_2\text{O}$ indicates that there are two molecules of water, which means four hydrogen atoms and two oxygen atoms in total.

Describe how parentheses are used in chemical formulas and provide an example.

Parentheses are used to group atoms in a formula, indicating that the atoms within the parentheses are treated as a unit. For example, in $\text{Ca}(\text{OH})_2$, the OH group is treated as one unit.

Part 3: Application and Analysis

If you have 3 moles of $\text{Al}_2(\text{SO}_4)_3$, how many sulfur atoms do you have in total?

undefined. A) 3

undefined. B) 6

undefined. C) 9 ✓

undefined. D) 12

There are 9 sulfur atoms in total from 3 moles of $\text{Al}_2(\text{SO}_4)_3$.

Given the reaction: $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$, which of the following are true?

undefined. A) The reaction produces two molecules of water. ✓

undefined. B) Four hydrogen atoms are consumed. ✓

undefined. C) Two oxygen atoms are consumed. ✓

undefined. D) The total number of oxygen atoms remains the same.

The reaction produces two molecules of water, consumes four hydrogen atoms, and two oxygen atoms.

Calculate the total number of atoms in one molecule of $\text{C}_6\text{H}_{12}\text{O}_6$ and explain your process.

In one molecule of $\text{C}_6\text{H}_{12}\text{O}_6$, there are 6 carbon atoms, 12 hydrogen atoms, and 6 oxygen atoms, totaling 24 atoms.

Which of the following correctly describes the composition of $(\text{NH}_4)_2\text{CO}_3$?

undefined. A) 2 nitrogen, 8 hydrogen, 1 carbon, 3 oxygen ✓

undefined. B) 1 nitrogen, 4 hydrogen, 1 carbon, 3 oxygen

undefined. C) 2 nitrogen, 4 hydrogen, 1 carbon, 3 oxygen

undefined. D) 2 nitrogen, 8 hydrogen, 2 carbon, 3 oxygen

The correct composition is 2 nitrogen, 8 hydrogen, 1 carbon, and 3 oxygen.

Part 4: Evaluation and Creation

Evaluate the following statements about chemical reactions. Which are true?

undefined. A) Atoms are rearranged during a chemical reaction. ✓

undefined. **B) The total mass of reactants equals the total mass of products. ✓**

undefined. C) New atoms are created in a chemical reaction.

undefined. D) Chemical reactions can change the type of atoms present.

Atoms are rearranged during a chemical reaction, and the total mass of reactants equals the total mass of products.

Explain how the law of conservation of mass applies to the chemical equation: $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$.

The law of conservation of mass states that matter cannot be created or destroyed. In the equation, the number of atoms of each element is the same on both sides.

Design a simple experiment to demonstrate the conservation of mass using household materials. Describe the materials, procedure, and expected outcome.

An example experiment could involve mixing vinegar and baking soda in a closed container to observe gas production while measuring the mass before and after the reaction.