

Balancing Chemical Reactions Worksheet Answer Key PDF

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Part 1: Building a Foundation

What is the law that states atoms are neither created nor destroyed in a chemical reaction?

undefined. A) Law of Conservation of Energy

undefined. B) Law of Conservation of Mass ✓

undefined. C) Law of Thermodynamics

undefined. D) Law of Chemical Equilibrium

The correct answer is the Law of Conservation of Mass.

Which of the following are reactants in the chemical equation $\text{C}_3\text{H}_8 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$?

undefined. A) C_3H_8 ✓

undefined. B) O_2 ✓

undefined. C) CO_2

undefined. D) H_2O

The reactants are C_3H_8 and O_2 .

Explain why coefficients are used in balancing chemical equations instead of changing subscripts.

Coefficients are used to balance equations because changing subscripts alters the identity of the compounds involved.

List the four types of chemical reactions.

1. Type 1

Synthesis

2. Type 2

Decomposition

3. Type 3

Single Replacement

4. Type 4

Double Replacement

The four types of chemical reactions are synthesis, decomposition, single replacement, and double replacement.

Part 2: Understanding and Interpretation

Which symbol in a chemical equation indicates the direction of the reaction?

undefined. A) Plus sign (+)

undefined. B) Equal sign (=)

undefined. C) Arrow (\rightarrow) ✓

undefined. D) Minus sign (-)

The arrow (\rightarrow) indicates the direction of the reaction.

In the reaction $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$, which of the following statements are true?

undefined. A) The number of hydrogen atoms is balanced. ✓

undefined. B) The number of chlorine atoms is balanced. ✓

undefined. C) The reaction is a synthesis reaction. ✓

undefined. D) The reaction is a decomposition reaction.

The number of hydrogen and chlorine atoms is balanced, and the reaction is a synthesis reaction.

Describe the process of balancing a chemical equation step-by-step.

Balancing a chemical equation involves identifying the number of atoms of each element, adjusting coefficients, and ensuring both sides of the equation are equal.

Part 3: Application and Analysis

Which coefficient would balance the equation $\text{N}_2 + \text{H}_2 \rightarrow \text{NH}_3$?

undefined. A) 1

undefined. B) 2 ✓

undefined. C) 3

undefined. D) 4

The coefficient that balances the equation is 2 for NH_3 .

Given the unbalanced equation $\text{Fe} + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3$, which steps would you take to balance it?

undefined. A) Balance iron atoms first. ✓

undefined. B) Balance oxygen atoms first.

undefined. C) Use a coefficient of 4 for Fe .

undefined. D) Use a coefficient of 3 for O_2 .

You would balance iron atoms first, then oxygen atoms.

Balance the following chemical equation: $\text{C}_4\text{H}_{10} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$.

The balanced equation is $2\text{C}_4\text{H}_{10} + 13\text{O}_2 \rightarrow 8\text{CO}_2 + 10\text{H}_2\text{O}$.

In the balanced equation $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$, what is the mole ratio of H_2 to O_2 ?

undefined. A) 1:1

undefined. B) 2:1 ✓

undefined. C) 1:2

undefined. D) 2:2

The mole ratio of H_2 to O_2 is 2:1.

Analyze the following unbalanced equation: $\text{Al} + \text{HCl} \rightarrow \text{AlCl}_3 + \text{H}_2$. Which elements need more atoms to balance the equation?

undefined. A) Aluminum (Al) ✓

undefined. B) Hydrogen (H) ✓

undefined. C) Chlorine (Cl) ✓

undefined. D) All of the above ✓

Aluminum, hydrogen, and chlorine all need more atoms to balance the equation.

Analyze the reaction $\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4 + \text{NaCl}$ and explain why it is considered a double replacement reaction.

This reaction is a double replacement because the cations and anions exchange partners to form new compounds.

Part 4: Evaluation and Creation

Which of the following statements best evaluates the importance of balancing chemical equations?

undefined. A) It ensures the correct physical state of reactants.

undefined. B) It predicts the color change in reactions.

undefined. C) It ensures the conservation of mass. ✓

undefined. D) It determines the temperature of the reaction.

Balancing chemical equations ensures the conservation of mass.

Evaluate the balanced equation $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$. Which of the following are true?

undefined. A) The reaction is a decomposition reaction. ✓

undefined. B) The number of potassium atoms is balanced. ✓

undefined. C) The number of oxygen atoms is not balanced.

undefined. D) The reaction releases oxygen gas. ✓

The reaction is a decomposition reaction, and the number of potassium atoms is balanced while the reaction releases oxygen gas.

Create a balanced chemical equation for a real-world scenario where vinegar (acetic acid) reacts with baking soda (sodium bicarbonate) to produce carbon dioxide, water, and sodium acetate.

The balanced equation is $\text{CH}_3\text{COOH} + \text{NaHCO}_3 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{CH}_3\text{COONa}$.