

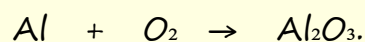


Answer all the questions below and then check your answers.

Rules on How to Balance Chemical Equations

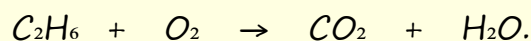
- Write the correct formulas for all reactants and products.
- Count the number of atoms of each element in the reactants and the products.
- Place coefficients in front of the chemical formulas to balance the number of atoms of each element on both sides of the equation.
- If the reactants and products contain a mixture of elements and oxygen or hydrogen atoms balance the oxygen atoms last, the hydrogen atoms second last and balance the other elements present in any order. .
- Check Your Work: Ensure that the same number of atoms of each element are present on both sides of the equation.

1. What does it mean when a chemical equation is balanced?
2. True or False: The equation $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$ is balanced.
3. Balance the following equation:

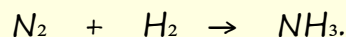


4. Why is it important to balance chemical equations?

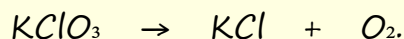
5. Balance the following equation and identify the type of reaction:



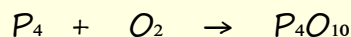
6. Explain the steps you would take to balance the equation:



7. Balance the following equation and explain your process:

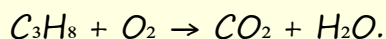


8. Given the unbalanced equation:

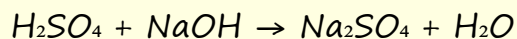


Balance it and describe the type of chemical reaction.

9. Balance the following equation and explain the steps in detail:



10. Balance the following equation:



and describe each step.

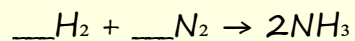
11. Which coefficient would balance the equation: $\text{H}_2 + \text{Cl}_2 \rightarrow \text{HCl}$?

- a) 1 b) 2 c) 3 d) 4

12. In the balanced equation $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$, what is the coefficient of O_2 ?

- a) 1 b) 2 c) 3 d) 4

13. Fill in the gaps to balance the equation



Answers

Rules on How to Balance Chemical Equations

- Write the correct formulas for all reactants and products.
- Count the number of atoms of each element in the reactants and the products.
- Place coefficients in front of the chemical formulas to balance the number of atoms of each element on both sides of the equation.
- If the reactants and products contain a mixture of elements and oxygen or hydrogen atoms balance the oxygen atoms last, the hydrogen atoms second last and balance the other elements present in any order. .
- Check Your Work: Ensure that the same number of atoms of each element are present on both sides of the equation.

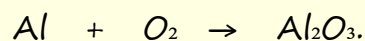
1. What does it mean when a chemical equation is balanced?

Answer: It means that the number of atoms of each element is the same on both the reactant and product sides of the equation.

2. True or False: The equation $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$ is balanced.

Answer: False

3. Balance the following equation:

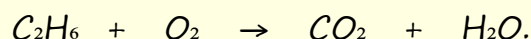


Answer: $4\text{Al} + 3\text{O}_2 \rightarrow 2\text{Al}_2\text{O}_3$

4. Why is it important to balance chemical equations?

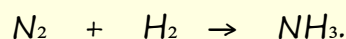
Answer: It is important to balance chemical equations to obey the Law of Conservation of Mass, which states that matter cannot be created or destroyed in a chemical reaction. Balanced equations enable you to calculate the masses of reactants and the masses of products that will be obtained from any given chemical reaction.

5. Balance the following equation and identify the type of reaction:



Answer: $2\text{C}_2\text{H}_6 + 7\text{O}_2 \rightarrow 4\text{CO}_2 + 6\text{H}_2\text{O}.$

6. Explain the steps you would take to balance the equation:



Answer:

Write the unbalanced equation: $\text{N}_2 + \text{H}_2 \rightarrow \text{NH}_3.$

Count the atoms: N: 2 on the left, 1 on the right; H: 2 on the left, 3 on the right.

Place coefficients (numbers) to balance nitrogen: $\text{N}_2 + \text{H}_2 \rightarrow 2\text{NH}_3.$

Recount the atoms: N: 2 on both sides; H: 2 on the left, 6 on the right.

Adjust hydrogen by placing a coefficient: $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3.$

Recheck to confirm the balance: N: 2 on both sides; H: 6 on both sides.

7. Balance the following equation and explain your process:



Answer:

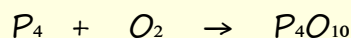
Write the unbalanced equation: $\text{KClO}_3 \rightarrow \text{KCl} + \text{O}_2$.

Count the atoms: K: 1 on both sides; Cl: 1 on both sides; O: 3 on the left, 2 on the right.

Adjust oxygen by placing a number 3 on product side and number 2 on reactant side to balance oxygen atoms.: $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$.

Recheck to confirm if balanced: K: 2 on left side now; Cl: 2 on left sides; O: 6 on both sides. Simply add a 2 in front of the KCl on the product side to balance off the K and Cl atoms.

8. Given the unbalanced equation:



Balance it and describe the type of chemical reaction.

Answer:

Write the unbalanced equation: $\text{P}_4 + \text{O}_2 \rightarrow \text{P}_4\text{O}_{10}$.

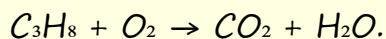
Count the atoms: P: 4 on both sides; O: 2 on the left, 10 on the right.

Adjust oxygen by placing a coefficient: $\text{P}_4 + 5\text{O}_2 \rightarrow \text{P}_4\text{O}_{10}$.

Recheck to confirm the balance: P: 4 on both sides; O: 10 on both sides.

This is a combustion reaction.

9. Balance the following equation and explain the steps in detail:



Answer:

Balance the O and H atoms last. So start with the carbon atoms.

Write the unbalanced equation: $\text{C}_3\text{H}_8 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$.

Count the atoms: C: 3 on the left, 1 on the right; H: 8 on the left, 2 on the right; O: 2 on the left, 3 on the right.

Balance carbon by placing a 3 in front of the CO_2 : $\text{C}_3\text{H}_8 + \text{O}_2 \rightarrow 3\text{CO}_2 + \text{H}_2\text{O}$.

Recount the atoms: C: 3 on both sides; H: 8 on the left, 2 on the right; O: 2 on the left, 7 on the right.

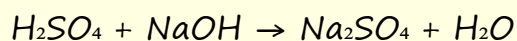
Balance hydrogen by placing a 4: $\text{C}_3\text{H}_8 + \text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$.

Recount the atoms: C: 3 on both sides; H: 8 on both sides; O: 2 on the left, 10 on the right.

Balance oxygen by placing a 5: $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$.

Recheck to confirm the balance: C: 3 on both sides; H: 8 on both sides; O: 10 on both sides.

10. Balance the following equation:



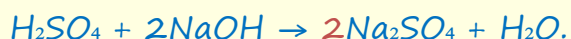
and describe each step.

Answer:

Write the unbalanced equation: $\text{H}_2\text{SO}_4 + \text{NaOH} \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$.

Count the atoms: H: 2 on the left, 2 on the right; S: 1 on both sides; O: 4 on the left, 4 on the right; Na: 1 on the left, 2 on the right.

Adjust sodium by placing a 2 as shown:



Recount the atoms: H: 4 on the left, 2 on the right; S: 1 on both sides; O: 6 on the left, 5 on the right; Na: 2 on both sides.

Adjust hydrogen and oxygen by placing a 2 as shown:



Recheck to confirm the balance: H: 4 on both sides; S: 1 on both sides; O: 6 on both sides; Na: 2 on both sides.

11. Which coefficient would balance the equation: $\text{H}_2 + \text{Cl}_2 \rightarrow \text{HCl}$?

- a) 1 b) 2 c) 3 d) 4

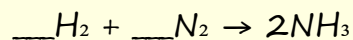
Answer: b) 2

12. In the balanced equation $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$, what is the coefficient of O_2 ?

- a) 1 b) 2 c) 3 d) 4

Answer: a) 1

13. Fill in the gaps to balance the equation



Answer: $3\text{H}_2 + 1\text{N}_2 \rightarrow 2\text{NH}_3$