

Balancing equations and conserving atoms

Grade 8 science (Year 9 · Class 8) · Test

Name: _____ Date: _____ Class: _____ Mark: ____ / 20

This test covers reactants and products, balancing, conservation of atoms and conservation of mass. Show all your working, and write the final balanced equations clearly. You have 45 minutes and the test is worth 20 marks.

Level: Grade 8 science (Year 9 · Class 8) · **Curriculum:** MS-PS1-2, MS-PS1-5

Time: 45 minutes · 8 questions · Total: 20 marks · Calculator allowed

Question 1 Reactants and products (2 marks)

In the reaction $\text{H}_2 + \text{Cl}_2 \rightarrow 2 \text{HCl}$, name the reactants and the product and state the total number of atoms of each element on the left.

Question 2 Balance three equations (3 marks)

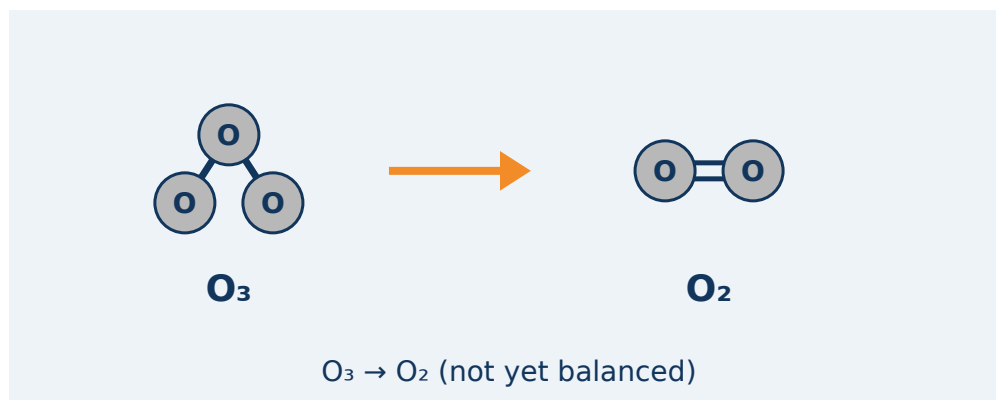
Balance each equation.

- $\text{K} + \text{O}_2 \rightarrow \text{K}_2\text{O}$ (1 mark)
- $\text{Mg} + \text{N}_2 \rightarrow \text{Mg}_3\text{N}_2$ (1 mark)
- $\text{H}_2 + \text{Br}_2 \rightarrow \text{HBr}$ (1 mark)

Question 3 Ozone (3 marks)

Ozone changes to oxygen as shown: $\text{O}_3 \rightarrow \text{O}_2$.

- Count the oxygen atoms on each side. (1 mark)
- Explain why the equation is not balanced. (1 mark)
- Write the balanced equation. (1 mark)



Ozone turning into oxygen.

Question 4 Zinc sulfide (3 marks)

Zinc reacts with sulfur: $\text{Zn} + \text{S} \rightarrow \text{ZnS}$. 13.0 g of zinc reacts with 6.4 g of sulfur.

- Calculate the mass of zinc sulfide formed. (1 mark)
- State the law you used. (1 mark)
- Calculate the mass of zinc sulfide formed from 26.0 g of zinc and enough sulfur, using the ratio. (1 mark)

Question 5 Conservation of atoms (3 marks)

Use the reaction $\text{H}_2 + \text{Cl}_2 \rightarrow 2 \text{HCl}$ to explain why atoms are conserved in a chemical reaction.

Question 6 Spot the error (2 marks)

A student balances $\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$ as $\text{Mg} + \text{O}_2 \rightarrow \text{MgO}_2$. Explain the mistake and write the correct equation.

Question 7 State symbols (2 marks)

$\text{Zn(s)} + 2 \text{HCl(aq)} \rightarrow \text{ZnCl}_2\text{(aq)} + \text{H}_2\text{(g)}$. State what (s), (aq) and (g) mean and identify the gas.

Question 8 Evidence of a reaction (2 marks)

Give four observations that suggest a chemical reaction has happened.