Balancing chemical equations

Name _____ Date _____

Key ideas

Each element must have the same number of atoms on both sides of a balanced equation. Change whole-number coefficients before formulas. Changing subscripts changes the identities of the substances.

Worked examples

Balance $H_2 + O_2 \rightarrow H_2O$.

Put 2 before H_2O to balance oxygen, then 2 before H_2 to balance hydrogen: $2H_2 + O_2 \rightarrow 2H_2O$.

Balance $Na + Cl_2 \rightarrow NaCl$.

Each Cl_2 molecule supplies two chlorine atoms, so place 2 before NaCl and 2 before Na: $2Na + Cl_2 \rightarrow 2NaCl$.

Practice questions

Show your reasoning. Each question is worth 2 marks.

1. Count the oxygen atoms represented by $3CO_2$. Explain your count.

2. Count the hydrogen atoms represented by $2NH_3$. Explain your count.

3. Explain why changing H_2O to H_2O_2 cannot balance an equation for making water.

4. Balance $Mg + O_2 \rightarrow MgO$. Verify the atom counts.

5. Balance $Al + Cl_2 \rightarrow AlCl_3$ using the smallest whole-number coefficients.

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6. Balance $N_2 + H_2 \rightarrow NH_3$. Verify the hydrogen atom count.

7. Balance $Ca + H_2O \rightarrow Ca(OH)_2 + H_2$. Verify hydrogen and oxygen.

8. Balance $Fe_2O_3 + CO \rightarrow Fe + CO_2$. Verify the oxygen count.

9. Balance $C_3H_8 + O_2 \rightarrow CO_2 + H_2O$. Explain how you obtained the oxygen coefficient.

10. Balance $Al + HCl \rightarrow AlCl_3 + H_2$. Verify all three elements.