

What are Single Displacement Reactions?

Worksheet

A single displacement reaction involves one element replacing another in a compound: $A + BC \rightarrow AC + B$. Only a more active element can displace a less active one. Example: $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$ (iron displaces copper).

Questions

1. Which equation shows single displacement?

- A) $2H_2 + O_2 \rightarrow 2H_2O$
- B) $Zn + HCl \rightarrow ZnCl_2 + H_2$
- C) $CaCO_3 \rightarrow CaO + CO_2$
- D) $2Na + Cl_2 \rightarrow 2NaCl$

2. In $A + BC \rightarrow AC + B$, what happens?

- A) A and B combine
- B) A replaces C
- C) A replaces B
- D) B and C combine

3. Can copper displace hydrogen from HCl?

- A) Yes, always
- B) No, hydrogen is more active
- C) Yes, if heated
- D) Only in solution

4. In $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$, why does Fe displace Cu?

- A) Fe is lighter
- B) Fe is more active (loses electrons easier)
- C) Cu is unstable
- D) Fe is larger

5. Iron (Fe) reacts with copper sulfate (CuSO₄). Iron is more active than copper, so it displaces it. Write and balance.

6. Zinc (Zn) is more active than hydrogen. When Zn reacts with HCl, Zn displaces H. Write the balanced equation.

7. Magnesium (Mg) is more active than zinc. When Mg reacts with ZnCl₂, Mg displaces Zn. Balance this.

8. Define: What is a single displacement reaction?

9. Define: What is the activity series?

10. Define: Can copper displace zinc?

Answer Key

1. B) $\text{Zn} + \text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$ - Zn + HCl \rightarrow ZnCl₂ + H₂ shows Zn replacing H in the compound.
2. C) A replaces B - Element A is more active and displaces element B from compound BC.
3. B) No, hydrogen is more active - Hydrogen is more active than copper in the activity series.
4. B) Fe is more active (loses electrons easier) - Iron is higher in the activity series than copper, so it can displace it.
5. Unbalanced: $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$ Fe: 1 on each side Cu: 1 on each side S: 1 on each side O: 4 on each side Balanced: $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$
6. Unbalanced: $\text{Zn} + \text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$ Zn: 1 on each side H: 1 on left, 2 on right (unbalanced) Cl: 1 on left, 2 on right (unbalanced) Balance: need 2 HCl on left, 1 H₂ on right Balanced: $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$
7. Unbalanced: $\text{Mg} + \text{ZnCl}_2 \rightarrow \text{MgCl}_2 + \text{Zn}$ Mg: 1 on each side Zn: 1 on each side Cl: 2 on each side Balanced: $\text{Mg} + \text{ZnCl}_2 \rightarrow \text{MgCl}_2 + \text{Zn}$
8. One element replaces another in a compound: $\text{A} + \text{BC} \rightarrow \text{AC} + \text{B}$. Only more active elements can displace less active ones.
9. A ranking of elements by their tendency to lose electrons. More active elements are higher and can displace less active ones.
10. No. Zinc is more active, so zinc can displace copper, but not the reverse.

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