

CAIE Chemistry IGCSE

9.4 Reactivity series

Flashcards

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What is the order of the reactivity series
and how can this order be deduced?



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The order can be deduced by the different metals reactions with acid, water and reduction with carbon.

Potassium
Sodium
Calcium
Magnesium
Aluminium
(Carbon)
Zinc
Iron
(Hydrogen)
Copper
Silver
Gold



Describe the reaction between
potassium and cold water



Describe the reaction between potassium and cold water

- The most violent/vigorous reaction with cold water since it is at the top of the reactivity series
- Potassium melts and floats, moving rapidly on the surface of the water. A lilac flame will also ignite
- Potassium + Water \rightarrow Potassium hydroxide + Hydrogen
- $2\text{K (s)} + 2\text{H}_2\text{O (l)} \rightarrow 2\text{KOH (aq)} + \text{H}_2 \text{ (g)}$



Describe the reaction between sodium
and cold water



Describe the reaction between sodium and cold water

- Less vigorous reaction with cold water than potassium since it is below K in the reactivity series
- Sodium melts to form a ball that moves around on the surface and fizzes rapidly before it disappears
- Sodium + Water \rightarrow Sodium hydroxide + Hydrogen
- $2\text{Na (s)} + 2\text{H}_2\text{O (l)} \rightarrow 2\text{NaOH (aq)} + \text{H}_2\text{(g)}$



Describe the reaction between calcium
and cold water



Describe the reaction between calcium and cold water

- Least vigorous reaction with cold water out of K and Na since it is below both in the reactivity series
- Reaction is slower and less violent: metal sinks in water and after an hour or so bubbles of hydrogen gas can be seen on the surface of the metal.
- Calcium + Water \rightarrow Calcium hydroxide + Hydrogen
- $\text{Ca (s)} + 2\text{H}_2\text{O (g)} \rightarrow \text{Ca(OH)}_2 \text{(aq)} + \text{H}_2 \text{(g)}$



Describe the reaction between
magnesium and steam



Describe the reaction between magnesium and steam

- Magnesium oxide and hydrogen gas will form
- Magnesium + Steam \rightarrow Magnesium oxide + Hydrogen
- $\text{Mg (s)} + \text{H}_2\text{O (g)} \rightarrow \text{MgO (s)} + \text{H}_2\text{(g)}$



Describe the reaction between the 3 most reactive metals in the reactivity series with dilute HCl



Describe the reaction between the 3 most reactive metals in the reactivity series with dilute HCl

Potassium, sodium and calcium are very reactive so this reaction can ignite, causing an explosion, so is too dangerous to be done in the school lab.



Which metals in the reactivity series will react with dilute HCl?



Which metals in the reactivity series will react with dilute HCl?

- Only metals above hydrogen will react with dilute acids.
- Magnesium- fast reaction
- Zinc and Iron- slightly fast reaction
- Copper, silver and gold- no reaction as below hydrogen in the reactivity series



How could the order of reactivity be deduced from experimental results?



How could the order of reactivity be deduced from experimental results?

- In a displacement reaction, the more reactive metal will replace the less reactive metal in a compound
- A less vigorous and slow reaction will usually mean a lower reactivity whereas lots of effervescence (bubbles/fizzing) and quicker reactions are usually higher in the reactivity series
- Only metals above hydrogen will react with dilute acids



What is meant by the reactivity of metals?

(extended only)



What is meant by the reactivity of metals?
(extended only)

The tendency of a metal atom to lose electrons and form its positive ion.



Describe the reaction between iron and
calcium oxide
(extended only)



Describe the reaction between iron and calcium oxide (**extended only**)

- No reaction will occur
- Iron is lower than calcium in the reactivity series so cannot displace calcium



Describe the reaction between sodium
and magnesium oxide
(extended only)



Describe the reaction between sodium and magnesium oxide (extended only)

- Sodium will displace magnesium to form sodium oxide
- Sodium is higher in the reactivity series than magnesium



Why doesn't aluminium appear to undergo oxidation? (extended only)



Why doesn't aluminium appear to undergo oxidation? (extended only)

Aluminium reacts with oxygen in the air to form aluminium oxide (Al_2O_3). This very unreactive oxide coats the surface of the metal, preventing any further oxidation.

