GCSE WJEC

# The reactivity series of metals

## Metal extraction and the reactivity series

The method used to extract metals depends on the reactivity of the metal. The reactivity series allows us to predict how metals will react.

Part of Chemistry (Single Science) | Metals and their extraction





## Pages



## Metal extraction and the reactivity series

Metals are extracted from ores, which are minerals found in the Earth's crust that contain metal compounds. Examples of ores include:

- haematite ($Fe_2O_3$)
- bauxite ($Al_2O_3$)

- galena (PbS)

The method used to extract a metal from its ore depends upon the stability of its compound in the ore, which in turn depends upon the reactivity of the metal.

- **Very reactive** metals, such as aluminium, form **stable** oxides and other compounds. Electrolysis is commonly used to extract these metals and requires a lot of electric current (energy) to reduce them to extract the metal.
- **Less reactive** metals, such as iron, form **less stable** oxides and other compounds. Reduction with carbon is often used to extract these metals and requires less energy to reduce them to extract the metal.

Therefore, the method of extraction of a metal from its ore depends on the metal's position in the reactivity series.

## Reactivity and extraction method

The table displays some metals in decreasing order of reactivity and the methods used to extract them.

| Metal | Method |
|---|---|
| Potassium | Electrolysis |
| Sodium | Electrolysis |
| Calcium | Electrolysis |
| Magnesium | Electrolysis |
| Aluminium | Electrolysis |
| (Carbon) | (Non-metal) |
| Zinc | Reduction by carbon or carbon monoxide |
| Iron | Reduction by carbon or carbon monoxide |
| Tin | Reduction by carbon or carbon monoxide |
| Lead | Reduction by carbon or carbon monoxide |
| (Hydrogen) | (Non-metal) |
| Copper | Various chemical reactions |
| Silver | Various chemical reactions |
| Gold | Various chemical reactions |

| Metal | Method |
| --- | --- |
| Platinum | Various chemical reactions |

Metals more reactive than carbon, such as aluminium, are extracted by electrolysis, while metals less reactive than carbon, such as iron, may be extracted by reduction with carbon.

As gold is so unreactive, it is found as the native metal and not as a compound. It does not need to be chemically separated. **However**, chemical reactions may be needed to remove other elements that might contaminate the metal.

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**Evidence for the reactivity series**

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