

1. Properties of Metals

(i) Physical Properties of Metals

(a) Metals have some or all of the following properties:

- good conductors of **electricity** and **heat**
- high **melting** and **boiling** points
- **Shiny** (though some are dull on the surface but **shiny** underneath)
- high **density**
- high **strength**
- **malleable** and **ductile**

(b) Most metals have a high **density** because there is little empty space between the closely packed **atoms**.

(c) Metals are **malleable** and **ductile** because the layers of **atoms** in a metal can **slide** over each other easily when a force is applied.

(d) An **alloy** is a mixture of metallic elements though some also contain non-metallic elements.

- steel is mainly made up of **iron** and **carbon**
- brass is a mixture of **copper** and **zinc**
- bronze is a mixture of **copper** and **tin**

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(ii) Chemical Properties of Metals

Reaction of Metals with Water

(a) When a metal reacts with **water**, **hydrogen** gas and the **hydroxide** of the metal are formed.

(b) When a metal reacts with **steam**, **hydrogen** gas and the **oxide** of the metal are formed.

(c) Magnesium reacts very **slowly** with cold water but reacts **vigorously** with steam when hot.

(d) Zinc and iron do not react with cold water but react **slowly** with steam when hot.

(e) Lead, copper and gold have **no reaction** with water or steam.

(f) Potassium and sodium react **vigorously** with cold water with a lot of heat produced.

(g) Calcium reacts **readily** with cold water.

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Reaction of Metals with Dilute Hydrochloric Acid

(a) When a metal reacts with dilute hydrochloric acid, **hydrogen** gas and a metal chloride are formed.

(b) Zinc reacts **moderately fast** with dilute hydrochloric acid and iron reacts slowly.

(c) Lead reacts **very slowly** with **warm** dilute hydrochloric acid.

(d) Potassium and sodium **explodes** with dilute hydrochloric acid.

(e) Calcium and magnesium reacts **very fast** with dilute hydrochloric acid.

(f) Copper and gold have **no reaction** with dilute hydrochloric acid.

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The Reactivity Series

(a) A metal 'high up' in the reactivity series reacts **vigorously** with chemicals and **corrodes** easily.

(b) Arrange the following metals in order of **increasing** reactivity:

aluminium, copper, iron, zinc, calcium, lead, potassium, gold

gold, copper, lead, iron, zinc, aluminium, calcium, potassium

(c) Metals **below** hydrogen in the reactivity series do **not react** with dilute hydrochloric acid to produce **hydrogen** gas.

(d) A **more reactive** metal will **displace** a less reactive metal from its salt.

~ The End ~