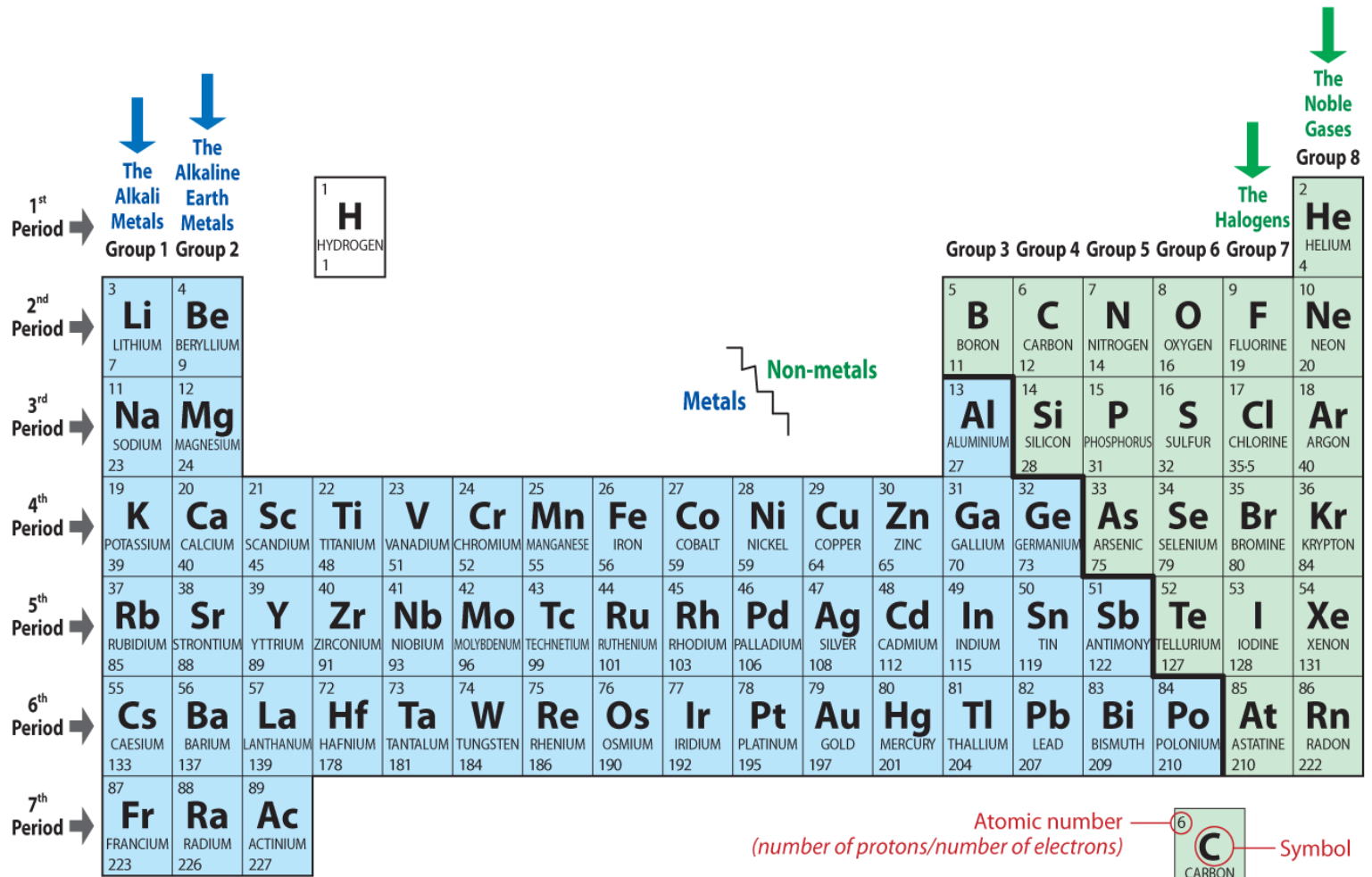




The Periodic Table and Metals



▲ Fig 22.2 The periodic table

- The periodic table is where all the elements are listed
- Every element has its own symbol and has 2 numbers (mass and atomic number)
- It is divided into 2 sections – left side is metals and the right side is non-metals
- Rows are called periods
- Vertical columns are called groups

Names and Symbols of Elements

H Hydrogen Non Metal

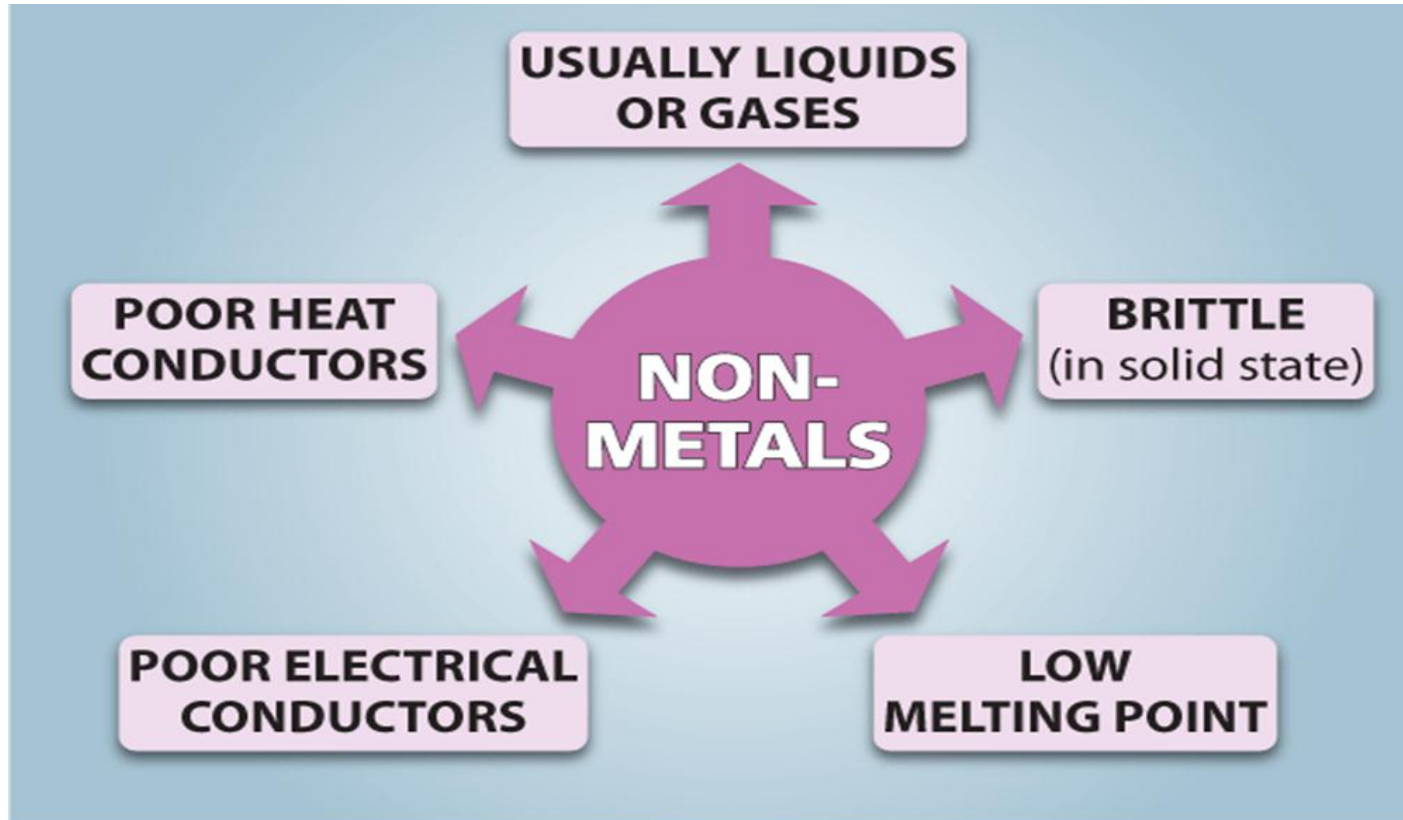
C Carbon Non Metal

N Nitrogen Non Metal

O Oxygen Non Metal

S Sulfur Non Metal

Properties on non-metals



▲ Fig 24.6 Non-metals

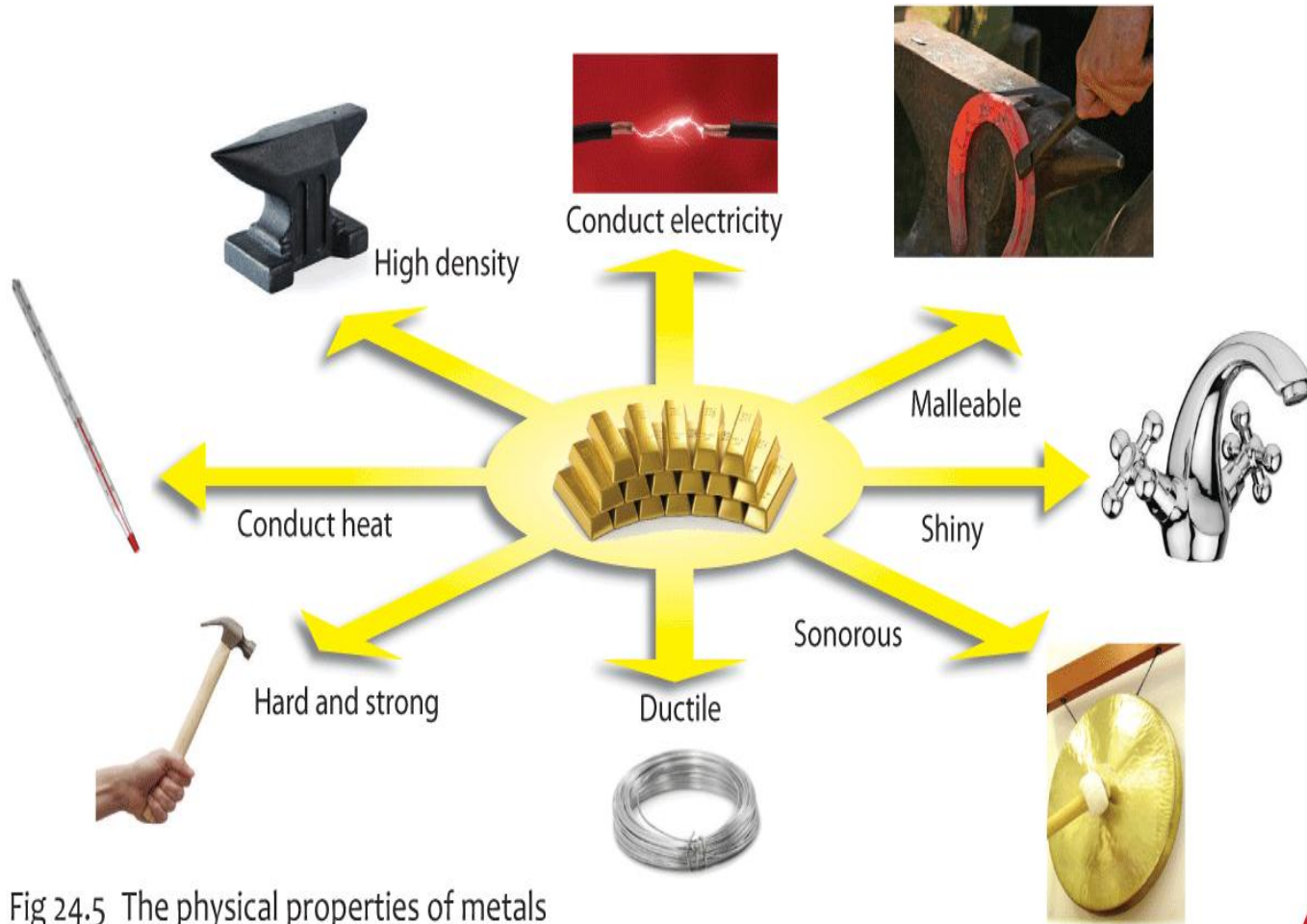
Names and Symbols of Elements

Al	Aluminium	Metal
Fe	Iron	Metal
Zn	Zinc	Metal
Ag	Silver	Metal
Au	Gold	Metal
Pb	Lead	Metal
Na	Sodium	Metal

Properties of metals

- Metals are **lustrous** (shiny)
- Metals are **malleable** (can be hammered into shape)
- Metals are **ductile** (can be stretched)
- Metals are usually **strong, hard solids** (exception sodium is soft)
- Metals are **good conductors** of **heat** and **electricity**
- Metals are **sonorous** (Make a loud ringing sound)

Physical Properties



▲ Fig 24.5 The physical properties of metals

Alloy

- An Alloy is a mixture of metals

Alloy	Composition	Use
Brass	Copper and zinc	Musical instruments Ornaments
Bronze	Copper and tin	Statues
Solder	Lead and tin	Soldering
Mild steel	Iron and carbon	Building reinforcement
Stainless steel	Iron, chromium and nickel	Knives Sinks
Alnico	Aluminium, nickel and cobalt	Powerful magnets

▲ Fig 24.8 Alloys, their uses and composition

Corrosion

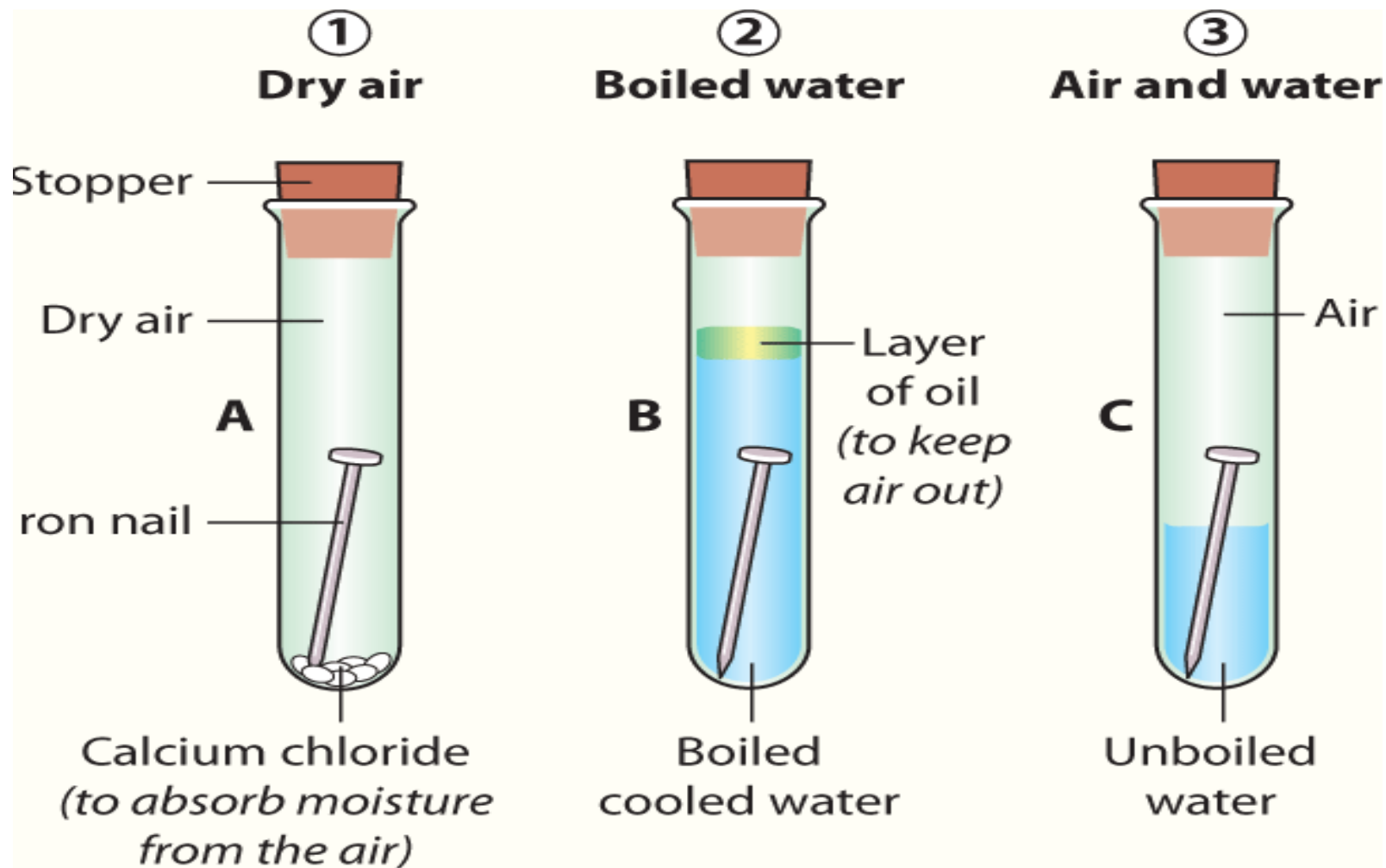
- Happens when a metal changes to its oxide by combining with oxygen from the air.

Rusting

- Rusting is corrosion of iron
- Iron needs water and oxygen to rust

Prevention of Rusting

- Rusting can be prevented by coating the iron in a material that stops either water or oxygen getting to the iron surface
- Greasing
- Painting
- Galvanising (coating with zinc)



▲ Fig 24.11 Testing conditions for rusting

Group 1 – Alkali Metals

- Group 1 elements are also called **The Alkali Metals**
- Called so because elements in this group react with water to form alkaline solutions (basic)
- One electron in their outer shell

- Have similar physical and chemical properties
- Soft, shiny metals
- But have to be stored in oil because they react with water and air

Reactions of the alkali metals with oxygen

- Alkali metals react with oxygen to form metal oxides
- They lose their shiny appearance

Reactions of the alkali metals with oxygen

Examples:

- Lithium + oxygen = Lithium oxide
- Sodium + oxygen = Sodium oxide
- Potassium + oxygen =

Reactions of the alkali metals with water

Reaction with water:

- Metals in group 1 can react violently with cold water
- Fizzing occurs and a gas called hydrogen is released which catches fire

Reactions of the alkali metals with water

Example:

- Potassium + water = Potassium hydroxide + hydrogen
- Sodium + water = Sodium hydroxide + hydrogen
- Lithium + water =

Group 2 – The Alkaline Earth Metals

- Group 2 elements are also called The Alkaline Earth Metals
- Much less reactive than group 1
- Similar physical and chemical properties
- 2 electrons in their outer shell

Reactions of general metals with water

- Metals react with water and release hydrogen gas

Reactivity Series of metals

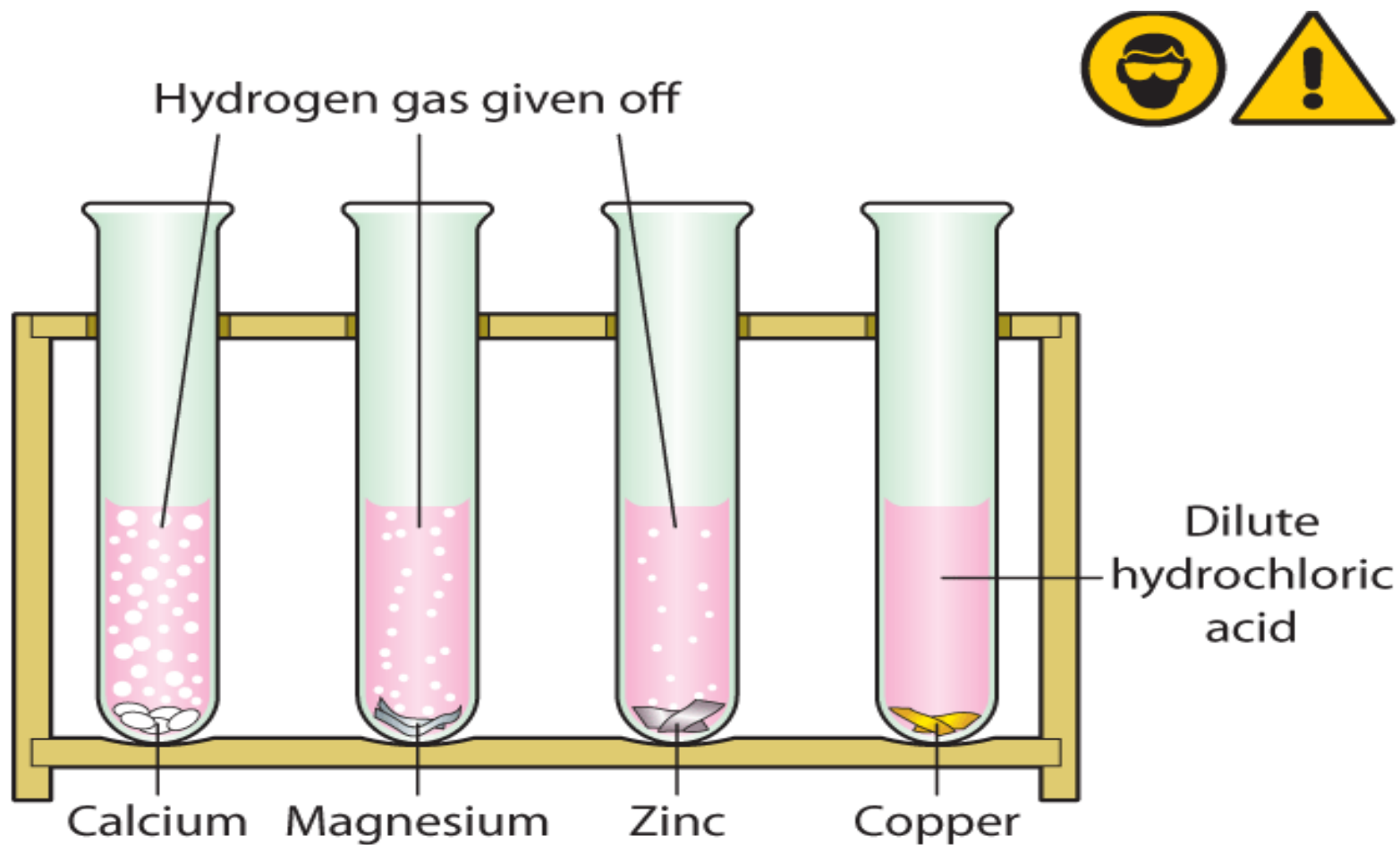
- Calcium reacts vigorously with cold water
- Magnesium takes a couple of days to react with cold water
- Copper does not react with water

Reactions of Metals with dilute acid

- Metals react with dilute hydrochloric acid to form salts and release Hydrogen gas

Reactivity Series of metals

- Calcium reacts the quickest
- Magnesium reacts slower than Calcium
- Zinc reacts slowly
- Copper does not react



▲ Fig 24.15 The reactivity of some metals with dilute hydrochloric acid

Order of reactivity

Increasing

Calcium



Magnesium

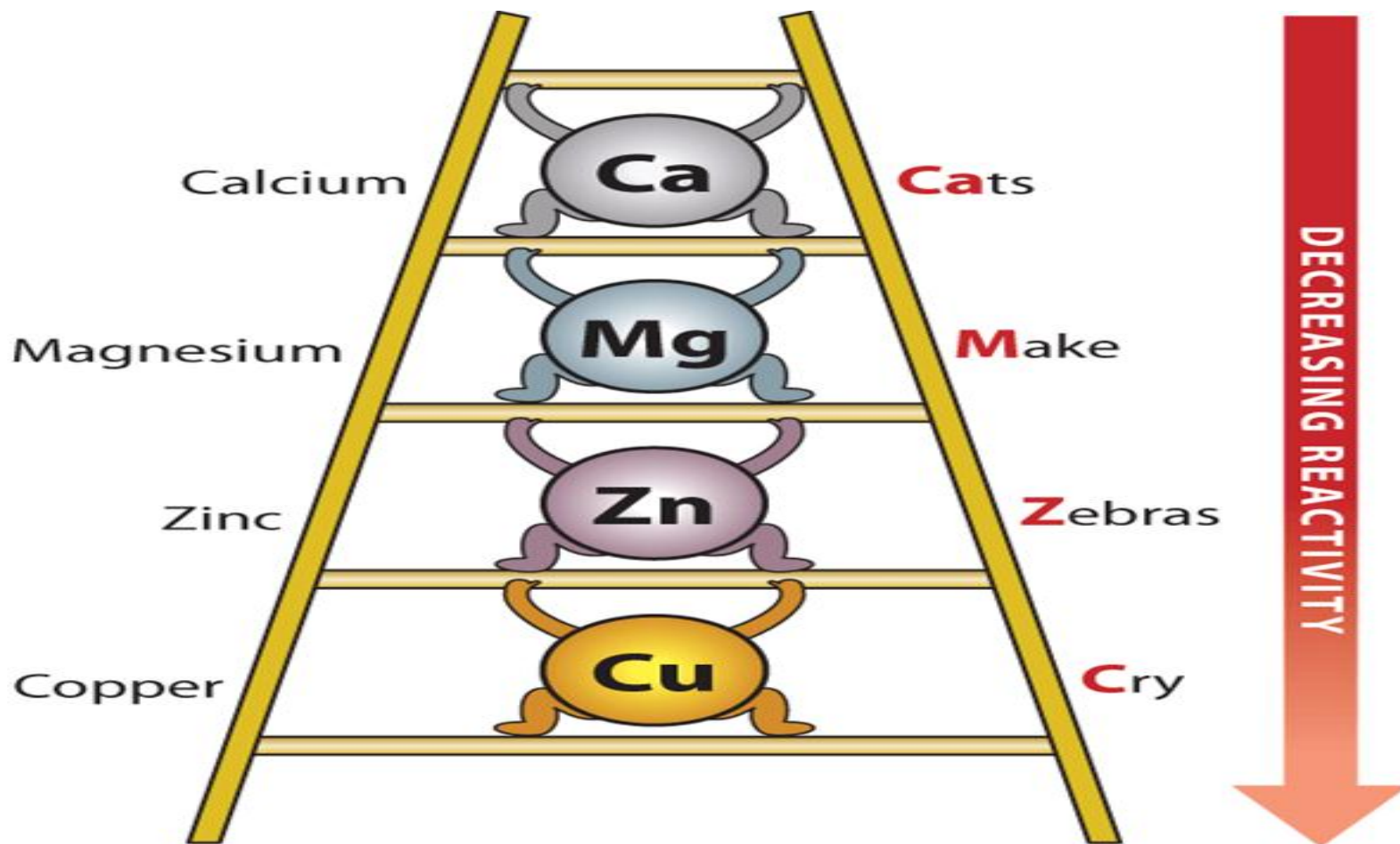


Zinc



Copper

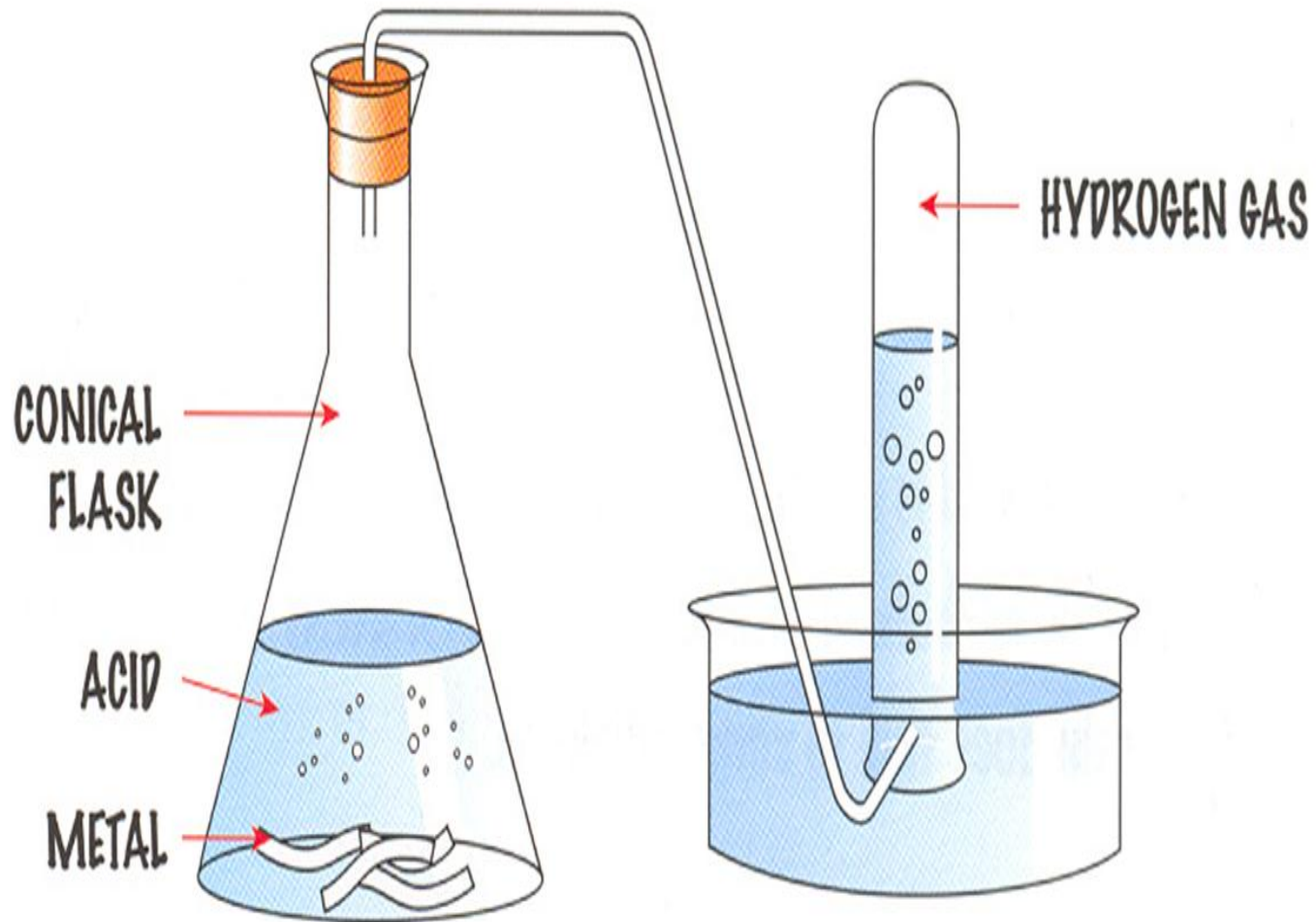
Decreasing



▲ Fig 24.16 Metals in decreasing order of reactivity

Experiment to investigate the reaction between zinc and hydrochloric acid

- Drop dilute hydrochloric acid onto some zinc granules
- The zinc starts to fizz in the acid
- This fizz is Hydrogen gas being produced



Word equation:

- Zinc + hydrochloric acid →
zinc chloride + hydrogen

Chemical equation:

- $\text{Zn} + \text{HCL} = \text{ZnCl}_2 + \text{H}_2$

To test the gas for Hydrogen

- Put a glowing splint over the jar of hydrogen gas (collected when zinc was put into hydrochloric acid)
- The gas burns with a pop

Group 7

- Group 7 elements are also called The Halogens

Group 8

- Group 8 elements are also called The Noble Gases
- Very unreactive because they have a full outer shell



▲ Fig 22.8 Uses of noble gases