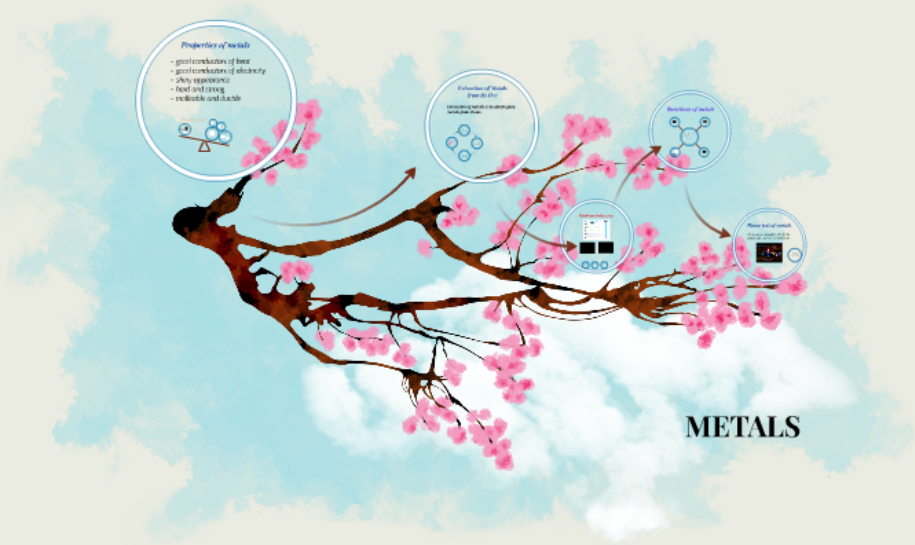
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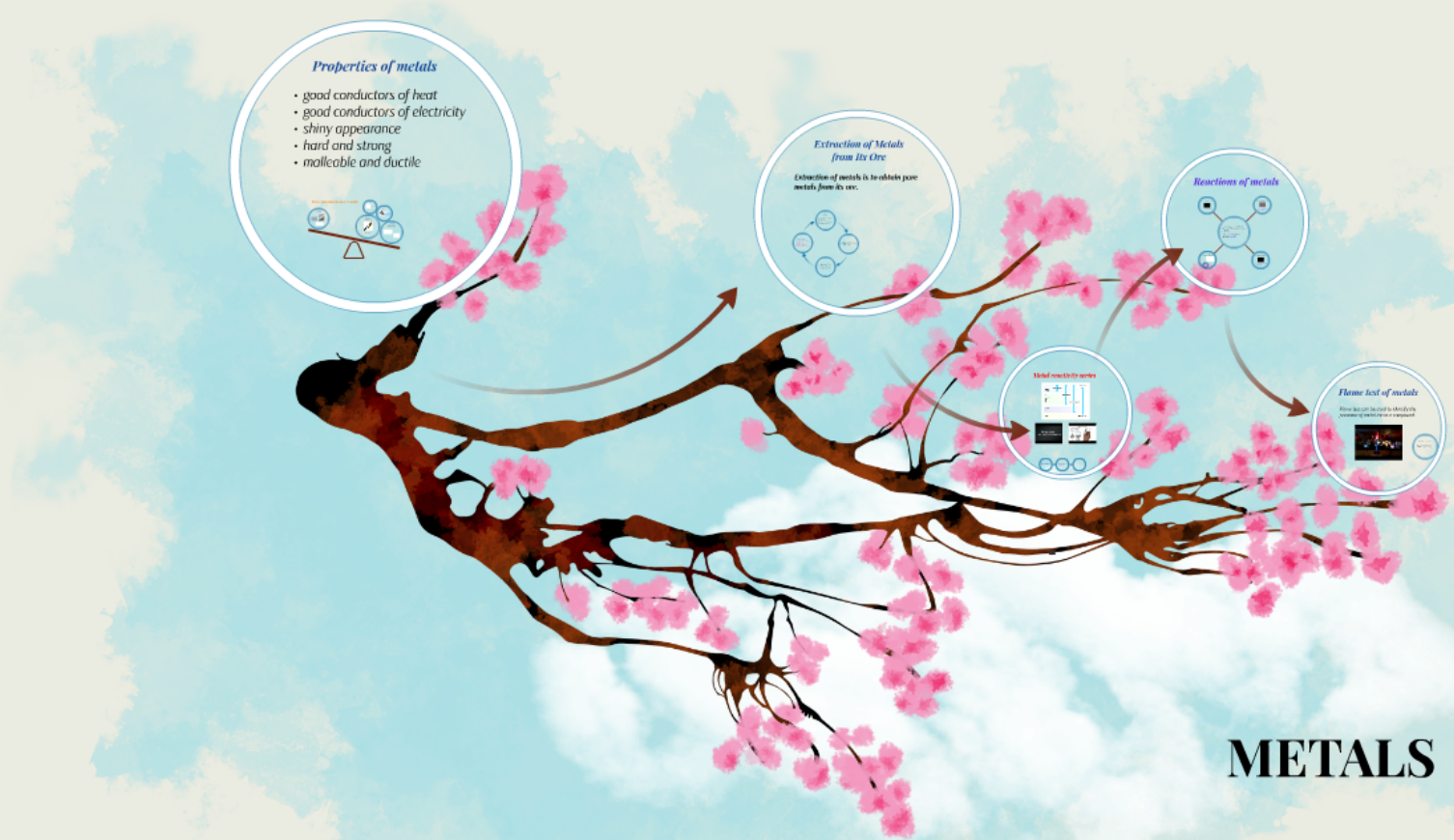
- good conductors of heat
- good conductors of electricity
- shiny appearance
- hard and strong
- malleable and ductile
Reactions of metals
Flame test of metals
METALS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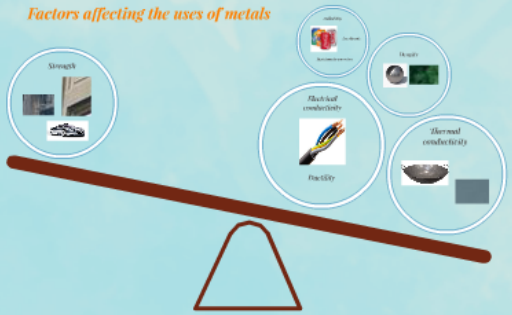


Factors affecting the uses of metals

Malleability

Low density

Resistance to corrosion

Density

Strength

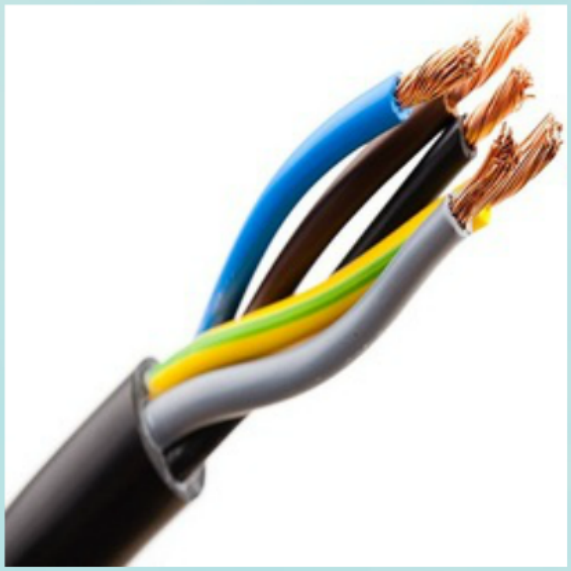
Electrical conductivity

Ductility

Thermal conductivity

Strength

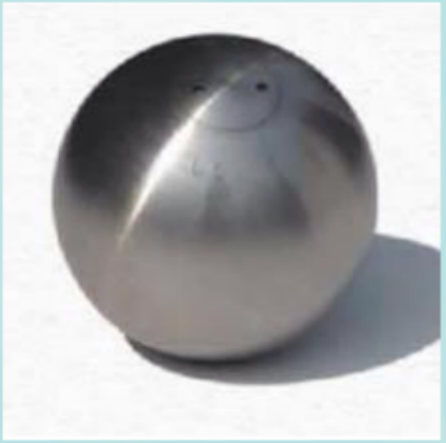
Electrical conductivity



Ductility

Thermal conductivity

Density



Malleability

Low density

Resistance to corrosion

Extraction of Metals from Its Ore

Extraction of metals is to obtain pure metals from its ore.

Methods of extraction

The ease of extraction depends on the reactivity of metals.

A less reactive metal can be extracted from its ore more easily, i.e. by simpler methods with less energy input.

Very unreactive metals (e.g. gold) exist as free elements

- - - - › physical method of extraction

Metals existing in compound form

- - - - > chemical method of extraction

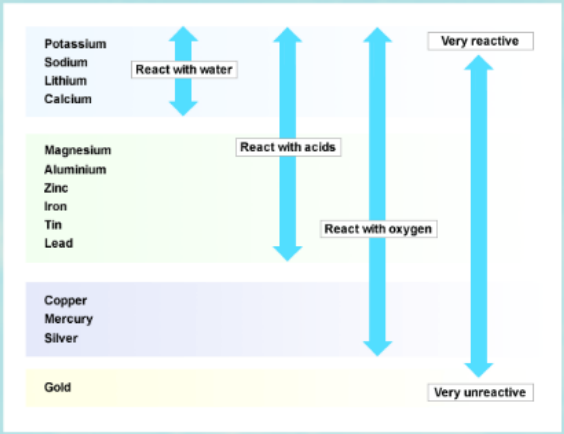
- *heating the metal oxide*
- *heating the metal oxide with carbon or carbon monoxide*
- *electrolysis of the molten ore*

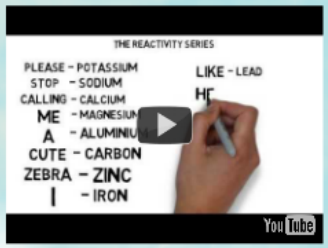
Unreactive metals, e.g. silver, can be extracted by heating its oxide.

Moderately reactive metals – from zinc to copper – are usually extracted by reduction of the oxides with coke/carbon.

Reactive metals – from potassium to aluminium – are extracted by electrolysis of their molten salts.

Metal reactivity series





Down the metal reactivity series, metals become more inert, i.e. they do not take part in reactions.

Down the metal reactivity series, metals react with less vigour.

Down the metal reactivity series, metals become easier to be extracted from their ores.

Reactions of metals

In the reaction of a metal, the metal atoms release their electrons to form metal ions.

A more reactive metal releases electrons more readily.

Reaction with air: oxygen

Metal + Oxygen → Metal oxide

Reaction with water

Metal + Water → Metal hydroxide + Hydrogen

Reaction with steam

Metal + Steam → Metal oxide + Hydrogen

Reaction with steam

The word equation:

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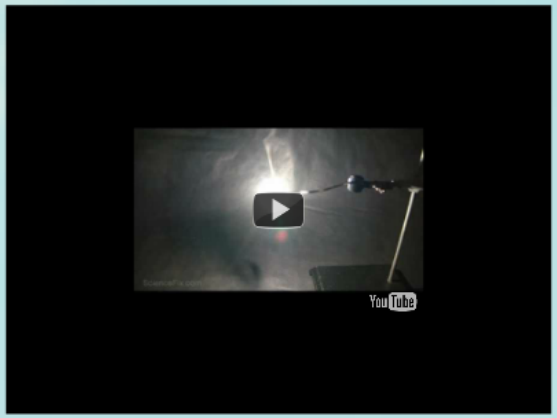
Reaction with air/oxygen



Metal + Oxygen → Metal oxide

Reaction with water

Metal + Water → Metal hydroxide + Hydrogen

(for calcium or metals higher
in the metal reactivity series)

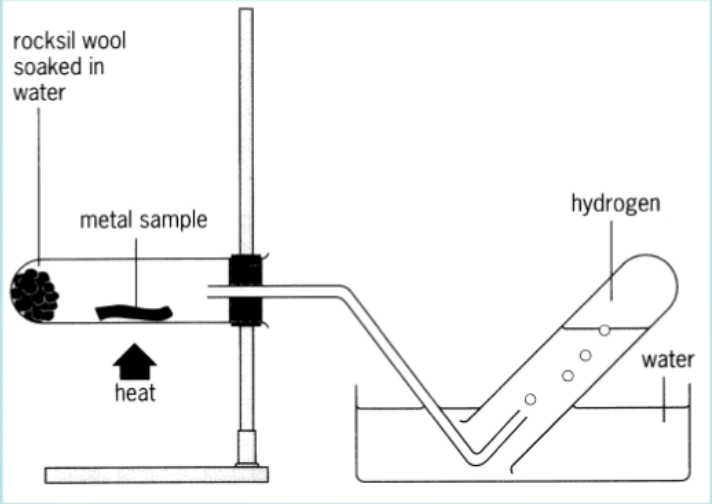
Reaction with steam

Metal + Steam → Metal oxide + Hydrogen

(for iron or metals higher in the metal reactivity series)

Reaction with steam

The set-up



Sodium and potassium must not be allowed to react with steam because it will cause explosion.

Magnesium does not react with cold water but reacts readily with hot water and violently with steam.

Aluminium has usually a protective layer of aluminium oxide covering its surface, which stops it from reacting with steam. The oxide layer can be removed by rubbing the metal with a piece of sand paper.

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Flame test of metals

Flame test can be used to identify the presence of metal ion in a compound.

Apparatus needed for flame test

- *Bunsen burner : non-luminous flame*
- *Platinum wire (or nichrome wire)*

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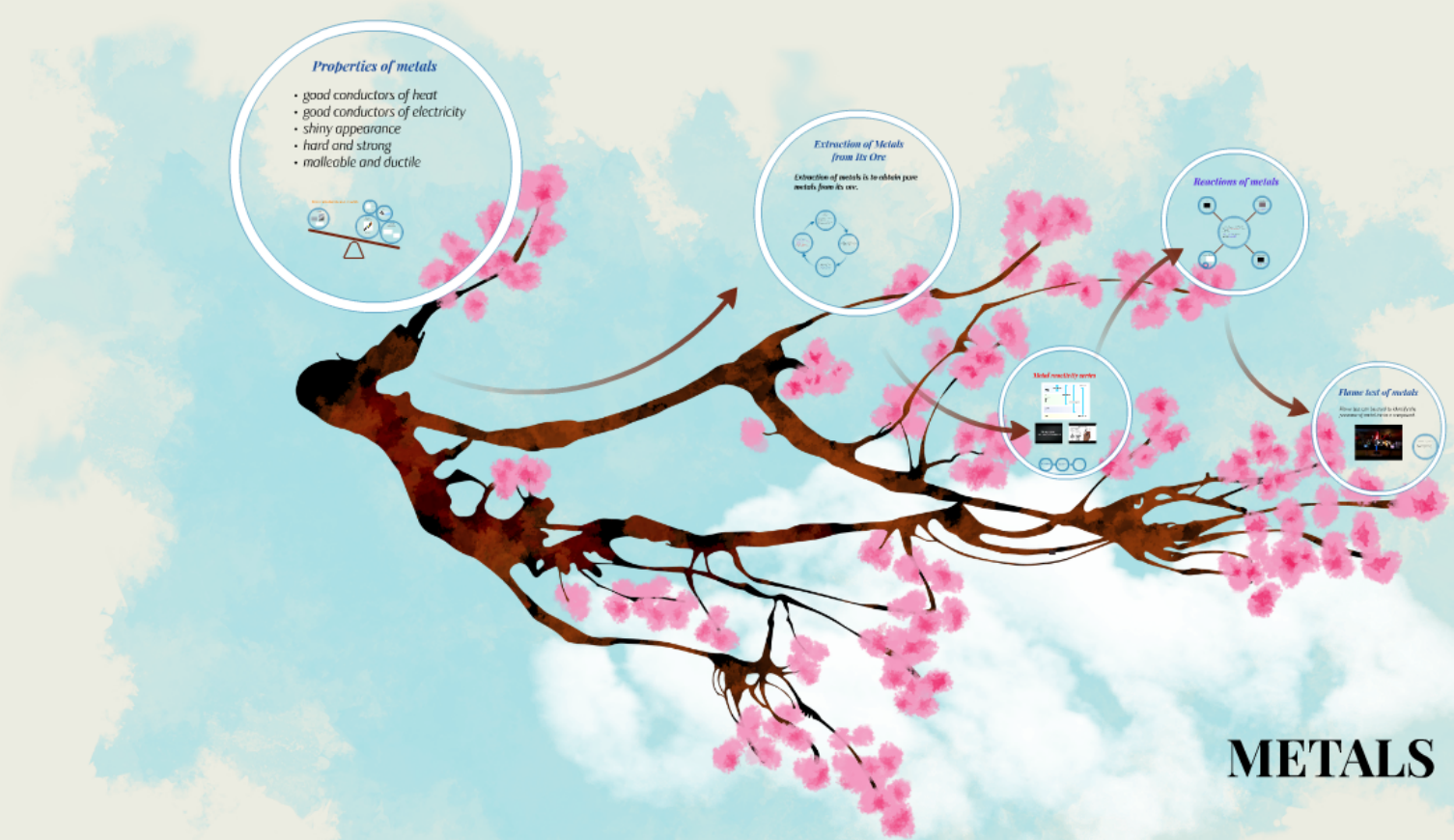
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