

CLASS 10

SCIENCE

REVISION NOTES

Revision Notes: Class 10 Science Chapter 3 Metals and Non-metals

A fast, one-glance recap of Class 10 Science Chapter 3 (Metals and Non-metals) -- for the full worked explanations, see the Solutions.

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Revision Notes: Metals and Non-metals

Physical properties of metals: lustrous, malleable (can be beaten into sheets), ductile (can be drawn into wires), sonorous, good conductors of heat and electricity, generally solid at room temperature (mercury is a liquid exception)

Physical properties of non-metals: generally dull (except iodine), brittle, poor conductors (except graphite), can be solid, liquid (bromine) or gas at room temperature

Metal + Oxygen → Metal oxide (basic in nature) — e.g. $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$

Amphoteric oxides: react with both acids and bases — e.g. Al_2O_3 , ZnO

Non-metal + Oxygen → Non-metallic oxide (acidic or neutral) — e.g. $\text{S} + \text{O}_2 \rightarrow \text{SO}_2$ (turns moist blue litmus red)

Metal + Water → Metal oxide/hydroxide + Hydrogen (reactivity dependent: K and Na react violently with cold water; Ca, Mg react with water more mildly; Al, Fe, Zn react only with steam; Pb, Cu, Ag, Au do not react with water at all)

Metal + Dilute acid → Salt + Hydrogen (only metals above hydrogen in the reactivity series; test: burning splinter gives a pop sound)

Reactivity series (high to low): $\text{K} > \text{Na} > \text{Ca} > \text{Mg} > \text{Al} > \text{Zn} > \text{Fe} > \text{Pb} > (\text{H}) > \text{Cu} > \text{Ag} > \text{Au}$

Displacement reaction: a more reactive metal displaces a less reactive metal from its salt solution — e.g. $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$

Ionic (electrovalent) compounds: formed by transfer of electrons between a metal and a non-metal; generally have high melting/boiling points, are soluble in water, insoluble in solvents like kerosene/petrol, and conduct electricity only when molten or in solution (not as solids)

Occurrence of metals: highly reactive metals (K, Na, Ca, Mg, Al) occur as oxides/carbonates/chlorides/sulphates; moderately reactive metals (Zn, Fe, Pb, Cu) occur mainly as sulphides/carbonates; least reactive metals (Au, Ag, Pt) occur as free elements

Extraction steps: (1) Enrichment/concentration of ore (e.g. froth flotation for sulphide ores) → (2) Conversion to oxide (calcination for carbonate ores, roasting for sulphide ores) → (3) Reduction of oxide to metal (using carbon, or by electrolysis for very reactive metals, or using a more reactive metal like aluminium in the thermit reaction) → (4) Refining (commonly electrolytic refining) to obtain the pure metal

Thermit reaction: $\text{Fe}_2\text{O}_3 + 2\text{Al} \rightarrow 2\text{Fe} + \text{Al}_2\text{O}_3 + \text{heat}$ — used to weld railway tracks/cracked machine parts

Electrolytic refining: impure metal = anode, pure metal strip = cathode, salt solution of the same metal = electrolyte; pure metal deposits at the cathode, impurities settle as anode mud

Corrosion: gradual destruction of metals by reaction with substances in their environment (e.g. iron)

→ rusting, copper → green tarnish, silver → black tarnish)

Preventing corrosion: painting, oiling/greasing, galvanising (zinc coating), alloying, electroplating

Alloys: homogeneous mixtures of two or more metals (or a metal and a non-metal) that improve on the properties of the pure metal — e.g. stainless steel (Fe + Cr + Ni, rust-resistant), brass (Cu + Zn), bronze (Cu + Sn), solder (Pb + Sn, low melting point)

Aqua regia: freshly prepared 3:1 mixture of concentrated HCl and concentrated HNO₃; can dissolve gold and platinum, which do not react with either acid alone

See also: [Extra Questions \(HOTS\)](#) / [Class 10 Science Formulas Handbook](#)

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