



Programmer_Deepak

Subject: Science

Chapter: Metals And Non-Metals

Date: 01-01-2025

>> Acid With Oxygen Metals

> Metal + Oxygen \rightarrow Metal Oxide (Basic) \rightarrow

> Example: $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$

> Amphoteric Metals: Beryllium [Be], Zinc [Zn], Tin [Sn], Lead [Pb], Aluminium \rightarrow

> [Al], [Antimony (Sb)] \rightarrow

> Aluminium with Oxygen: $4\text{Al}(\text{s}) + 3\text{O}_2(\text{g}) \rightarrow 2\text{Al}_2\text{O}_3(\text{s})$

> Zinc with Oxygen: $2\text{Zn}(\text{s}) + \text{O}_2(\text{g}) \rightarrow 2\text{ZnO}(\text{s})$

> Aluminium Oxide Reactions: \rightarrow

> $1.\text{Al}_2\text{O}_3(\text{s}) + 6\text{HCl}(\text{aq}) \rightarrow 2\text{AlCl}_3(\text{aq}) + 3\text{H}_2\text{O}(\text{l})$

> $2.\text{Al}_2\text{O}_3(\text{s}) + 2\text{NaOH}(\text{aq}) \rightarrow 2\text{NaAlO}_2(\text{aq}) + \text{H}_2\text{O}(\text{l})$

>> Acid With Oxygen Non-Metals

> Non-Metal + Oxygen \rightarrow Non- \rightarrow

> Metal Oxide (Acidic/Neutral) \rightarrow

> Example: $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$

> $\text{S} + \text{O}_2 \rightarrow \text{SO}_2$

>> Acid With Water Metals

> Metal + Water \rightarrow Metal Hydroxide + H_2 \rightarrow

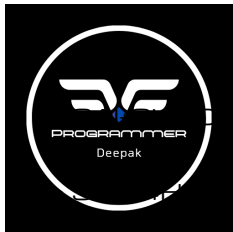
> Na_2O , K_2O , CaO , and MgO dissolve in water to form metal hydroxides \rightarrow

> Example: $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$

> K, Na react violently with water; Ca reacts mildly; \rightarrow

> $\text{Ca} + 2\text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + \text{H}_2$

> Mg reacts with hot water. Al, Fe, Zn react with steam; \rightarrow

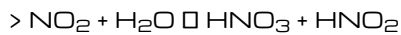


> Pb, Cu, Ag, Au do not react with water.

>> Acid With Water Non-Metals

> Non metals don't react with water

> Non-Metal Oxide + Water \rightarrow Acid



>> Acid With Metals

> Metal + dil. Acid \rightarrow Salt + H_2



> Hydrogen gas isn't

> produced when metals react with HNO_3 because it

> oxidizes H_2 to water and reduces to nitrogen oxides. Only Mg and Mn with

> very dilute HNO_3 release H_2 gas.

> Metal (Mg and Mn) + Dilute nitric acid \rightarrow Salt + Hydrogen gas



> Other Metals + Dilute nitric acid \rightarrow Salt + Water + $\text{NO}_2/\text{N}_2\text{O}/\text{NO}$

> Aqua regia is a mix of concentrated hydrochloric and nitric acids in a 3:1

> ratio. It's highly corrosive and can dissolve gold and platinum.

>> Acid With Non-Metals

> No Reaction

>> Metals Salt With Metals



> More reactive metals displace less reactive metals from their salt solutions.

> (No reaction).

> Metal A + Salt solution of B → Salt solution of A + Metal B

> Example: $\text{Pb} + \text{CuCl}_2 \rightarrow \text{PbCl}_2 + \text{Cu}$

>> Metals Salt With Non-Metals

> No Reaction

>> Reaction Of Metals And Non-Metals

> When metals react with non-metals, electrons transfer from metals to non-metals, forming ions. The

> compound formed is ionic.

> Metal + Non-metal → Ionic compound

>> Physical Properties Of Ionic Compound

> Property. Description

> Physical nature. Solid, hard, brittle due to strong.

> ionic bonds.

> Melting & Boiling points High, due to strong inter-ionic attractions requiring more energy to break.

> Solubility. Soluble in water, insoluble in organic solvents like kerosene and petrol.

> Electrical conductivity. Conducts in molten and aqueous states, not in solid due to immobile ions.

>> Alloying

> An alloy is a mixture of metals or a metal with a non-metal, altering properties like conductivity and melting

> point.

> Examples :

> Brass (Copper + Zinc) and Bronze (Copper + Tin) are poor conductors, unlike Copper, which powers electrical

> circuits.

> Solder (Lead + Tin) melts easily, making it perfect for welding electrical wires.

> Pure gold is soft, so it is alloyed with silver or copper to make jewelry, typically in 22 carat form in India.

> The Iron Pillar near Qutub Minar in Delhi, over 1600 years old, resists rust due to ancient Indian



Techniques

Programmer_Deepak