Programmer_Deepak

Subject: Science

Chapter: Metals And Non-Metals

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>> Acid With Oxygen Metals

> Metal + Oxygen □ Metal Oxide (Basic)□

> Example: $2Mg + O_2$ □ $2MgO$□

> Amphoteric Metals: Beryllium (Be), Zinc (Zn), Tin (Sn), Lead (Pb), Aluminium□

> (Al), (Antimony (Sb)□

> Aluminium with Oxygen: $4Al(s) + 3O_2(g)$ □ $2Al_2O_3(s)$□

> Zinc with Oxygen: $2Zn(s) + O_2(g)$ □ $2ZnO(s)$□

> Aluminium Oxide Reactions:□

> 1.$Al_2O_3(s) + 6HCl(aq)$ □ $2AlCl_3(aq) + 3H_2O(l)$□

> 2.$Al_2O_3(s) + 2NaOH(aq)$ □ $2NaAlO_2(aq) + H_2O(l)$

>> Acid With Oxygen Non-Metals

> Non-Metal + Oxygen □ Non-□

> Metal Oxide (Acidic/Neutral)□

> Example: $C + O_2$ □ CO_2□

> $S + O_2$ □ SO_2

>> Acid With Water Metals

> Metal + Water □ Metal Hydroxide + H_2□

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

> Example: $2Na + 2H_2O$ □ $2NaOH + H_2$□

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

> Ca+2H2O□Ca(OH)2+H2□

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

steam]Al2O3+3H2

[steam]Fe3O4+4H2

> 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 Acid

> $SO_2 + H_2O \rightarrow H_2SO_3$

> $SO_3 + H_2O \rightarrow H_2SO_4$

> $CO_2 + H_2O \rightarrow H_2CO_3$

> $NO_2 + H_2O \rightarrow HNO_3 + HNO_2$

>> Acid With Metals

> Metal + dil. Acid Salt + H_2

> Example: $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

> 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 Salt + Hydrogen gas

> $2Mg + 4HNO_3 \rightarrow 2Mg(NO_3)_2 + H_2$

> $Mn + 2HNO_3 \rightarrow Mn(NO_3)_2 + H_2$

> Other Metals + Dilute nitric acid Salt + Water + $NO_2/N_2O/NO$

> 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

ve metals displace less reactive metals from their salt solutions

nt reaction).

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

> Example: $Pb + CuCl_2 \rightarrow PbCl_2 + Cu$

>> 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

echniques