Some Important Chemical Compounds and their uses

	Preparation	Uses
Common Salt (NaCl)	1. $NaOH + HCl \rightarrow NaCl + H_2O$ 2. From sea water by evaporation 3. From underground deposit {Large crystals of common salt found in underground deposit which is brown due to presence of impurities in it. It is mined from underground deposit like coal.}	1. Raw material for making large number of useful chemicals in industry. Eg: NaOH (caustic soda), Na_2CO_3 (washing soda), $NaHCO_3$ (baking soda). 2. Preservative in pickle and curing meat and fish. 3. To melt ice and clear roads in winters in cold countries. 4. Used in manufacturing of soap.
Caustic Soda (NaOH) **(Sodium Hydroxide)**	Passing electricity through concentrated solution of NaCl (called '**brine**') $2NaCl\ (Brine) + 2H_2O \xrightarrow[\text{(electrolysis)}]{\text{electricity}}$ **2NaOH (Caustic Soda) + Cl_2 + H_2** At anode (+ve electrode): Cl_2 is produced At cathode (-ve electrode): H_2 is produced It is called chloro-alkali process because products formed are chlorine (Chloro) and NaOH (alkali).	**Uses of H_2** 1. Hydrogenation of oil to get vegetable ghee (margarine) 2. To make ammonia for fertilizers 3. In fuel for rockets. **Uses of Cl_2** 1. In water treatment 2. To clean water in swimming pools 3. To make plastic, e.g. PVC 4. To make CFCs, chloroform, dyes etc. **Uses of NaOH** 1. Used in making soap and detergent. 2. Used in manufacturing of paper 3. De-greasing metals

		4. Refining oil 5. Making dyes and bleaches **<u>Uses of HCl</u>** 1. Cleaning steel 2. Preparation of chloride, e.g. NH_4Cl 3. In making medicines and cosmetics 4. In making plastics, PVC etc.
Baking Soda ($NaHCO_3$) **Sodium Hydrogen Carbonate**	$NaCl + NH_3 + H_2O + CO_2 \rightarrow NaHCO_3 + NH_4Cl$ **<u>Properties</u>** <u>Action of Heat:</u> $2NaHCO_3 \xrightarrow{heat} Na_2CO_3 + CO_2 + H_2O$	1<u>. Used as antacid</u> in medicine to remove acidity of the stomach 2. <u>Used in making baking powder</u> (Basic soda + tartaric acid) $NaHCO_3 + H^{\oplus}$ (from mild acid) $\rightarrow Na^{\oplus}$ (sodium salt of acid) $+ CO_2 + H_2O$ The CO_2 produced during the process gets trapped in wet dough and bubbles out slowly to make cake 'rise' so that it becomes soft and spongy. Tartaric acid neutralizes it, and so it has pleasant taste. 3. Used in soda-acid fire extinguisher
Washing Soda ($Na_2CO_3.10H_2O$) **(Sodium Carbonate)**	$\mathbf{Na_2CO_3} + 10\ H_2O \rightarrow Na_2CO_3.10H_2O$ Preparation of $\mathbf{Na_2CO_3}$ {$NaCl + NH_3 + H_2O + CO_2$ $NaHCO_3 + NH_4Cl$ $NaHCO_3 \rightarrow \mathbf{Na_2CO_3} + CO_2 + H_2O$}	1. Used in glass, soap and paper industries 2. Used in manufacturing of sodium compounds such as Borax 3. Cleaning agent for domestic purpose 4. Remove permanent hardness of water

Bleaching Powder ($CaOCl_2$) Calcium Oxychloride	$Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$ Slaked Lime Calcium Oxychloride <u>Properties</u> $CaOCl_2 + H_2SO_4 \rightarrow CaSO_4 + Cl_2 + H_2O$ The Cl_2 produced by action of dilute acid acts as bleaching agent.	1. For bleaching cotton and linen in textile industry, for bleaching wood pulp in paper factories, for bleaching washed clothes in laundry 2. Oxidizing agent in chemical industries 3. Disinfecting drinking water
Plaster of Paris (P.O.P) ($CaSO_4.1/2\ H_2O$) (Calcium Sulphate Hemihydrate)	$CaSO_4.2H_2O(\text{Gypsum}) \xrightarrow{\text{Heat to } 100^\circ C}$ $CaSO_4.H_2O$ (Plaster of Paris) +3/2 H_2O * Heating of gypsum should not be done above 100°C as above that temperature, water of crystallization will eliminate and anhydrous $CaSO_4$ will be obtained. This anhydrous $CaSO_4$ is known as **Dead Burnt Plaster**. * $CaSO_4.1/2\ H_2O$ means that two molecules of $CaSO_4$ share one molecule of water. <u>Properties</u> Has remarkable property of setting into a hard mass on wetting with water, as gypsum is formed. $CaSO_4.1/2\ H_2O$ (P.O.P) + 1/2 $H_2O \rightarrow CaSO_4.2H_2O$ (Gypsum set as hard mass) Hence, P.O.P should be stored in moisture-proof container as moisture can cause slow setting of P.O.P by hydrating it.	1. Used in hospital for setting fractured bones in the right position to ensure correct healing. 2. Making toys, decorative materials, cheap ornaments, and casts of statues. 3. Used as fire-proofing material 4. Used in chemistry labs for setting air gaps in apparatus. 5. Making smooth surfaces, such as For making ornamental designs on ceilings of houses and other buildings