CHEMISTRY STUDY MATERIALS FOR CLASS 10
(NCERT Based: Revision of Chapter -02)

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Acids, Bases and Salts

BLEACHING POWDER ($CaOCl_2$):

Bleaching powder is also known as chloride of lime. It is a solid and yellowish white in colour. Bleaching powder can be easily identified by the strong smell of chlorine.

When calcium hydroxide (slaked lime) reacts with chlorine, it gives calcium oxychloride (bleaching powder) and water is formed.

$$Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$$

Aqueous solution of bleaching powder is basic in nature. The term bleach means removal of colour. Bleaching powder is often used as bleaching agent. It works because of oxidation. Chlorine in the bleaching powder is responsible for bleaching effect.

USE OF BLEACHING POWDER:

- Bleaching powder is used as disinfectant to clean water, moss remover, weed killers, etc.
- Bleaching powder is used for bleaching of cotton in textile industry, bleaching of wood pulp in paper industry.
- Bleaching powder is used as oxidizing agent in many industries, such as textiles industry, paper industry, etc.

BAKING SODA ($NaHCO_3$)

Baking soda is another important product which can be obtained using byproducts of chlor- alkali process. The chemical name of baking soda is sodium hydrogen carbonate ($NaHCO_3$) or sodium bicarbonate. Bread soda, cooking soda, bicarbonate of soda, sodium bicarb, bicarb of soda or simply bicarb, etc. are some other names of baking soda.

Baking soda is obtained by the reaction of brine with carbon dioxide and ammonia. This is known as Solvay process.

$$\underset{\text{Brine}}{\underline{NaCl + H_2O}} + CO_2 + NH_3 \rightarrow NH_4Cl + NaHCO_3$$

In this process, calcium carbonate is used as the source of CO_2 and the resultant calcium oxide is used to recover ammonia from ammonium chloride.

PROPERTIES OF SODIUM BICARBONATE:

- Sodium bicarbonate is white crystalline solid, but it appears as fine powder.
- Sodium hydrogen carbonate is amphoteric in nature.
- Sodium hydrogen carbonate is sparingly soluble in water.
- Thermal decomposition of sodium hydrogen carbonate (baking soda).
- When baking soda is heated, it decomposes into sodium carbonate, carbon dioxide and water.

$$2NaHCO_3 + \text{heat} \rightarrow Na_2CO_3 + CO_2 + H_2O$$

Sodium carbonate formed after thermal decomposition of sodium hydrogen carbonate; decomposes into sodium oxide and carbon dioxide on further heating.

$$Na_2CO_3 \rightarrow Na_2O + CO_2$$

This reaction is known as dehydration reaction.

USE OF BAKING SODA:

- Baking soda is used in making of baking powder, which is used in cooking as it produces carbon dioxide which makes the batter soft and spongy.
- Baking soda is used as antacid.
- Baking soda is used in toothpaste which makes the teeth white and plaque free.
- Baking soda is used in cleansing of ornaments made of sliver.
- Since, sodium hydrogen carbonate gives carbon dioxide and sodium oxide on strong heating, thus it is used as fire extinguisher.

BAKING POWDER:

Baking powder produces carbon dioxide on heating, so it is used in cooking to make the batter spongy. Although baking soda also produces carbon dioxide on heating, but it is not used in cooking because on heating; baking soda produces sodium carbonate along with carbon dioxide. The sodium carbonate; thus produced; makes the taste bitter.

$$2NaHCO_3 + \text{heat} \rightarrow Na_2CO_3 + CO_2 + H_2O$$

Baking powder is the mixture of baking soda and a mild edible acid. Generally, tartaric acid is mixed with baking soda to make baking powder.

$$NaHCO_3 + C_4H_6O_6 \rightarrow CO_2 + H_2O + Na_2C_4H_4O_6$$

When baking powder (mixture of baking soda and an edible acid) is heated, the sodium carbonate formed because of heating of baking soda neutralizes after reacting with tartaric acid and sodium tartarate salt is formed. The smell of sodium tartarate is pleasant and taste is good. This makes the cake or any other food tasty.

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