

## CHAPTER # 18

### CHEMICAL INDUSTRIES:

**Q1. What is the sodium hydroxide (NaOH) (caustic soda)? Write its physical properties and uses?**

**SODIUM HYDROXIDE (NaOH) (CAUSTIC SODA):**

Sodium hydroxide (NaOH) is one of the most important chemical of industrial use. It is commonly called as caustic soda, because it is caustic i.e corrosive to touch and causes harmful burns.

**PREPARATION:**

Sodium hydroxide is commercially prepared by castner-kellner's cell. (Chapter 15)

**PHYSICAL PROPERTIES OF SODIUM HYDROXIDE:**

1. It is a white crystalline solid.
2. It melts at 318°C to a clear liquid, and at 322°C, it decomposes.
3. Its density is 2.31 g/ml.
4. It is highly soluble in water and liberate large amount of heat.

**USES:**

1. It is used in the manufacture of soap and petroleum industry.
2. It is used in textile and paper industries.
3. It is used in bleaching and dyeing process as well as for mercerizing the cotton cloth.
4. It is used in purification of bauxite.
5. It is used in manufacture of artificial silk.

**Q2. Write physical properties of Na<sub>2</sub>CO<sub>3</sub> (washing soda) and NaHCO<sub>3</sub> (baking soda)?**

**PHYSICAL PROPERTIES OF SODIUM CARBONATE: (Na<sub>2</sub>CO<sub>3</sub>)**

1. It is a white amorphous solid.
2. It melts at 852°C.
3. It is highly soluble in water at room temperature with evolution of heat.

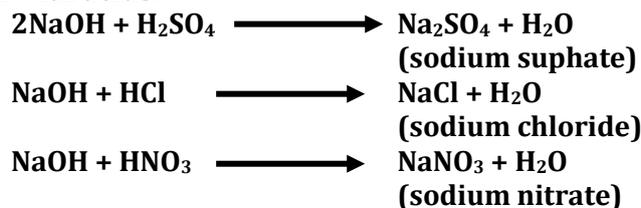
**PHYSICAL PROPERTIES OF SODIUM BI-CARBONATE: (NaHCO<sub>3</sub>)**

1. It is a white crystalline compound.
2. It is bitter in taste.
3. Its density is 2.11 g/ml.
4. It is sparingly soluble in water at room temperature.

**Q3. Write chemical properties of NaOH, Na<sub>2</sub>CO<sub>3</sub> and NaCHO<sub>3</sub> ?**

**1. CHEMICAL PROPERTIES OF NaOH:**

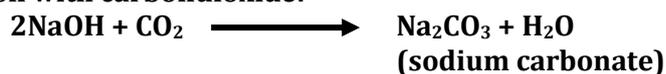
**i. Reaction with acids:**



**ii. Reaction with ammonium chloride:**

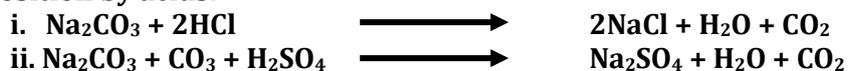


iii. Reaction with carbondioxide:



2. CHEMICAL PROPERTIES OF  $\text{Na}_2\text{CO}_3$ :

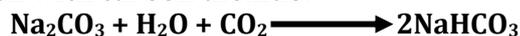
i. Decomposition by acids:



ii. Reaction with non- alkali metals salts:



iii. Reaction with carbon dioxide:



iv. Reaction with sand (Fusion):



3. CHEMICAL PROPERTIES OF  $\text{NaHCO}_3$ :

i. Action of heat:



ii. Reaction with acids:



Q4. Define soap and saponification? What are the raw materials use for the preparation of soap?

SOAP:

*"The sodium and potassium salts of fatty acids used for cleansing purpose are called soap."*

SAPONIFICATION:

*"The chemical process for the preparation of soap is called saponication."*

RAW MATERIALS USE FOR THE PREPARATION OF SOAP:

- The natural source of the above fatty acids is either vegetable oils such as coconut oil and palm oil or animal fats. Such as beef tallow.
- The alkali metal (Sodium and potassium ) sources are sodium hydroxide (NaOH) and potassium hydroxide (KOH).

Q5. How many types of soaps are there? Also describe the function of soap.

TYPES OF SOAPS:

There are four types of soaps.

- Toilet soaps
- Laundry soaps
- Kitchen soaps
- Shaving soaps

FUNCTION OF SOAP:

Soaps serve their functions as dirt remover. Most dirt particles (on skin or cloth) become surrounded by a layer of an oil or fat.

Soap solutions however are able to separate the individual particles because their hydrocarbon chain of the carbonoxylate part can dissolve the oily layer.

**Q6. Define the following terms:**

- i. Paints                      ii. Varnishes                      iii. Polishes                      iv. Inks

**i. PAINTS:**

*"Paints are fluids containing a coloring material (pigments) dispersed in organic liquid."*

**ii. VARNISHES:**

*"Varnishes is a colloidal solution used without pigments as a protective and decorative coating for various surfaces."*

**iii. POLISHES:**

*"Certain articles such as shoes, furniture's cars, motorcycles, floor of the houses etc. if left untreated tend to be damaged. They need to be protected by applying a protective layer upon their surface. That layer is called polishes."*

**iv. INKS:**

*"Inks are deeply colored liquids of varied composition used for writing or printing."*

**TYPES OF INKS:**

There are different types of inks.

- i. Black ink                      ii. Blue ink                      iii. Marking ink                      iv. Printing inks  
v. Red ink(Brazil wood)   vi. Type writing inks   vii. Blue black ink                      viii. Royal blue ink  
ix. Stamp pad ink

**Q7. What are the causes of food spoilage? Also define methods of food preservation.**

The food may be spoiled by biological attack by pests, diseases or decay through micro organisms and chemical reactions.

**CAUSES OF FOOD SPOILAGE:**

**1- MOISTURE:**

The agricultural products of low moisture contents such as corn and soyabean when exposed to higher humidity take up enough moisture contents to permit the growth of moulds and bacteria.

**2- MICROBIAL ACTIVITIES:**

There are several kinds of food which tend to spoil by microbial attack. Fish, poultry and dairy products are specially spoiled by microbial growth.

**3- CHEMICAL CHEANGES:**

The chemical changes brought by enzymes are responsible for food spoilage. These enzymes may have their origin in the food material or may be produced by yeast, moulds and bacteria which contaminate the product.

**FOOD PRESERVATION METHODS:**

There are numerous methods of preservation of foods. Some of the most widely used ones are described here.

#### 1- REMOVAL OF MOISTURE:

This method of preservation of food relates with removal of water or drying process.

Dried foods are easy to store or transport because they occupy only about one tenth the volume of fresh food. The use of this technique controls the growth of micro-organisms, which render the food to spoil.

#### 2- ADDITION OF SALT AND SUGAR:

As a means of chemical preservation sugar and salt are added to many sausage to increase their shelf life. The sugar and salt bind the water, which helps the micro-organisms to grow. The inhibition in growth of microbes by this way retards the process of food spoilage. The water binding agents are known as humectants.

#### 3- TEMPERATURE CONTROL:

One of the controlling factors for preservation of food is temperature refrigeration and freezing of food in this respect lowers the environmental temperature to levels which do not allow the growth of many destructive organisms.

#### 4- PRESERVATION BY STORAGE:

Many types of fresh food such as fruits, vegetables, meats, fish etc. when required to be stored for long term are preserved by heat treatment employing various methods.

#### EXAMPLE:

##### i. CANNING:

*"The preservation of food by sealing into air tight containers is called canning."*

##### ii. IRRADIATION:

*"The process of passing radiation through any substance is called irradiation."*

Q8. What are the plastics? How many types of plastic there? Write its uses.

#### PLASTIC:

*"Plastics are one of the types of polymers. The compounds built up of a large number of smaller molecules that have reacted with one another are called polymers."*

#### TYPES OF PLASTICS:

Plastics are classified as:

##### i. Thermoplastics

##### ii. Thermosetting plastics

#### USES OF SOME OF THE COMMON PLASTICS:

##### a. polyethene:

It is a type of plastic which is most commonly used in the preparation of polythene bags for carrying fruits, vegetables etc and plastic bottles.

##### b. Polyvinyl chloride (PVC):

It is used in the manufacture of electric cable coverings, suitcases, gramophones records etc.

##### c. Bakelite:

It is used in manufacture of electric board sheets, switches, cameras, radio, telephones etc.

**Q9. Write differences between thermoplastic and thermosetting plastics.**

S.No	THERMO PLASTIC	THERMOSETTING PLASTIC
1.	They are formed by addition polymerization.	They are formed by condensation polymerization.
2.	They have low molecular weight.	They have high molecular weight.
3.	They are soft, weak and brittle.	They are hard, strong and more brittle.
4.	On heating they can be proceed.	On heating they cannot be proceed.

**Q10. What are detergents? Write down the composition and function of detergents.**

**DETERGENTS:**

The cleansing agents used for cleaning a solid surface are called detergents.

**COMPOSITION OF DETERGENTS:**

The detergents consist of two parts: a hydrocarbon and a sulphonate ( $-SO_3^-$ ) or a sulphate ( $-SO_4^{2-}$ ) group. These molecules are made usable by converting them into a water sodium salts. A simple example of these compounds is sodium lauryl sulphate,  $C_{12}H_{25}OSO_3^-Na^+$ , a sodium salt of a long hydrocarbon attached to a sulphate group.

The detergents closely related to soaps and used for household laundry belong to the sulphonates such as sodium -p-dodecyl benzene sulphate. The structure of such molecule contain a benzene ring between sulphonate and alkyl group.



**FUNCTION OF DETERGENTS:**

The detergents of this type are used for washing various kinds of clothes. Detergents function in the same way as soaps. they offer an advantage over soaps by functioning well in hard water, that is water containing calcium ( $Ca^{2+}$ ), ferrous ( $Fe^{2+}$ ), ferric ( $Fe^{3+}$ ) and magnesium ( $Mg^{2+}$ ) ions. These ions are converting into water soluble salts by detergents. A detergents removes dirt very easily. There is a large variety of detergents which are used as washing powders and washing liquids.

**Q11. Write differences between oil paints (Enamels) and water paints (Distemper).**

S.NO.	OIL PAINTS (ENAMELS)	WATER PAINTS (DISTEMPER)
1.	Oil base paints are composed of oil, pigments and thinners.	Water based paints are composed of emulsion.
2.	China clay and barium sulphate ( $BaSO_4$ ) are used as a filler in the pigments.	Different coloring material and colored salts are used as a pigments.
3.	These types of paints are usually called synthetic enamels.	These types of paints are usually called distemper and plastic emulsion.
4.	It can be applied over wooden or iron surfaces.	It can be applied over walls especially the interior ones.