

CHEMISTRY NOTES FOR CLASS 10TH (FOR SINDH)

CHAPTER

8

Chemical Industries

You will learn in this chapter about:

- ⚡ Chemical industries i.e. soda industries.
- ⚡ Industrial preparation of sodium hydroxide (NaOH), (Caustic soda). Its properties and uses.
- ⚡ Industrial preparation of sodium bicarbonate (NaHCO_3) and sodium carbonate (Na_2CO_3), their properties and uses, washing soda ($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$).
- ⚡ Soaps and their preparations (Saponification). Types of soaps, functions of soaps. Detergents, their compositions and functions of detergents.
- ⚡ Plastics, classification of plastics, structures and uses of common plastics.
- ⚡ Paints, composition of paints or enamels. Distempers varnishes, compositions and their uses or applications.
- ⚡ Polishes, black shoe polish, dark brown shoe polish. Preparation of shoe polish.
- ⚡ Inks, types of inks, preparations of some inks.
- ⚡ Food preservation, causes of food spoilage, food preservation method.

Section - A

Multiple Choice Questions (M.C.Qs.)

Choose the correct answer for each from the given options:

1. Sodium hydroxide is prepared on a large scale by the following methods.
(a) electrolytes process (b) saponification method
(c) hydrolysis. (d) hydration
2. Sodium hydroxide at 318°C :
(a) Melts with decomposition (b) Does not melt
(c) Melts to a clear liquid (d) Converts to gas.
3. Carbon dioxide and sodium hydroxide react to give:
(a) sodium carbonate and water (b) sodium carbonate only
(c) sodium metal and water (d) sodium and carbon monoxide
4. When sodium hydroxide reacts with ammonium chloride it liberates gas.
(a) carbon dioxides (b) hydrogen (c) oxygen (d) ammonia
5. Sodium hydrogen carbonate used in medicine to::
(a) increase the basicity (b) increase the acidity
(c) neutralize the acidity (d) decrease the basicity
6. The product obtained by reaction of sodium carbonate with carbon dioxide in aqueous medium is:
(a) sodium hydroxide (b) sodium hydrogen carbonate
(c) sodium peroxide (d) sodium oxide

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7. Carbonates and bicarbonates of sodium are manufactured by:
- (a) Contact method (b) Ammonia Solvay process
(c) Ostwald's process (d) Haber's method
8. Detergents are cleansing agents prepared from:
- (a) water soluble sodium salts (b) hydrocarbons only
(c) hydrocarbon and a sulphonate (d) sulphonate only
9. The material which softens on heating and hardens on cooling come under the class.
- (a) Thermosetting plastic (b) thermo plastic
(c) Formica (d) Bakelite
10. The class of plastic that can only be heated once before they set on cooling is:
- (a) thermo plastic (b) cellulose nitrate
(c) cellulose acetate (d) Thermosetting plastic
11. The polymer which is used in the manufacture of bags for shopping purpose is:
- (a) poly vinyl chloride (b) poly ethylene (c) epoxy resin (d) araldite
12. Cameras, radios, telephones sets, etc are prepared from:
- (a) polyethene (b) poly vinyl chloride
(c) Bakelite (d) cellulose nitrate
13. The pigments used to produce white colour are:
- (a) oxides of iron (b) chromium oxide (c) zinc sulphide (d) ferric oxide
14. Varnishes are used:
- (a) with pigments (b) without driers (c) without pigments (d) without resins
15. Which of the following constituents of shoe polish is used to provide shining to the shoes?
- (a) bees wax (b) sodium hydroxide (c) pearl ash (d) soap
16. The common ingredients used in black and brown shoe polishes is:
- (a) nigrosine oil (b) pearl ash (c) animal charcoal (d) turpentine oil
17. A mixture of gall nuts with ferrous sulphate and hydrochloric acid produces:
- (a) black ink (b) printing ink (c) marking ink (d) blue ink
18. Red ink is normally prepared from:
- (a) oak plant (b) linseed oil (c) silver nitrate (d) brazil wood
19. Addition of salts and sugar:
- (a) decreases the shelf life of food (b) preserve the food
(c) spoil the food (d) help to grow microorganisms
20. The radiation passed through food to preserve it are comprised of:
- (a) α - rays (b) γ - rays (c) β - rays (d) α , β and γ - rays
21. The chemical name of caustic soda is:
- (a) sodium hydroxide (b) potassium hydroxide
(c) lithium hydroxide (d) calcium hydroxide
22. The chemical name of soda ash is:
- (a) sodium carbonate (b) anhydrous sodium carbonate
(c) decahydrate sodium (d) aqueous sodium carbonate
23. The chemical name of baking soda is:
- (a) sodium carbonate (b) potassium carbonate
(c) sodium bicarbonate (d) potassium bicarbonate.
24. The chemical name of washing soda is:
- (a) sodium carbonate (b) calcium carbonate
(c) decahydrate calcium carbonate (d) decahydrate sodium carbonate

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25. The cell used to prepare sodium hydroxide is called:
 (a) Nelson (b) Castner Kellner (c) Daniel (d) voltaic cell
26. In Castner Kellner cell, cathode is a stream of flowing:
 (a) mercury (b) iron (c) sodium (d) water
27. In Castner Kellner cell, the gas released at the anode is:
 (a) hydrogen (b) oxygen (c) nitrogen (d) chlorine
28. Sodium and mercury react together to form sodium:
 (a) emulsion (b) metal (c) amalgam (d) colloid
29. Sodium hydroxide is a white _____ solid.
 (a) covalent (b) ionic (c) amorphous (d) crystalline
30. The melting point of sodium hydroxide is:
 (a) 218°C (b) 318°C (c) 228°C (d) 328°C
31. The density of sodium hydroxide is:
 (a) 1.13 g/ml (b) 2.13 g/ml (c) 3.13 g/ml (d) 4.13 g/ml
32. Sodium hydroxide is _____ soluble in water:
 (a) highly (b) sparingly (c) slightly (d) sufficiently
33. The reaction between sodium hydroxide and an acid is called:
 (a) hydrolysis (b) neutralization (c) combustion (d) decomposition.
34. Sodium hydroxide reacts with ammonium salts on warming to release:
 (a) nitrogen (b) hydrogen (c) oxygen (d) ammonia
35. Sodium hydroxide reacts with certain metals to form respective salts and _____ gas.
 (a) oxygen (b) hydrogen (c) chlorine (d) ammonia
36. Sodium hydroxide is used in the preparation of:
 (a) soap (b) paper (c) acids (d) plastics
37. A saturated solution of sodium chloride is called:
 (a) alkali (b) acid (c) base (d) brine
38. In ammonia Solvay process, carbon dioxide is produced by heating:
 (a) lime (b) limestone (c) slaked lime (d) quick lime
39. To recover ammonia for further use, ammonium chloride is reacted with:
 (a) sodium hydroxide (b) potassium hydroxide
 (c) calcium hydroxide (d) magnesium hydroxide
40. Sodium bicarbonate is used in medicines as:
 (a) oxyacid (b) acid (c) purgative (d) antacid
41. Sodium carbonate is a white _____ solid.
 (a) crystalline (b) covalent (c) ionic (d) amorphous
42. The melting point of sodium carbonate is:
 (a) 625°C (b) 752°C (c) 852°C (d) 952°C
43. When sodium carbonate is fused with sand (SiO_2), produces:
 (a) water glass (b) pyrex (c) ordinary glass (d) hard glass
44. Sodium Carbonate is used as a _____ agent.
 (a) drying (b) cleaning (c) colouring (d) germicide.
45. Sodium and potassium salts of which acids used for cleaning purposes:
 (a) fatty (b) carboxylic (c) acetic (d) strong
46. The formula for stearic acid is:
 (a) $\text{C}_{15}\text{H}_{31}\text{COOH}$ (b) $\text{C}_{17}\text{H}_{33}\text{COOH}$ (c) $\text{C}_{17}\text{H}_{35}\text{COOH}$ (d) $\text{C}_{14}\text{H}_{31}\text{COOH}$
47. The formula for oleic acid is:
 (a) $\text{C}_{15}\text{H}_{31}\text{COOH}$ (b) $\text{C}_{17}\text{H}_{33}\text{COOH}$ (c) $\text{C}_{17}\text{H}_{35}\text{COOH}$ (d) $\text{C}_{14}\text{H}_{31}\text{COOH}$

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48. The formula for palmitic acid is:
 (a) $C_{15}H_{31}COOH$ (b) $C_{17}H_{33}COOH$ (c) $C_{17}H_{35}COOH$ (d) $C_{16}H_{33}COOH$
49. The animal fats used as a source of fatty acids is for the making of soaps is:
 (a) mutton (b) sheep (c) beef (d) pig
50. The chemical process for the preparation of soap is called:
 (a) saponification (b) soaping (c) soap making (d) none of them
51. Glycerol is a _____ alcohol.
 (a) monohydric (b) dihydric (c) trihydric (d) polyhydric

Answers of M.C.Qs.

1. (a)	8. (c)	15. (a)	22. (b)	29. (d)	36. (a)	43. (a)
2. (c)	9. (b)	16. (d)	23. (c)	30. (b)	37. (d)	44. (b)
3. (a)	10. (d)	17. (a)	24. (d)	31. (b)	38. (b)	45. (a)
4. (d)	11. (b)	18. (d)	25. (b)	32. (a)	39. (c)	46. (c)
5. (c)	12. (c)	19. (b)	26. (a)	33. (b)	40. (d)	47. (b)
6. (b)	13. (c)	20. (d)	27. (d)	34. (d)	41. (d)	48. (a)
7. (b)	14. (c)	21. (a)	28. (c)	35. (b)	42. (c)	49. (c)
						50. (a)
						51. (c)

Section - B/C

Short / Descriptive Answer Questions

Q1. Give the industrial preparation of sodium hydroxide.

Ans. Industrial Preparation of Sodium Hydroxide (Caustic Soda) by:

Castner Kellner Process : Sodium hydroxide (caustic soda) is manufactured by the electrolysis of sodium chloride solution (brine). The electrolysis is carried out in castner kellner cell (a mercury cell), which consists of two compartments : one for the electrolytic decomposition of the brine, the other for the chemical decomposition of sodium amalgam.

In the electrolytic compartment the cathode consists of a moving stream of mercury and the anode consists of a number of titanium plates. sodium is deposited at the cathode and dissolves in the mercury forming an amalgam (sodium amalgam). The sodium amalgam flows out of the electrolytic chamber into the decomposition chamber where it reacts with water forming sodium hydroxide solution, hydrogen and free mercury.

At the cathode:



At the anode:



Diagram no.3 see page no. 256

There are no waste products in this process. The mercury set free in this cell is recycled to be used as cathode.

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Q2. What are the physical properties of sodium hydroxide?

Ans. Physical properties of sodium Hydroxide :

1. It melts at 318°C to a clear liquid and it decomposes at 322°C .
2. Its density is 2.13g/ml .
3. It is highly soluble in water.
4. It is deliquescent, i.e. it absorbs so much water (moisture) from the air that it dissolves in it (forms a solution). Deliquescent means turn to a liquid.
5. It is a strong alkali and turns red litmus to blue.
6. It is a white crystalline solid.

Q3. Write down the chemical properties of caustic soda (sodium hydroxide).

Ans. Chemical properties of caustic soda (sodium Hydroxide) :

1. **Reaction with Acids :** Sodium hydroxide reacts with acids forming corresponding salts along with water.
(i) Sodium hydroxide (NaOH) reacts with acid (HNO_3) to form sodium nitrate (NaNO_3) and water.



- (ii) Sodium hydroxide (NaOH) reacts with hydrochloric acid (HCl) to form sodium chloride (NaCl) and water.



- (iii) Sodium hydroxide (NaOH) reacts with sulphuric acid (H_2SO_4) to form sodium sulphate (Na_2SO_4) and water.



2. **Reaction with Ammonium Chloride :** Sodium hydroxide (NaOH) reacts with ammonium salts e.g. ammonium chloride (NH_4Cl) liberating ammonia (NH_3) gas along with sodium chloride (NaCl) and water (H_2O).



3. **Reaction with Carbon Dioxide :** Sodium hydroxide (NaOH) reacts with carbon dioxide (CO_2) to produce sodium carbonate (Na_2CO_3) and water (H_2O).

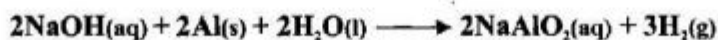


4. **Reaction with Chlorine :** Sodium hydroxide (NaOH) reacts with chlorine (Cl_2) gas to form sodium salt of oxyacid (sodium hypochlorite) along with sodium chloride (NaCl) and water (H_2O).



5. **Reaction with Metals :** Sodium hydroxide reacts with certain metals to form respective salts and hydrogen (H_2) gas.

- (i) Sodium hydroxide reacts with aluminium to form sodium aluminate (NaAlO_2) and hydrogen (H_2) gas.

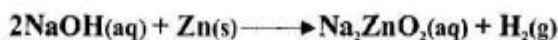


- (ii) Sodium hydroxide (NaOH) reacts with tin (Sn) to form sodium stannate (Na_2SnO_3) and hydrogen (H_2) gas.



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(iii) Sodium hydroxide (NaOH) reacts with zinc (Zn) to form sodium zincate (Na_2ZnO_2) and hydrogen (H_2).



Q4. Describe the uses of sodium hydroxide.

Karachi Board: 2008-2009-2011

Ans. Uses of Sodium Hydroxide :

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

Karachi Board: 2008-2009-2011

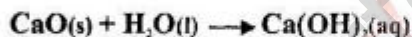
Q5. Describe ammonia solvay process for the manufacture of sodium hydrogen carbonate.

Ans. Industrial Preparation of Sodium Hydrogen Carbonate (Sodium Bicarbonate) by Ammonia Solvay Process : The most popular method of preparing sodium hydrogen carbonate is ammonia Solvay process. It consists of the following steps :

1. Limestone (CaCO_3) is heated to produce quick lime (CaO) and carbon dioxide.



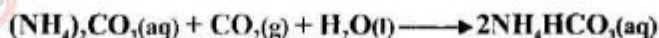
2. Slaked lime Ca(OH)_2 is prepared from quick lime (CaO).



3. Carbon dioxide (CO_2) is passed into a solution of common salt containing ammonia. Ammonium hydrogen carbonate (NH_4HCO_3) is first formed.



4. Excess carbon dioxide (CO_2) is passed into the solution to produce ammonium bicarbonate (NH_4HCO_3).



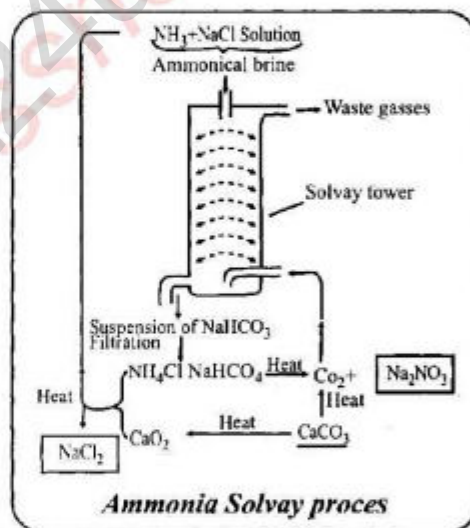
5. Ammonium bicarbonate (NH_4HCO_3) reacts with sodium (NaCl) of the brine to form a precipitate of sodium hydrogen carbonate (NaHCO_3) which is only sparingly soluble in brine.



6. The crystals of sodium bicarbonate (NaHCO_3) are filtered off, washed to remove ammonium salts and heated to form sodium carbonate which is called soda ash.



7. The liquid from the filters contains ammonium salts. Slaked lime is added and all the ammonia is liberated for use again.



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8. The overall reaction for the preparation of sodium hydrogen carbonate (NaHCO_3) may be summarized

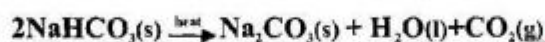


Q6. Write down the physical properties of sodium bicarbonate.

- Ans.** 1. It is a white crystalline compound. 2. It is bitter in taste.
3. Its density is 2.11 g/ml. 4. It is a weak alkali.
5. It is sparingly soluble in water.

Q7. Write down the chemical properties of sodium hydrogen carbonate.

- Ans.** 1. Sodium hydrogen carbonate gives off carbon dioxide (CO_2) on heating along with sodium carbonate (Na_2CO_3) and water (H_2O).



2. Sodium bicarbonate reacts with hydrochloric acid (HCl) to form sodium (NaCl) with the liberation of carbon dioxide (CO_2) gas along with water.



Q8. Write down the uses of sodium bicarbonate.

Karachi Board: 2012

Ans. Uses of sodium bicarbonate :

1. Sodium bicarbonate is largely used in baking powder for which it is called baking soda.
2. It is used in the preparation of effervescent drinks and fruit salts.
3. It is used in fire extinguisher.
4. It is used in medicine as antacid to neutralize the acidity in the stomach.
5. It is used in the textile, tanning, paper, ceramics industries.

Q9. Write down the industrial preparation of sodium carbonate.

Ans. Sodium carbonate (Na_2CO_3) can be prepared directly from sodium bicarbonate or by using the raw material adapting the method described for the preparation of sodium carbonate (Ammonia Solvay Process Q.5). By both means sodium bicarbonate is heated to give anhydrous sodium carbonate (soda ash).

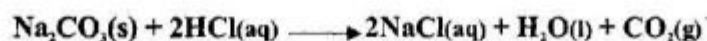


Q10. Write down the physical properties of sodium carbonate.

- Ans.** 1. It is a white amorphous solid. 2. It melts at 852°C .
3. It is highly soluble in water.

Q11. Write down the chemical properties of sodium carbonate.

- Ans.** 1. Sodium carbonate decomposes by the action of acids liberating carbon dioxide (CO_2) gas along with respective salts and water.



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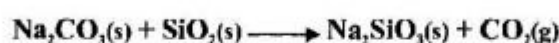
2. It reacts with nonalkali metal salts to form carbonates of nonalkali metal carbonates along with respective salts.



3. Aqueous sodium carbonate reacts with carbon dioxide to form sodium bicarbonate.



4. Sodium carbonate forms sodium silicate (Na_2SiO_3) reacting with sand (SiO_2).



Q12. What are the uses of sodium carbonate?

- Ans.** 1. It is used as a cleaning agent. 2. It is used for softening hard water.
3. It is used for making soap. 4. It is used for making glass and ceramics.
5. It is also used for making papers, cement and paint.

Q13. How is washing soda prepared?

Ans. **Preparation of Washing Soda:** On adding a calculated amount of water to soda ash (Na_2CO_3) sodium carbonate decahydrate ($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$) or washing soda is formed.



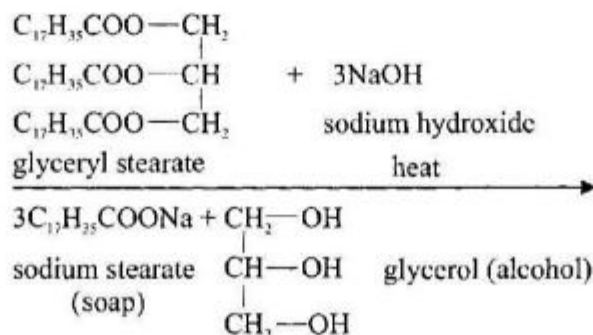
Q14. Define soap. How is soap prepared?

Karachi Board: 2010-2011

Ans. Soap: Ordinary soaps are the sodium and potassium salts of some complicated organic acids such as stearic acid ($\text{C}_{17}\text{H}_{35}\text{COOH}$), oleic acid ($\text{C}_{17}\text{H}_{33}\text{COOH}$) and palmitic acid ($\text{C}_{15}\text{H}_{31}\text{COOH}$) used for cleaning purposes.

Preparation of Soap (Saponification): Many naturally occurring fats and oils consist mainly of esters. The hydrolysis of esters is important in the manufacture of soap. A typical fat is glyceryl stearate.

Soap is made by heating a mixture of a fat and an aqueous caustic alkali with steam. The glycerol (an alcohol) is released from the fat and soap is formed. Strong brine is then added and the soap separates as curds on the top, the glycerol remains at the bottom of the watery solution. The chemical process for the preparation of soap is called saponification. The equation for the reaction is as under.



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Q15. What are different types of soaps and their composition ?

Karachi Board: 2011

Ans. Types of Soaps and their Composition :

- Toilet Soap :** They are prepared from 80 to 90% tallow oil and 10 to 20% coconut oil. Beef tallow consists of stearic acid and oleic acids. Palmitic acid is found in vegetable oils. In toilet soaps the desired colours and perfumes are added.
- Laundry Soaps :** The soap prepared by using ordinary fat is further heated with resin and caustic soda and their molten mixture is solidified. During solidification, sodium silicate, washing soda and sodium phosphate are added to enhance the cleaning ability of laundry soaps which are used for washing clothes.
- Kitchen Soaps :** They are prepared by adding finely divided sand and washing soda. Kitchen soaps are used for washing utensils.
- Shaving Soaps :** These soaps are prepared by the saponification of good quality animal fats or edible oils with potassium hydroxide (caustic potash -- KOH). In shaving soaps stearic acids is used in excessive amount to prevent them from drying.

Q16. Write down the function of Soap.

Ans. Function of Soap : Soap enables dirt and grease to be washed away in water, while water alone has no effect. Water molecules are polar. Dirt and grease, being mainly organic hydrocarbons, are nonpolar in water.

Soap has a nonpolar hydrocarbon end (this will dissolve grease) and polar charged end (this will dissolved in water).

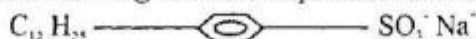
Agitating soap with water produces millions of tiny micelles. Within each micelle the soap molecules are grouped together with all the nonpolar ends grouped together in the centre while the polar ends points outwards, attracted towards the water. Nonpolar dirt and grease will dissolve in the nonpolar centre of these micelles. In this way dirt is indirectly dissolved in water, which is the function

Q17. Define detergents. Write down the composition and functions of detergents.

Ans. Detergents : Detergents, sometimes called "soapless soaps" are salts of sulphonic acids having a general formula $\text{RSO}_3^- \text{Na}^+$, or $\text{R}-\text{O}-\text{SO}_3^- \text{Na}^+$.

Composition of Detergents : Detergents consists of two parts, a hydrocarbon and a sulphonate ($-\text{SO}_3^-$) or a sulphate ($-\text{OSO}_3^-$) groups. Liquid and solid synthetic detergents are manufactured from petrochemicals and not from animal or vegetable fats and oils. A simple example of a detergent used for washing utensils has sodium lauryl sulphate $\text{C}_{12}\text{H}_{25}\text{OSO}_3^- \text{Na}^+$, a sodium salt of a long chain hydrocarbon attached to a sulphate group.

The detergents used for washing laundry belong to sulphonates such as sodium-*p*-dodecyl benzene sulphonate. It has a benzene ring between sulphonate and alkyl group.



Functions of Detergents : Detergents are better than soaps. They produce an abundant lather even in hard water. In addition they are not alkaline like many soaps. Detergents have excellent cleansing properties removing dirt easily.

Q18. Define plastics. Write down the classification of plastics.

Karachi Board: 2009-2011

Ans. Plastics : Plastics belong to synthetic polymers, A polymer is a large molecule built up from many hundreds or thousands of monomer units joined together. Thus the well known plastic polythene is composed of large molecules formed by the repeated combination of ethene molecules.

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Classification of Plastics : Plastics are classified as under:

1. **Thermoplastic :** It softens on heating and becomes hard again on cooling. This is because there are only weak attractive forces between the long polymer molecules and these are easily disrupted on heating. Most addition polymers and some condensation polymers are thermoplastic. They can be easily moulded into various shapes.

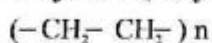
Examples: cellulose nitrate, cellulose acetate, vinyl polymers, nylon, polythene, polystyrene, etc.

2. **Thermosetting Plastics :** It becomes hard on heating. It can not be softened again by heating.

Example : phenol formaldehyde (formica, bakelite), epoxy resins (araldite and adhesive).

Q19. Write down the structure and uses of some common plastics.

Ans. 1. Polythene (Polyethylene) Structure :

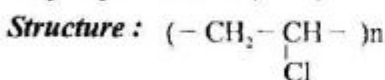


It is a polymer of ethene ($CH_2 = CH_2$).

Uses :

- (i) It is used in making common polythene bags used as shopping bags.
- (ii) It is also used in making plastic bottles.

2. **Polyvinyl Chloride (PVC) :**

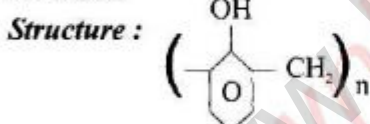


It is a polymer of vinyl chloride ($CH_2 = CHCl$).

Uses :

- (i) It is used in making electrical cable coverings.
- (ii) It is used in making suitcases, gramophone records and pipes.

3. **Bakelite :**



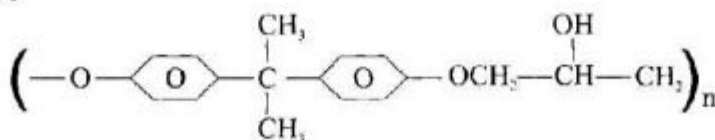
It is formed by polymerization of phenol and formaldehyde.

Uses :

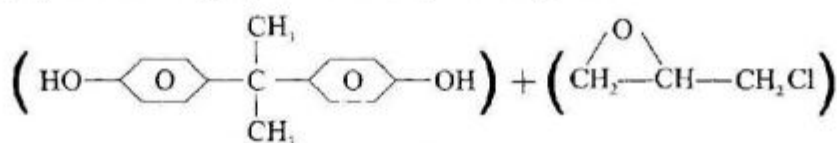
- (i) It is used in making switches, board sheets.
- (ii) It is also used in making camera, radio and telephone, etc.

4. **Epoxy Resin :**

Structure :



It is formed by polymerization of biphenol A and epichlorohydrin.



Example: Araldite plastic.

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Q20. What are paints? Describe the composition of oil paints and water paints. What are the characteristics of a good paint?

Ans. Paints : Paints are fluids containing a colouring material (pigment) and a binding medium (organic liquid).

Types of paints: Paints may be oil based or water based. Oil paints are also called enamels. Water paints are also called distempers.

Composition of Oil Paints (Enamels):

1. **Linseed Oil:** It serves as a protective layer on the painted surface.
2. **Pigments:** They give colour to the paints.
3. **Thinner:** It is turpentine or other volatile liquid.
4. **Resins:** They serve as binders.
5. **Drier:** It speeds up the drying of linseed oil.
6. **Fillers:** They include china clay or barium sulphate. They increase the durability of the paints. Oil paints or enamels are applied to wooden or iron surfaces.

Composition of Water Paints (Distempers):

1. **Emulsions:** Water paints consist of an emulsion of hydrocarbons, butadiene and styrene, polymers polyvinyl acetate or acrylic resins in water.
2. **Pigments:** For white colour usually titanium dioxide, lithopone, zinc sulphide, barium sulphate, for black colour carbon black, for yellow colour chrome yellow, for red colour oxides of iron (Fe_2O_3), for brown colour iron oxide (FeO) and for green colour chromium oxide are used. The remaining items of the paint are similar to oil paints. Water paints and plastic emulsions are applied to walls.

Characteristics of a good paint: A good paint should have the following characteristics:

1. It should resist the effects of light and heat.
2. It should resist the action of acids, alkalis and the atmospheric oxygen.
3. It should not be affected by climatic conditions like rain, heat or other seasonal changes.

Q21. Write a note on varnishes.

Ans. Varnishes : Varnishes are colloidal solutions. They do not have any pigments.

Composition of Varnishes:

1. **Linseed Oil:** It dries fast and forms a tough adherant film on the applied object.
2. **Resins:** The resins are synthetic alkyl and urethane. They are used for their durability, less yellowing ease of application and beauty. Alkyl resins are formed by the reaction of polyhydric alcohol and poly basic acids. Urethane resins are ethyl carbonate molecules.
3. **China wood Oil:** Varnishes differ from paints in not containing a pigment and plasticizer. Spirit varnishes use a volatile liquid like alcohol as a solvent for the resin.

Q22. What is a polish? What are the constituents of black and dark brown shoe polishes?

Ans. Polish : A polish is a protective layer applied to shoes, furniture, cars, house floors, etc.

Constituents of Black Shoe Polish: The black shoe polish comprises powdered animal charcoal, bee wax, carnauba wax, turpentine oil, sodium hydroxide and soap.

Constituents of Dark Brown Shoe Polish: It is mainly made from bismarck brown, pearl ash (potassium carbonate), turpentine oil, palm oil and soap.

Preparation of Shoe Polish: First bee wax is melted then turpentine oil is added to it. The mixture is mixed and cooled by stirring. Caustic soda heated in a little water to make a strong alkaline solution called lye. The lye is added to it and stirring is done till attains desired thickness. Then the pigment is added to it. For black shoe polish animal charcoal is added while for the brown shoe polish a concentrated solution of bismarck brown and pearl ash in water is added.

Functions of the Constituents: Animal charcoal gives black colour to the black shoe polish. Bismarck brown gives dark brown colour to the polish. The waxes: bee wax and carnauba wax

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maintain the required softness and provide shine to the shoes. Turpentine oil keeps the shoes soft, prevents them from drying and helps in the absorption of the polish in leather.

Q23. What are inks? Describe different types of inks.

Ans. **Inks:** They are colouring liquids having different composition. Inks are used for writing or printing.

Types of Inks:

1. **Black Ink:** It has an infusion of gall nuts with ferrous sulphate and some hydrochloric acid.
2. **Blue Ink:** It has prussian blue in a dilute solution of oxalic acid.
3. **Marking Ink:** It has silver nitrate solution with a colour or it is thickened with a gum or a dye.
4. **Printing Ink:** For a good quality printing a polymerized linseed oil is usually used along with resin oil and various pigments. Low quality printing inks have a varnish medium along with driers and pigments.
5. **Red Ink:** It is made from Brazil wood or by dissolving carmine in aqueous ammonium hydroxide. The dye eosin is also a constituents of red ink.
6. **Typewriting Ink:** They have glycerol along with dyes and other materials.
7. **Blue Black Ink:** It consists of tannic acid, gallic acid, ferrous sulphate, dilute hydrochloric acid, gum arabic, carbolic acid, phenol blue and water.
8. **Royal Blue Ink:** It has methyl violet, ethylene glycol, acetone, phenol and carboxy methyl Cellulose along with blue colour.
9. **Stamp pad Ink:** It consists of aniline dye, glycerine, tug, soyabean oil, water and alcohol.

Q24. Write down the preparations of blue black ink.

Ans. Preparations of Blue Black Ink : Tannic acid (75g) and gallic acid (30g) are dissolved in 150cm³ of warm water. In another container, ferrous sulphate (100g) along with gum arabic (60g) is dissolved in 600cm³ of distilled water. The two solutions are mixed with 75ml of dilute hydrochloric acid (15g) along with phenol blue (15g) and water to produce 30cubic decimetre solution. The contents are left for 15 days and then filtered.

Q25. Write down the preparations of royal blue ink.

Ans. Royal Blue Ink : Carboxy methyl cellulose is first dissolved in a little water. In another container, ink blue (15g) and methyl violet (5g) are dissolved in 200 cubic centimetre distilled water and the solution is filtered. This solution is mixed with the earlier prepared solution along with ethylene glycol 20 cubic centimetre and acetone 10 cubic centimetre and 1g phenol. The solution is stirred well and left for 10 days. Then it is filtered, the royal blue ink is ready for use.

Q26. What is meant by food preservation? What are the causes of food spoilage?

Ans. Food Preservation : Preventing food from being destroyed or spoiled is called food preservation.

Causes of Food Spoilage: There are a number of causes of food spoilage. Some of them are given as under:

1. **Moisture:** Moisture promotes the growth of microorganisms. That is the reason that food spoils fast in moist weather and humid places.
2. **Microbial Activities:** Fish, poultry, dairy products are easily spoiled by microorganism growth.
3. **Chemical Changes:** The chemical changes brought about by enzymes spoil the food easily. These enzymes are produced by yeasts, moulds and bacteria.

Q27. Write down some food preservation methods.

Ans. Some common food preservation methods are given as under:

1. **Removal of Moisture:** In this method, food is dried by the removal of water. Meat, milk, tea,

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coffee, some vegetables and fruits are dried to preserve them for a long time. This technique controls the growth of microorganisms. Dried food is easy to store and transport too. Dried food occupies only one tenth the volume of fresh food.

2. **Addition of Salt and Sugar:** Salt and sugar bind the water molecules and thus the growth of microorganisms is checked. The water binding agents are called humectants.
3. **Temperature control:** Refrigeration and freezing of food controls the growth of microorganisms. Food can be preserved for a long time by temperature control.
4. **Preservation by Storage:** Two common methods of storage are given as under:
 - (i) **Canning:** The food sealed into air tight containers for preservation is called canning.
 - (ii) **Irradiation:** The process of radiating any substance by alpha, beta and gamma rays is called irradiation. Recommended doses for radiation do not have any harmful effects on food which can be preserved by this method.
5. **Preservation by Chemical Addition:** Sodium sulphite, potassium metabisulphite are used to prevent the bread and cheese from moulds and yeasts. Dry fruit, jams and jellies are preserved by the addition of sulphur dioxide or salts of sulphurous acid.

Textbook Exercise

1. Fill in the blanks :

- (i) Sodium hydroxide causes harmful burns to the skin, therefore it is commonly called caustic soda.
- (ii) Sodium hydroxide produces a large amount of heat when dissolved in water.
- (iii) When sodium hydroxide is treated with sulphuric acid it forms sodium sulphate salt.
- (iv) The reaction of sodium hydroxide with certain metals results in the liberation of hydrogen gas.
- (v) The molecular formula for baking soda is NaHCO_3 .
- (vi) Sodium carbonate, washing soda and baking soda are generally prepared by ammonia solvay process.
- (vii) The chemical process for the preparation of soap is called saponification.
- (viii) The detergents usually consist of two parts, a hydrocarbon and a sulphonate or a sulphate.
- (ix) Compound made up of large number of smaller molecules are called polymers.
- (x) The plastics belong to thermosetting class can only be heated once before they set on cooling.
- (xi) P.V.C is the abbreviation (short form) for polyvinyl chloride.
- (xii) Paints are fluids containing pigments dispersed in organic liquid.
- (xiii) Linseed oil, pigment, resins, etc are main components of oil paints.
- (xiv) A thinner is turpentine or other volatile liquid.
- (xv) Water based paints are available in the form of Plastic emulsions.
- (xvi) varnishes are used without pigments to furnish the transparent film on the surface coated.
- (xvii) Marketing ink consist of AgNO_3 solution thickened with gum or of dyes.
- (xviii) The removal of moisture controls the growth of microorganism which renders the food to spoil.

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- (xix) The water binding agents used in the preservation of food are known as humectants.
- (xx) The preservation of food by sealing into tight containers is called canning.
- (xxi) NaHCO_3 is used in the preparation of effervescent drinks and fruit salts.
- (xxii) Sodium carbonate when fused with sand (SiO_2) it forms sodium silicate (glass).
- (xxiii) Na_2CO_3 is used for softening hard water.
- (xxiv) The colour of black shoe polish is due to animal charcoal.
- (xxv) Turpentine oil beside keeping the shoes soft prevent them from drying and helps in its absorption in the leather.

Answers the following questions.

2. (a) Give the industrial preparation of sodium hydroxide.

Ans: See Q.1.

- (b) Give the reaction of NaOH with.



Ans: See Q.3.

- (c) Describe the uses of NaOH.

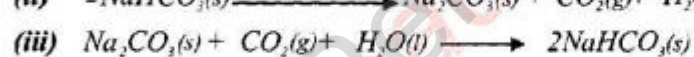
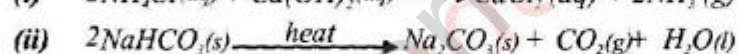
Ans: See Q.4.

3. (a) Describe ammonia solvay process for the manufacture of sodium hydrogen carbonate.

Ans: See Q.5.

- (b) Complete the following reactions.

Ans: Balanced Equations:



4. (a) What do you mean by saponification?

Ans: See Q.14.

- (b) What are different types of soap? and what is the function of soap?

Ans: See Q.15 and 16.

5. (a) What do you understand by a detergent? Give the composition of detergent and its function.

Ans: See Q.17.

- (b) Differentiate between thermoplastic and thermosetting plastic. Describe the structure of some of the plastic.

Ans: See Q.18.

- (c) Describe composition and application of varnishes.

Ans: See Q.21.

6. (a) Differentiate between oil paints and water paints.

Ans: See Q.20.

- (b) What are polishes? Give in details about the compositions and preposition of different types of polishes.

Ans: See Q.22.

- (c) Write notes on food preservation.

Ans: See Q.26 and 27.

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