→ All exercise is according to the new book :-

Q.1 Solved MCQs :-

(1)	(c)	(8)	(c)
(2)	(d)	(9)	(a)
(3)	(a)	(10)	(d)
(4)	(b)	(11)	(c)
(5)	(c)	(12)	(d)
(6)	(b)	(13)	(d)
(7)	(b)	(14)	(b)

Q.2 Short Questions / Answers :-

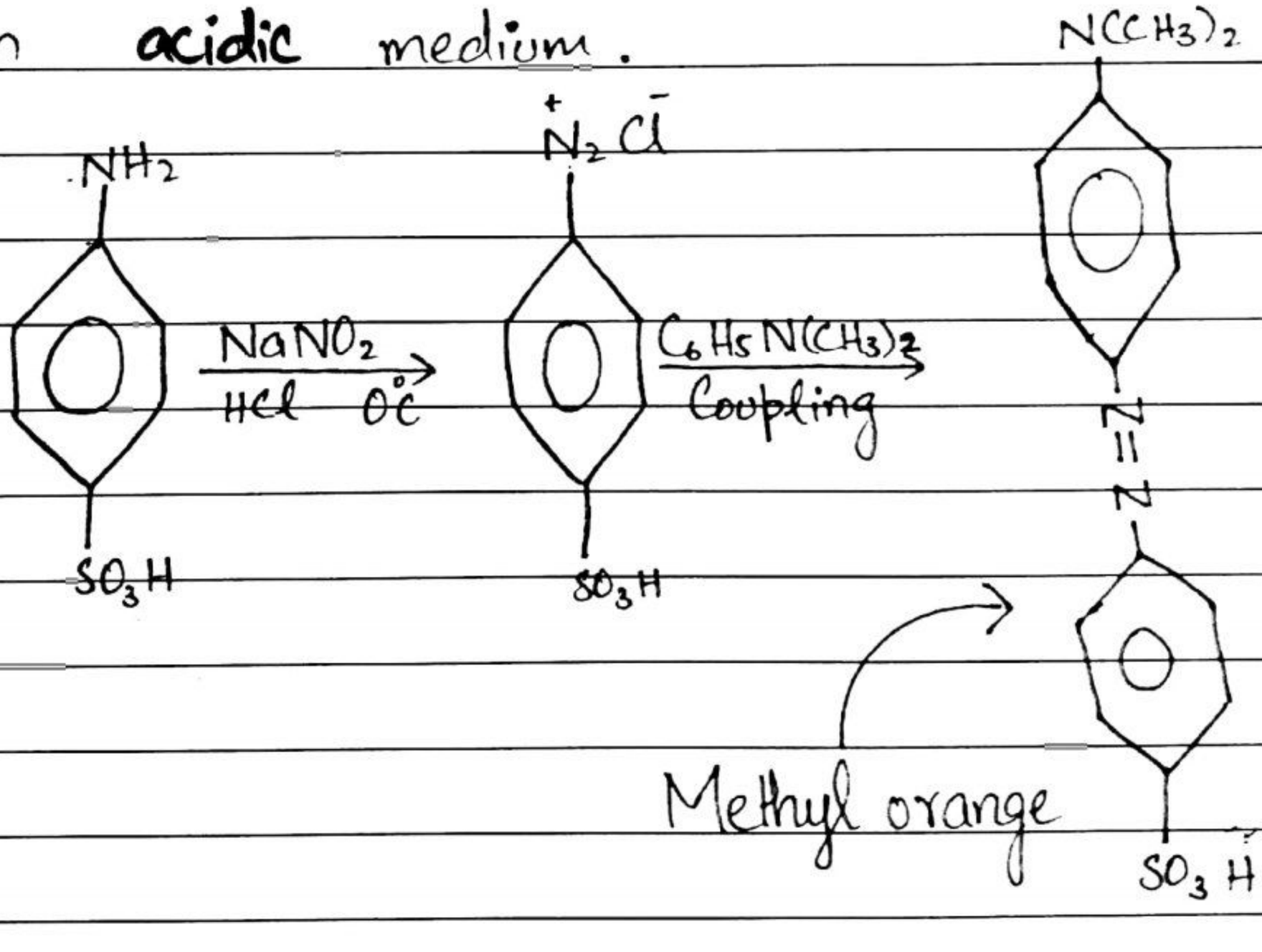
Q (i) What is the difference between classical and Industrial chemistry ?

Ans (i)	Classical chemistry	Industrial chemistry
(*)	Classical chemistry is very essential for advancing the science of chemistry by discovering and reporting new products, routes, and techniques.	(*) Industrial chemistry applies physical and chemical procedures for the transformation of natural raw material in to products useful for humans.
*)	Classical chemistry is not commercial.	*) Industrial chemistry is commercially used in society.

Q (ii) How is methyl orange prepared?

Ans (ii) Methyl orange is obtained from **sulphanilic acid** by the following steps:

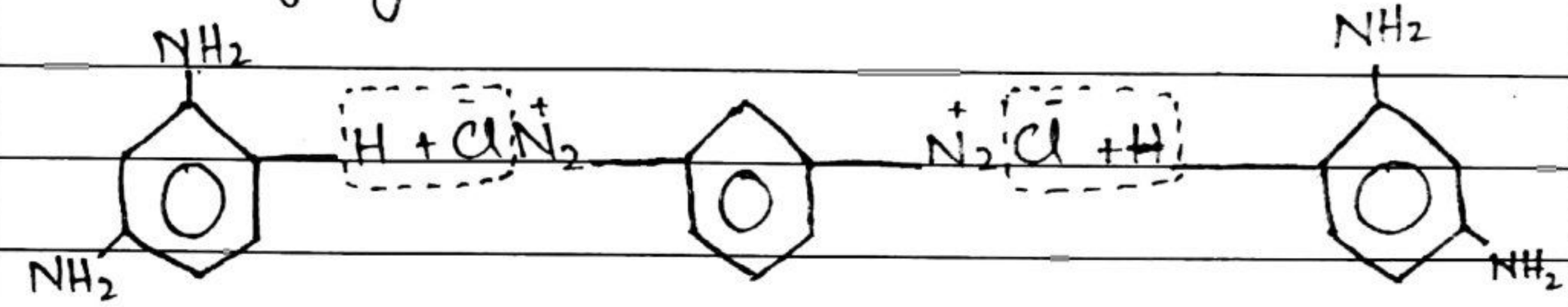
Methyl orange imparts orange colour to wool and silk but the colour is not fast to sunligth or washing. It is a valuable indicator for acid-base titrations because it gives **yellow** colour in **basic** medium and **red** colour in **acidic** medium.



Q (iii) How is Bismarck Brown prepared?

Ans (iii) It is obtained by coupling of **one** molecule

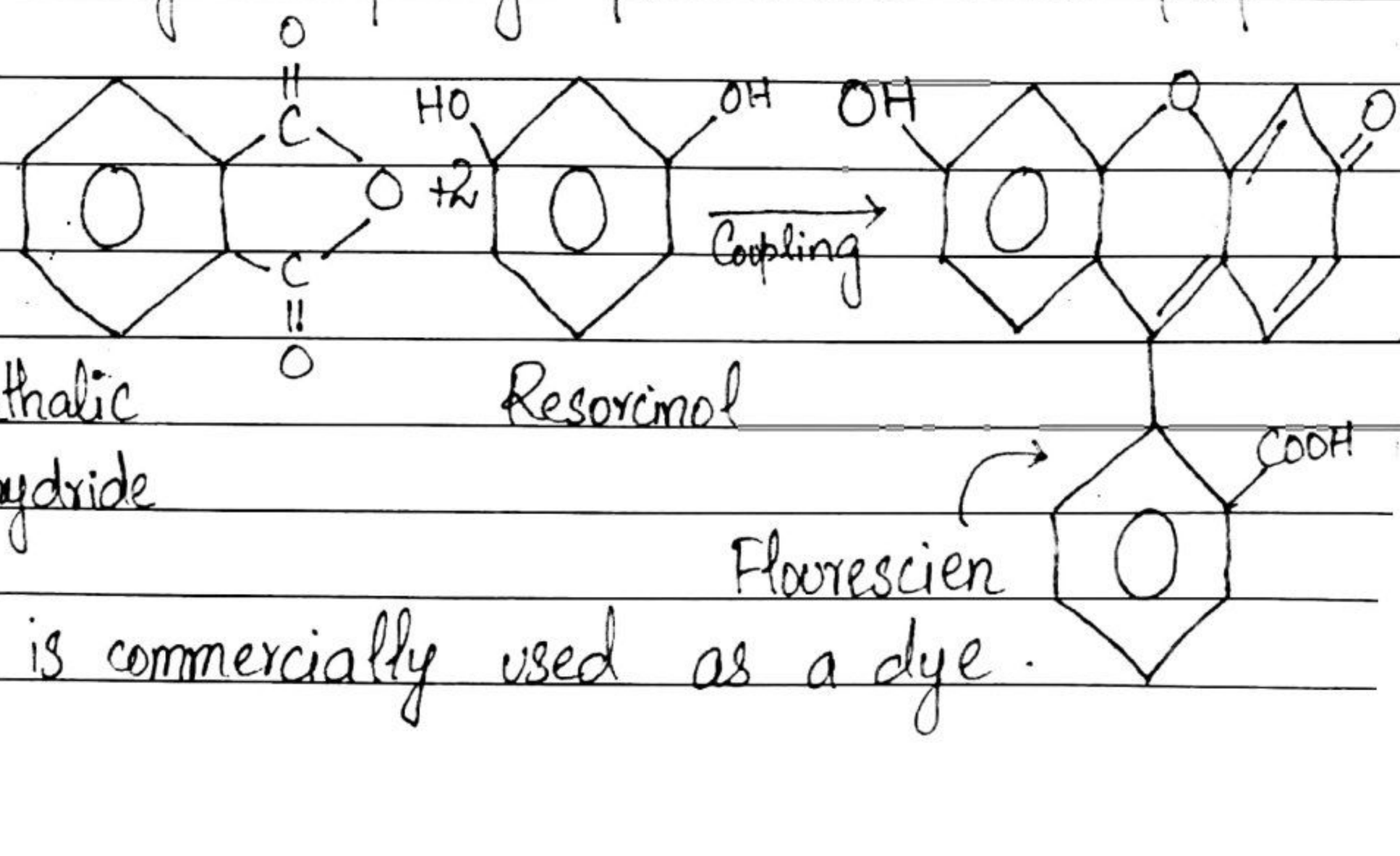
of **tetrazotised meta-diamino benzene** and **2 molecules of meta-diamino benzene**. It is used as a dye for shoe polish and for dying wool and cotton.



Bismarck Brown

Q (iv) How is Flourescien prepared?

Ans(iv) When **Phthalic anhydride** is reacted with **2** moles of **Resorcinol** then by coupling flourescien is prepared



Phthalic anhydride

Resorcinol

Flourescien

It is commercially used as a dye.

Q (v) Enlist different chemicals produced from ethylene ?

Ans(v) Different chemicals produced from ethylene include

1) 1,2- Dichloroethane.
2) Vinyl acetalē.
3) Ethylene oxide.
4) Ethanol.
5) Poly ethylene.

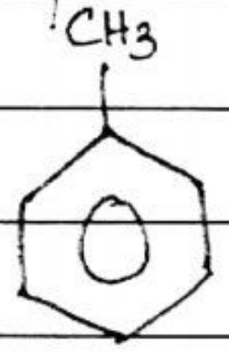
ethylene $\Rightarrow CH_2=CH_2$

Q (vi) Writē different chemicals produced from toulene ?

Ans(vi) These are the certain chemical produced from toulene

1) Benzene
2) Benzoic acid
3) Toulene diisocyanatē (T-D-I)

Toulene =>

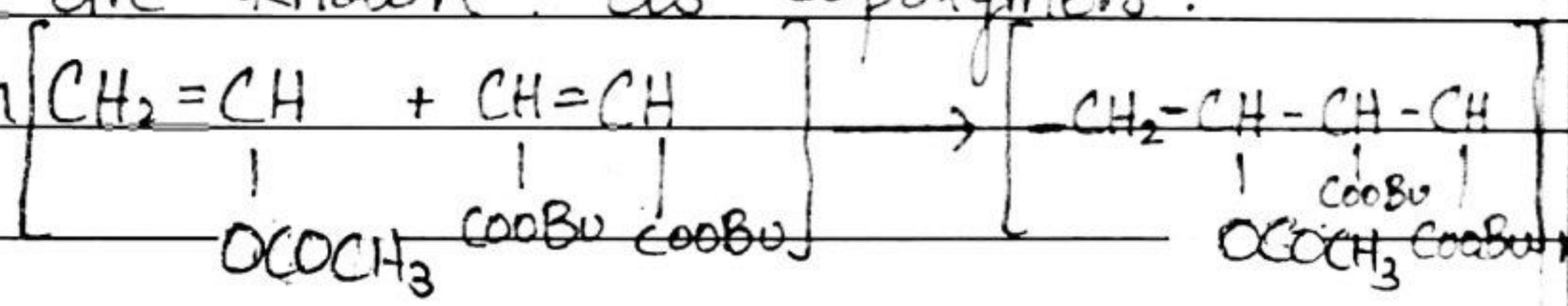


Q (vii) Differentiatē between homopolymer and copolymer?

Ans(vii) **Homopolymer**:- Polymers which are synthesized by only one kind of monomers are called Homopolymer.

e.g $n\left\{CH_2=CH(OCOCH_3)\right\} \xrightarrow{\text{Polymerization}} \left[-CH_2-CH(OCOCH_3)-\right]_n$

Copolymer:- Polymers which are synthesized from two different kind of monomers are known as copolymers.

e.g 

Q.(viii) What is the difference between therom plastic and thermosetting polymers?

Ans(viii) **Theromoplastic polymers:-** These are that type of plastic polymers which softens on heating and hardens on cooling

e.g Poly vinyl chloride (PVC)

Thermosetting polymers:- These are type of plastic polymers which become more hard on heating and do not become soft when heated

e.g Bake lite

Q (ix) How will you sythesize Nylon 6,6 from 1,3 Buta diene

Ans (ix) 1-3-Butadiene ⟶ Nylon 6,6

$$CH_2=CH-CH=CH_2 + Cl_2 \xrightarrow{h\nu} \underset{Cl}{CH_2}-CH=CH-\underset{Cl}{CH_2}$$

$$\underset{Cl}{CH_2}-CH=CH-\underset{Cl}{CH_2} + 2NaCN \longrightarrow \underset{CN}{CH_2}-CH=CH-\underset{CN}{CH_2} + 2NaCl$$

$$\underset{CN}{CH_2}-CH=HC-\underset{CN}{CH_2} + H_2 \xrightarrow[\Delta]{Ni} CN-CH_2-CH_2-CH_2-CH_2-CN$$

$$CN-CH_2-CH_2-CH_2-CH_2-CN \xrightarrow{H_3O^+} COOH(CH_2)_4COOH$$

$$CN-CH_2-CH_2-CH_2-CH_2-CN \xrightarrow{LiAlH_4} NH_2(CH_2)_6NH_2$$

Now,

$$n\left[HO-\overset{O}{\overset{\|}{C}}-(CH_2)_4-\overset{O}{\overset{\|}{C}}-OH + H-NH-(CH_2)_6-NH-H\right]$$

Adepic acid — Hexamethylene diamine

$$\left[-\overset{O}{\overset{\|}{C}}-(CH_2)_4-\overset{O}{\overset{\|}{C}}-NH-(CH_2)_6-NH-\right]_n + nH_2O$$

Nylon 6,6

Q.3 Long Questions

Q (i) What is chemical industry? Discuss different raw materials used in this industry?

Ans (i) **Chemical Industry:-** The industry which uses chemicals (raw or pure) for the welfare of society is known as chemical industry.

The chemical industry can also be classified according to the type of main raw materials used or type of principal products made. We therefore have **industrial inorganic chemicals industries** and **industrial organic chemical industries.**

All chemicals are derived from raw materials available in nature. The natural enviorment is the source of raw materials for the chemical industry.

(a) **Raw material from the atmosphere:-**

The atmosphere is a field above ground level. The mass of earth's atmosphere is approximately 5×10^{15} tons. It is the source of six industrial gases namely NO_2, O_2, Ne, Ar, Kr and Xe are manufactured.

(b) **Raw materials from the hydrosphere:-**

Ocean water is about 1.5×10^{21} liters and is a good source of NaCl, Mg, Br.

Raw materials from lithosphere :-

The vast majority of elements are obtained from the earth's crust in the form of **mineral ores, carbon** and **hydro carbons. Coal, natural gas and crude petroleum** besides being energy sources are also converted to thousands of chemicals.

Raw materials from the biosphere :-

Vegetation and animals contribute raw materials to the so-called angro-basked industries. **Oils, fats, waxes, resins, suger, natural fibers** and leather are example of thousands of natural products.

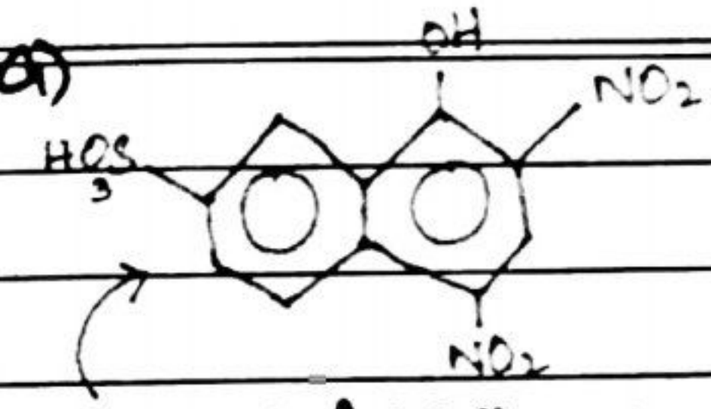
Q(ii) What are dyes? How are they classified on the basis of structures?

Ans(ii) **Dyes:-** A dye is a coloured compound, normally used in solution, which is capable of being fixed to fabric. A dye owes its colour and fixing property to the acidic or basic auxochromic group such as OH, SO_3H, NH_2 and NR_2 e.t.c.

Classification :- Dyes may be classified according to the type of chromophores present in their structures. These include:

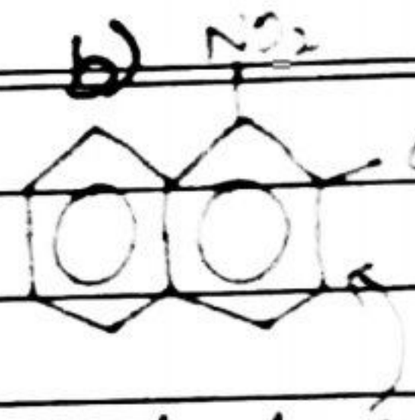
1) **Nitro and Nitroso Dye :-** The NO_2 and NO group are chromophores in this class of dyes. e.g are

a)



Naphthol Yellow (nitro dye)

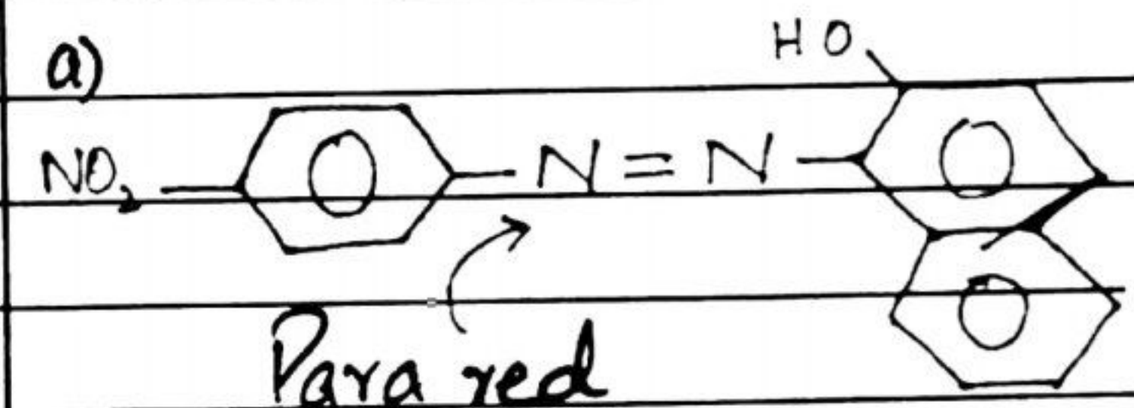
b)



Mordant Green 4 (nitro dye)

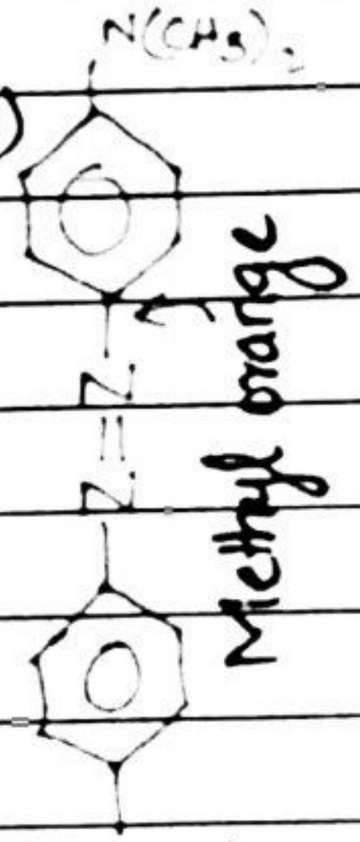
2) **Azo Dye :-** The azo dye contain more azo group -N=N-. The common auxochromes are NH_2, NR_2, OH, $S^{(III)}$

a)

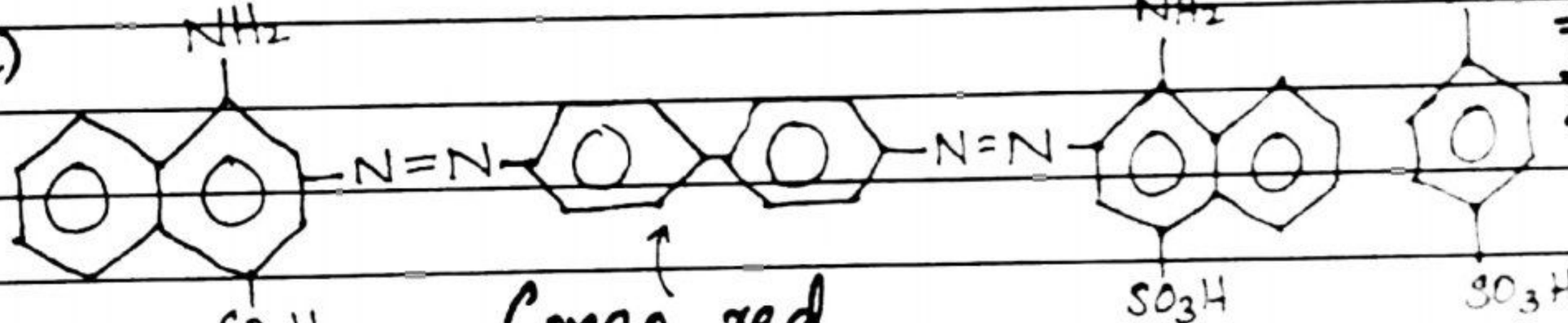


Para red

b)

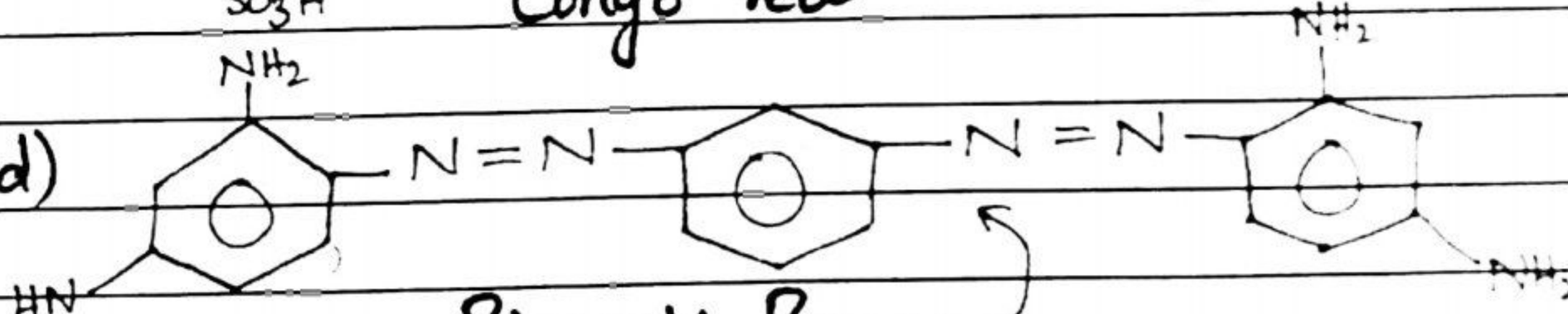


c)



Congo red

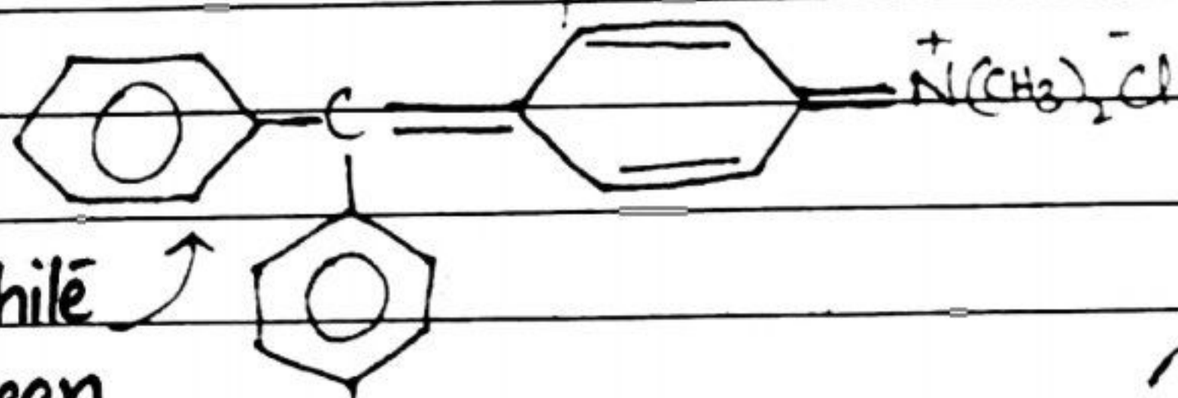
d)



Bismarck Brown

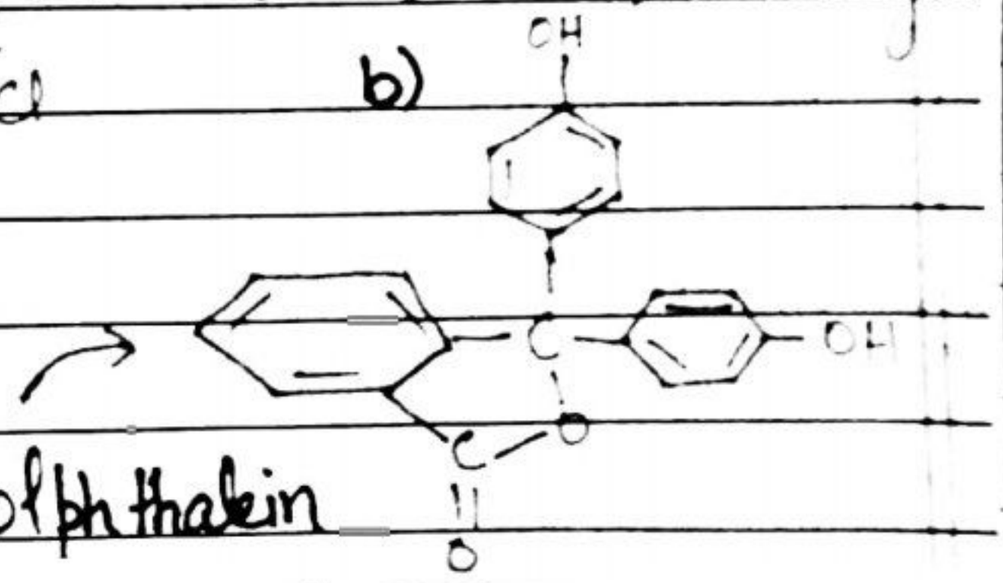
3) **Triaryl methane dyes:-** In triarylmethane dye, a central carbon is bonded to three aromatic rings one of which is the chromophore. The auxochromes are $-NH_2$, $-NR_2$ e.g

a)



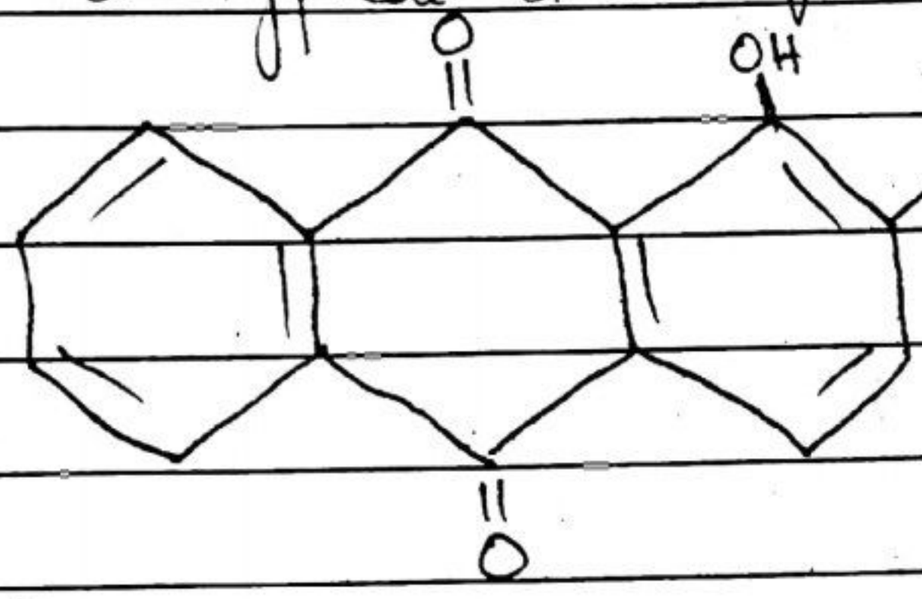
Malachite Green

b)



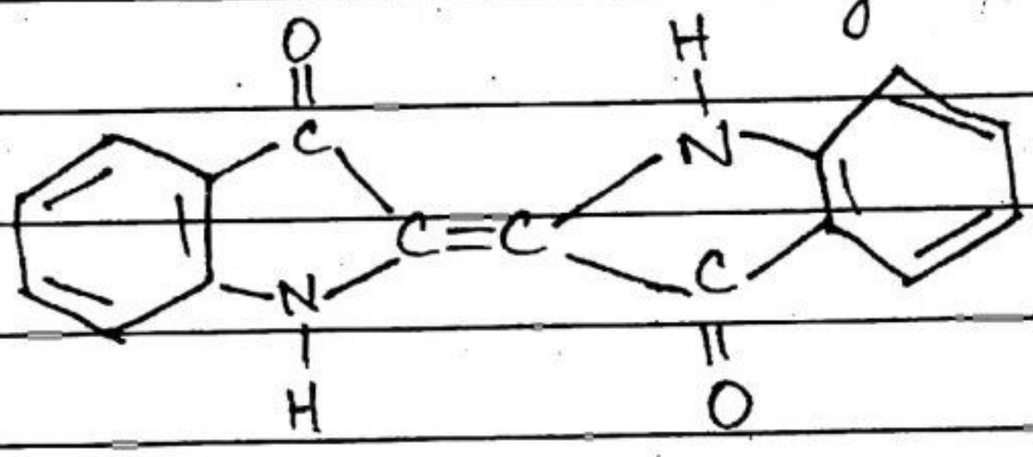
Phenolphthalein

4) **Anthraquinone Dye:-** Para quinoid chromophore is present in these anthracene-type dyes. Alizarin is a typical anthraquionone dye.



← Alizarin

5) **Indigo dye:-** These are the type of dyes which contain carbonyl chromophores



← Indigo

Q (iii) What do you know about dye? How are they classified on the bases of applications?

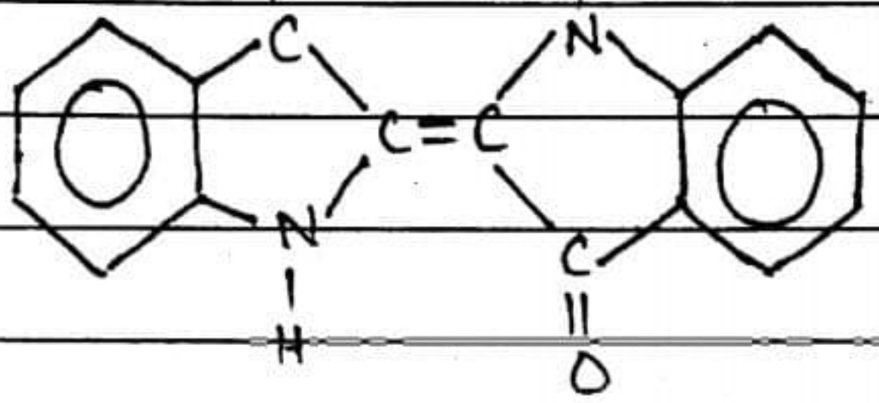
Ans (iii) **Dye:-** A dye is a coloured compound, normally used in solution, which is capable of being fixed in fabric.

Classification on the basis of applications:- The dyes are often classified on the basis of techniques employed for their application.

1) **Direct dye:-** These are dyes which can be applied to the fabric by direct immersion in aqous solution. A direct dye contain acidic or basic anochrome which combine with the opposite polar group present in the fabric Wool and silk are readily dyed by this method.

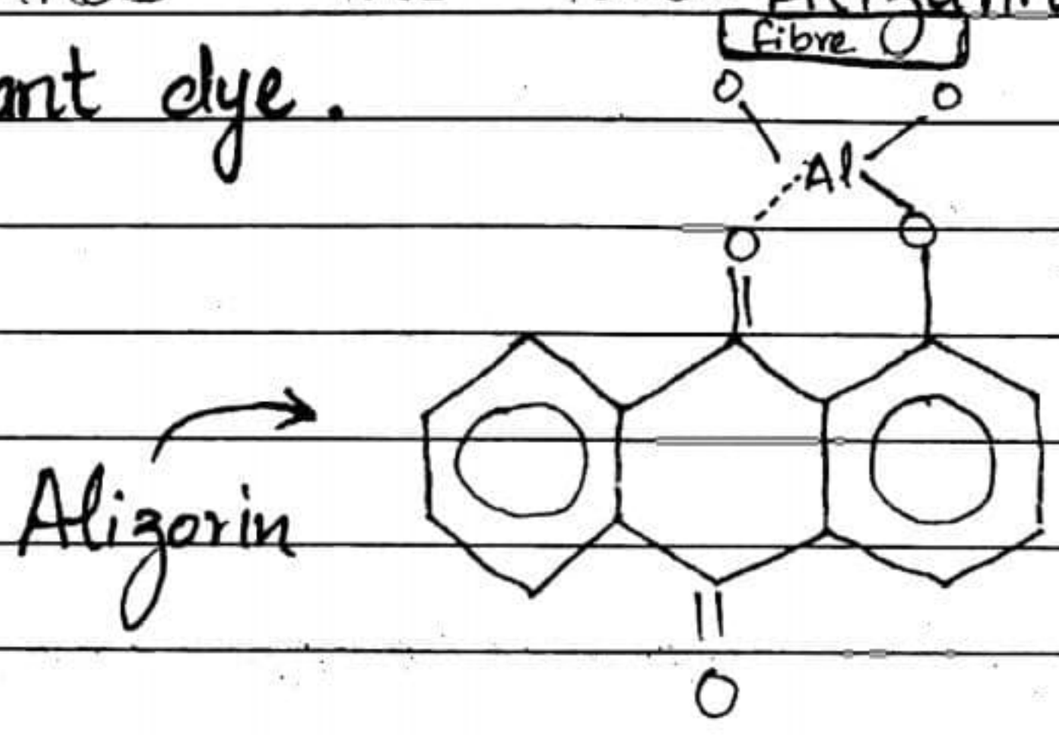
Martius Yellow is an example of typical direct dye.

2) **Vat Dyes**:- These dyes are insoluble in water but on reduction with sodium hydrosulphide in a vat form a colourless compound which has a great affinity for cotton and other cellulose fabric is made. **Indigo is a good example of vat dye.**



← Indigo

3) **Mordant Dye**:- This class of dyes has no natural affinity for the fabric and are applied to it with the help of salts e.g oxides of aluminium or chromium. These salts are called Mordants. A fibre such as cotton is first treated with a mordant and then with the dye solution. The mordant form an insoluble coordination complex between the fiber and the dye and binds the two. **Alizarin is an example of a mordant dye.**



Alizarin →

4) **Azoic Dye:-** In this methode of dyeing, The cloth is first soaked in the solution of a coupling reagent usually a phenol or naphthol. Then it is immersed in the solution of an auxochromes. It is suitable for cotton, nylon and other cellulosic fibre.

5) **Disperse Dye:-** These dyes are insoluble in water but can be dispersed in a colloidial form of water. The fabric is immersed in the colloidial dispersion of the dye. The fine dye particles are absorbed into the crystal structure of the fabric. These are used in nylon, orlon, polyester and cellulose acetate.

Q iv) Write a note on (i) Vat dyes (ii) Mordant Dye?

Ans (i) **Vat Dyes:-** These dyes are soluble in water but on reduction with sodium hydrosulphide in a vat form a colourless solable compound is achieved. The cloth is soaked in the solution of a reduced dye and then hung in air, or treated with oxidants. As a result colourless compound is oxidized back to its insoluble dye. Indigo is its example (Structure is in previous answer).

(ii) **Mordant Dyes-** This class of dye has no natural affinity for the fabric and are applied to it with the help of salts e.g oxides of aluminium and chromium. These salts are called Mordants. A fiber such as cotton is first treated with a mordant and then with dye solution. The mordant forms an insoluble coordination complex between the fibre and the dye and binds the two. Alizarin is an example of a mordant dye. (Structure is given in previous answer)

Q.(v) What are Pesticides. Describe its types in detail?

Ans (v) **Pesticides:-** are any chemicals used by human to control pests. Pests may be insects, plants diseases, fungi, weeds e.t.c. It is of 8 types.

1) **Insecticides:-** These are chemicals used to control insects.

2) **Miticides:-** These are chemicals used to control mites and ticks.

3) **Fungicides:-** These are chemicals used to control fungi which causes molds, rots and plant diseases.

4) **Herbicides:-** These are chemicals used to control unwanted plants. It may be selective or non-selective herbicides.

i) **Non-selective herbicides:-** are toxic to all plants. These are often used to clear all plants. e.g. it can be used for clearing gaurabo

ii) **Selective herbicides:-** Kill some plants with no or little injurey to other significant plants.. e.g it can be used for lawn i.e. crabgrass killers on lawns.

5) **Rodenticides:-** These are chemicals used to control rats, bats and mice.

6) **Nematicides:-** These are chemicals used to kill nematodes.

7) **Molluscicides :-** These are chemicals used to kill snails and slugs.

8) **Repellent:-** There are chemicals which makes sites of food unattractive to the targeted pest.

Q (vi) Describe the basic building block in petrochemical tecnology?

Ans(vi) **Petrochemicals** are chemicals derived from petroleum

Building blocks:- There are 3 building blocks of petrochemical technology

1) **Olefin:-** include ethylene, propylene and butadiene. Ethylene and propylene are important sources of industrial chemicals and plastics products. Butadien is used in making rubber. Oleifin are basis for polymers and olefins are producing plastic, resins, fibres, eldstomers and gels.

2) **Aromatics:-** includes benzene, toulene, xylene. At oil refineries, aromatic hydrocarbons are mainly produced by catalytic reforms.

3) **Synthesis gases:-** Is a mixture of carbon monoxide and hydrogen used to make ammonia and methanol. Ammonia is used to make the fertilizer urea and methanol is used as a solvent.

Q (vii) Describe raw materials and manufacturing process of Nail Polish?

Ans(vii) **Raw materials:-** There are 4 raw materials for the production of nail polish these include.

1) **Film forming agent:-** e.g Nitrocellulose.
2) **Resins and plasticizers:-** e.g castor oil, fatty acids and acetic ac
3) **Solvents:-** e.g Butyl stearate and acetate compounds.
4) **Colouring agent:-** e.g "pearl" or "fish scale".

Manufacturing process:-

1. When properly and fully milled, the mixture is removed from the mill in the sheet form and then broken up into small chips for mixing with the solvent. The mixing is performed in stainless steel Kettles.
2. At the end of the process, the mix is cooled slightly before the addition of such other materials as perfumes and moisturizers.
3. The mixture is then pumped in to smaller, 55 gallon drums and then trucked to a production line. The finished nail polish is pumped in to explosion proof pumps and then into smaller bottles suitable for the retail market.

Q.(viii) What are adhesives? Discuss its working and types?

Ans(viii) **Adhesive**:- are meant to stick things together. An adhesive is a compound that adheres or bonds two items together. Adhesives may come from either natural or sythetic sources. Adhesive are natural product; it is also manufactured in factories. Some modern adhesive are extremely strong, and are becoming increasingly important in modern construction and industry.

Types:

1) **Natural adhesives**:- are made from inorganic mineral sources, or biological sources such as vegetable matter, starch, natural resins, animal skin. They are often referred to as bioadhesives.
2) **Sythetic adhesives**- Elastomers, thermoplastic, and thermosetting adhesive

are examples of sythetic adhesives.

3) **Drying adhesives:-** These adhesives are a combination of ingredients suspended in a solvent. White glue and rubber cements are members of the drying adhesive family. As the solvent evaporates, the adhesive hardens.

4) **Contact adhesives:-** Contact adhesives must be applied to both surfaces and allowed some time to dry before the two surfaces are pushed together. Some contact adhesives require as long as 24 hours to dry before the surface are to be held together.

5) **Hot glue:-** Also known as "hot melt" adhesives, these adhesives are thermoplastics; they are popular for crafts because of their ease of use and the wide range of common materials to which they can adhere. The glue gun melts the solid adhesive and then allows the liquids to pass through the "barrel" of the gun onto the materi where it solidifies.

6) **UV and light curing adhesives:-** UV and light curing adhesives consist essentially of low or medium molecular weight resins.