CHEMISTRY (HONS) PAPER - VII

ORGANIC CHEMISTRY

Q.1. What is a dye ?

Ans. : A dye is a natural or synthetic coloured organic compound that is used to impart colour to an object like fibres, leather, wood etc. A good dye must be capable of easy application, fast to laundering, light etc. and water soluble. The structure of dyes contains aromatic and heterocyclic rings with $-OH, -SO_3 - NO_2, -NH_2, -COOH$ and halo groups. Being cheap, synthetic dyes are widely used.

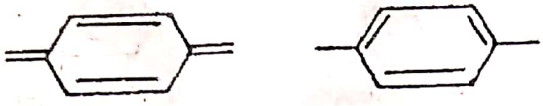
Natural dyes e.g. indigo, alizarin etc.

Synthetic dyes e.g. azo, vat, and triphenyl methane etc.

Q.2. Discuss Quinonoid theory of colour and constitution.

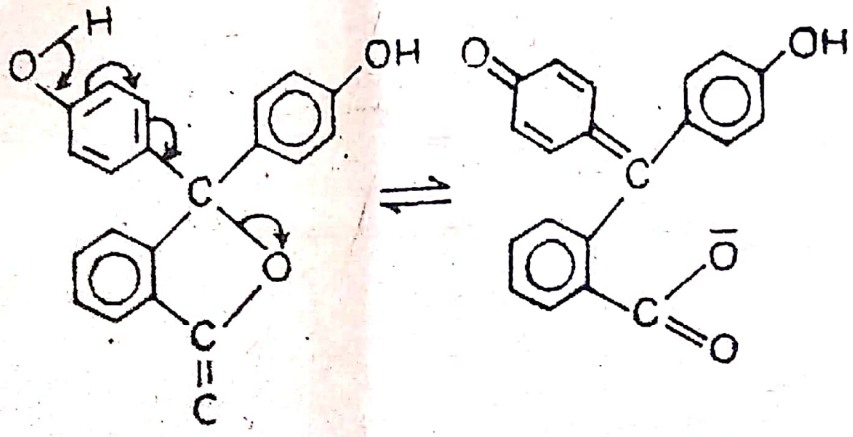
Ans. : Quinonoid theory :

Armstrong (1885) observed that quinones are coloured compounds and hence structures of coloured compounds e.g. dyes can be interpreted by a quinonoid structure.



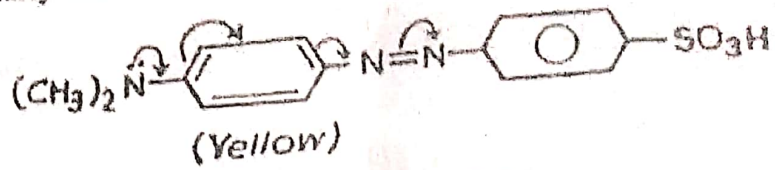
Quinonoid Benzenoid

Hence coloured compounds exist in two forms-quinonoid and benzenoid. The quinonoid form has more intense colour than the benzenoid form. One form can exist only in acid medium while the another only in alkaline medium. As the pH of the solution changes, the solution shows a change of colour due to intramolecular change. The phenolphthalein is colourless in acid medium (benzenoid form) but shows a red colour in alkaline solution (quinonoid form):



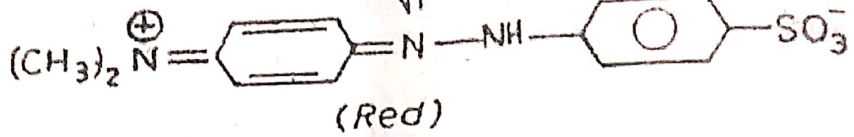
Benzenoid form Quinonoid form

Similarly the methyl orange has benzenoid and quinonoid forms



(Yellow)

Benzenoid form



(Red)

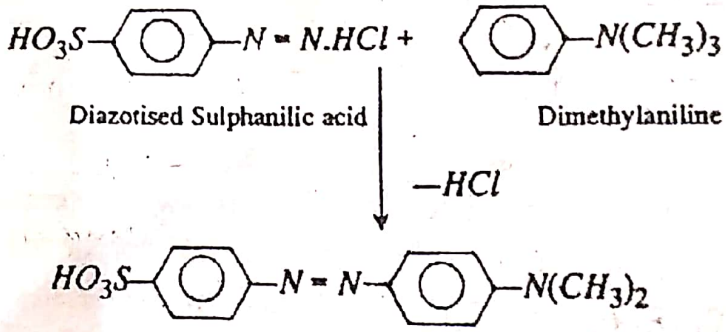
Quinonoid form

Q.3. Write short note on : Azo dyes.

Ans. : Azo dyes are characterised by the presence of diazo group (– N = N –) in their structures. These are prepared by coupling henzene diazonium salts with phenols or aromatic amino compounds. Methyl orange, bismark brown, congo red and para red are important azo dyes.

1. Methyl orange :

It is prepared by coupling diazotised sulphaniline with dimethyl aniline–

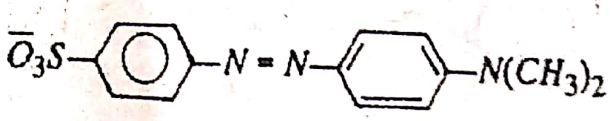


Diazotised Sulphanilic acid

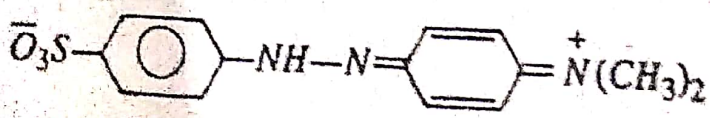
Dimethylaniline

Methyl Orange

It dyes wool and silk and gives orange colour. But the colour is not fast. It is an important acid-base indicator. It shows yellow colour with alkali and red with acid



yellow (benzenoid structure)



Red (quinonoid structure)