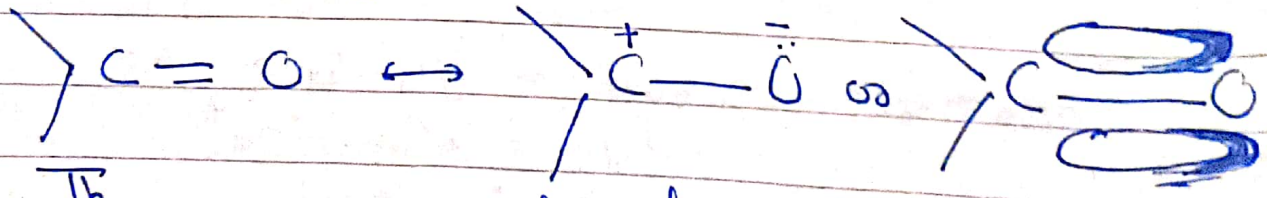
MESOMERIC EFFECT.

Imp.

The mesomeric effect (M. effect) refers to the polarity produced in a molecule as a result of interaction between two π bonds or a π bond and lone pair of electrons. The effect is transmitted along a chain in a similar way as are inductive effect

The mesomeric effect is of great importance in conjugated compounds. Conjugated compounds are those in which the carbon atoms are linked alternatively by single and double bonds. In such systems, the π electrons get delocalised as a consequence of mesomeric effect, giving a number of resonance structure of the molecule.

Consider a carbonyl group $>C=O$ The oxygen atom is more electronegative than the carbon atom. As a result, the π electrons of the carbon - oxygen double bond get displaced towards the oxygen atom. This gives the following resonance structure.

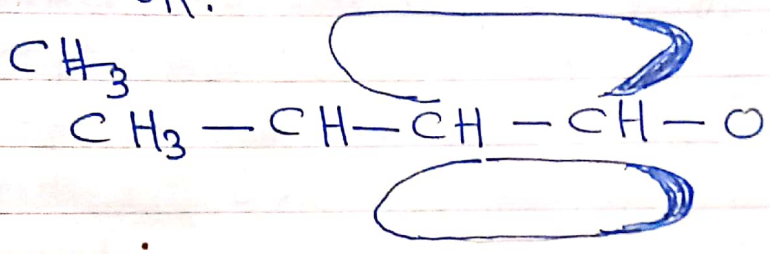


The mesomeric effect is represented by a.

curved arrows. The head of the arrow indicates the movement of a pair of π electrons. If the carbonyl group is conjugated with a carbon-carbon double bond, the above polarization will be transmitted further via the π electrons.

$$CH_3-CH=CH-CH=O \leftrightarrow CH_3-\overset{+}{C}H-CH=CH-\overset{-}{O}$$

OR.



The mesomeric effect like the inductive effect may be positive or negative. Atoms which lose electrons towards a carbon atom are said to have +M effect. Those atoms or groups which draws electrons away from a carbon, cause to have -M effect. Those atoms or groups which draws electrons away from a carbon atoms or groups which cause +M or -M effect are listed below.

(a) +M Effect Groups.

$-Cl$, $-Br$, $-I$, $-NH_2$, $-NR_2$, $-OH$, $-OCH_3$.

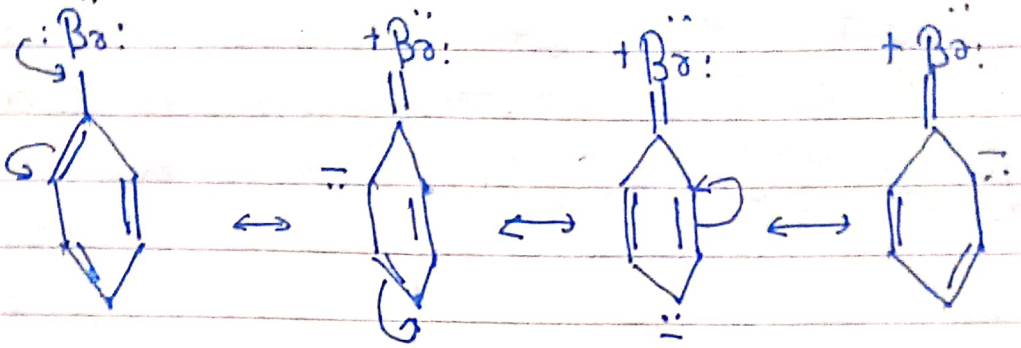
(b) -M Effect Groups.

$-NO_2$, $-C\equiv N$, $-\overset{O}{\overset{\|}{C}}-$

(3).

The +M effect of the bromine atom is shown below.

+M



Bromo benzene.

The −M effect of the nitro group is shown below: