

Mesomeric effect:-

The relay of π electrons ^{from} ~~at~~ ^{one} side of the molecule ~~side~~ to another in a conjugated system is known as mesomeric effect. It is a permanent effect and extends in the molecule as long as ^{conjugation} exists.

The structure arising out due to this effect is called resonating or canonical or contributing structures which are separated by (\longleftrightarrow) a double arrow sign. The rules for writing such ~~the~~ structure may be shown as under:-

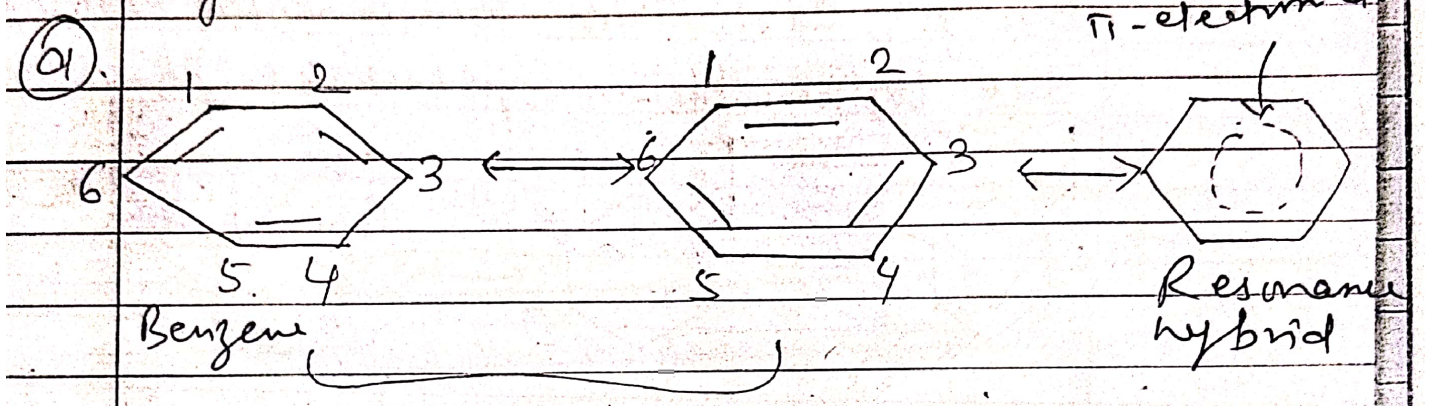
* Rules: to write down the resonance structures and its effect

- (i) The atomic nucleus in the molecule becomes static, only π electrons shift in the conjugate system.
- (ii) All the concerned atoms in the molecule must be in the plane.
- (iii) None of these contributing structure is capable to explain all the properties of the molecule.
- (iv) The true structure is the resonance hybrid of all such contributing structures, which cannot be actually represented on the paper.
- (v) The difference in energy between the resonance hybrid and the most stable canonical structure is called resonance energy.
- (vi) Higher the resonance energy, higher would be the stability of the molecule.
- (vii) Similarly, more and more contributing structures that can be written for a particular compound more would be

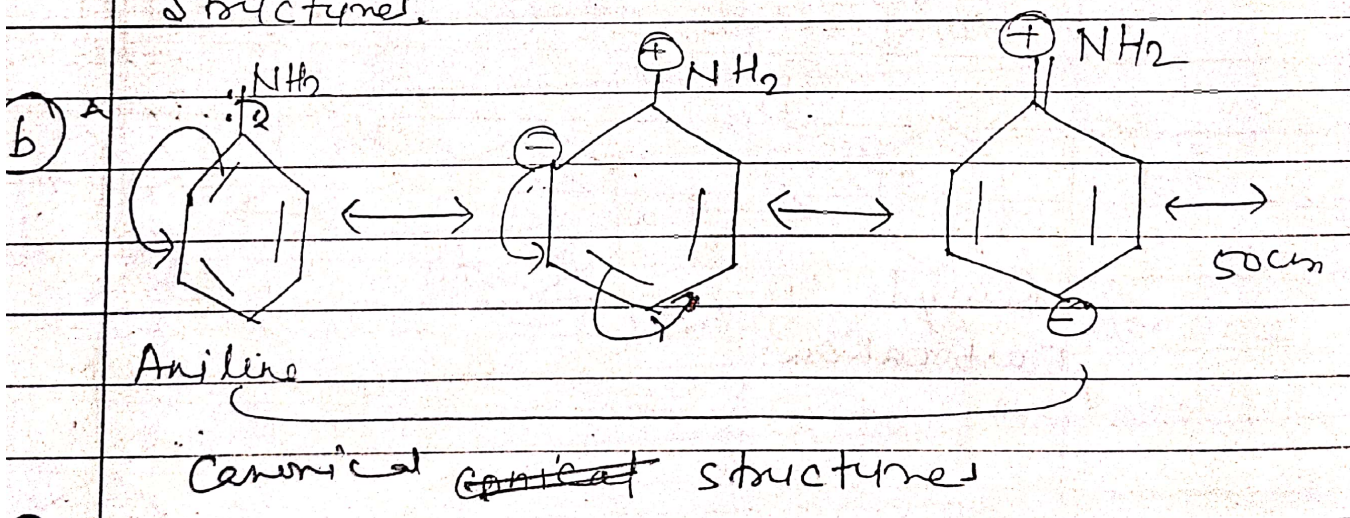
(iii) charged resonating structures have high energy content so, these are less stable.

(v) Equivalent resonating structures ~~have~~ are more contributing towards the stability of the molecule.

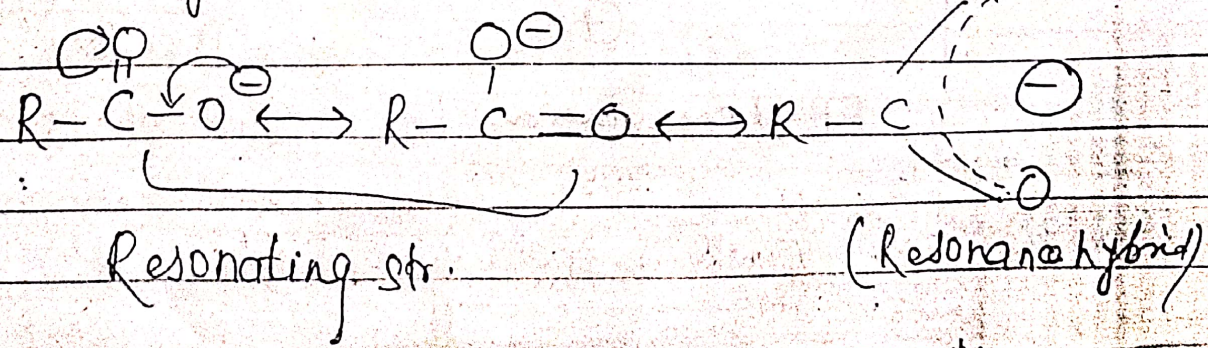
e.g.



Canonical or contributing or resonating structures.



(c)* Carboxylate ion: -

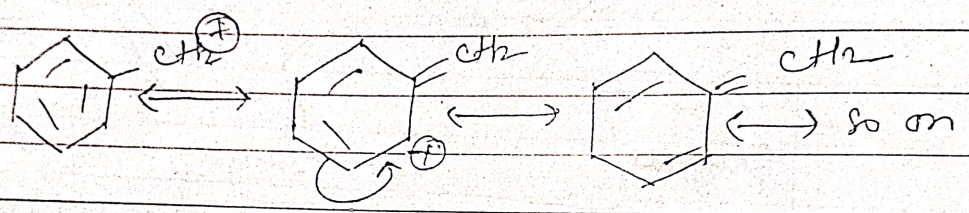


* Application →

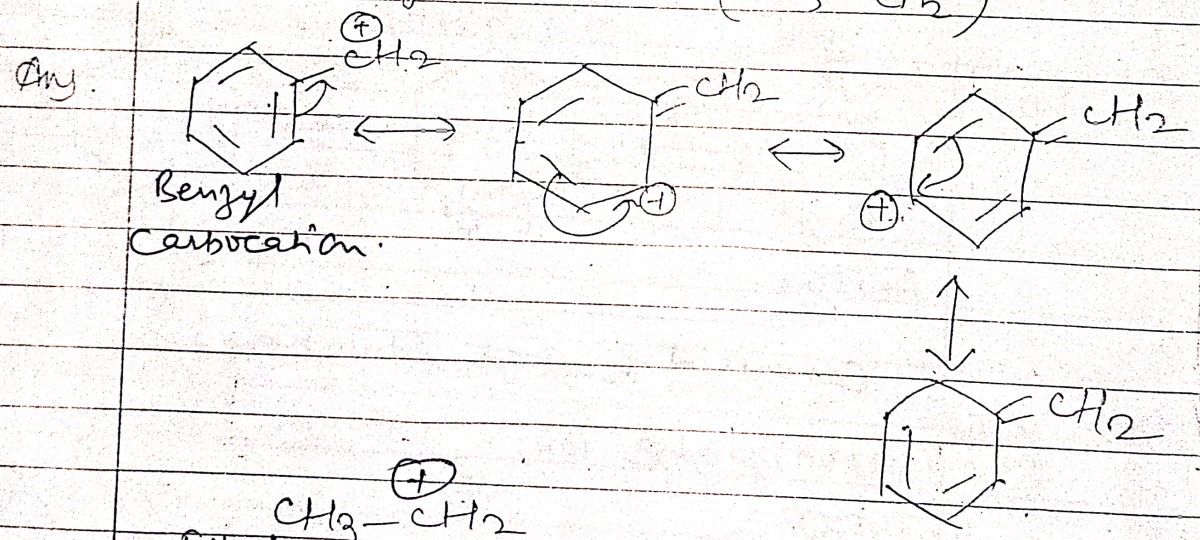
The stability of various cations or anion can be explained by this effect, as for example.

① a. The stability of Carboxylate ion as shown above.

b. Benzyl Carbonium ion is more stable due to mesomeric effect as shown below



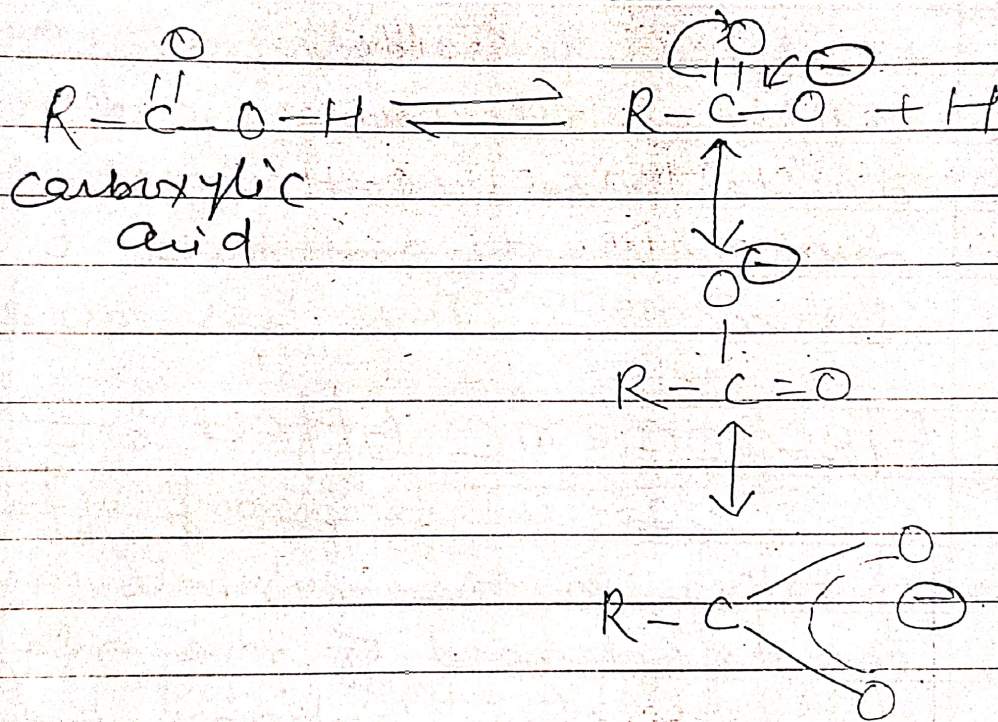
② a* Benzyl Carbonium ion is more stable than ethyl c⁺ ion (CH₃-CH₂⁺)



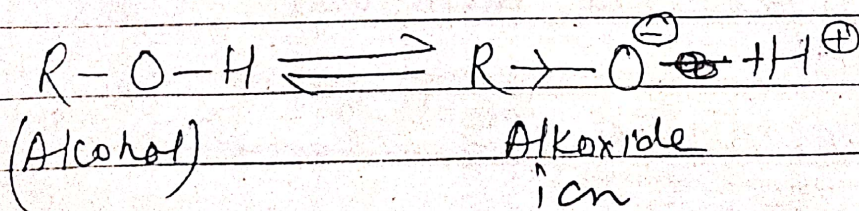
In case of Benzyl Carbonium ion, the +ve charge on Carbon atom gets dissipated on all the Carbon atoms of the ring by

resonance as shown above. Hence, it is stabilized to a greater extent. But in case of ethyl carbonium ion there is only +I effect of only one methyl group. So, dissipation ~~of the~~ ^{of the} charge through inductive effect, is comparatively lower, hence, ^{it is} less stable.

* Carboxylic acid is more acidic than alcohol.



(stabilised by resonance)
(carboxylation)



In case of Carboxylic acid the Carboxylate acid (conjugate base) is

Stabilised by resonance as shown above where dissipation of $-ve$ charge takes place to a greater extent. So, the dissociation of $O-H$ bond becomes more & more and equilibrium is shifted more towards R.H. side. ~~It~~^{Its} acidic strength is more.

In case of alcohol, $O-H$ bond is less polar due to the $+I$ effect of alkyl group and the resulting alkoxide ion is destabilised due to the same effect. So, the dissociation of $O-H$ bond becomes lesser i.e. it is less acidic.

Electromeric Effect \rightarrow

It is temporary effect operating in the substrate molecule on the demand of the reagent.

In such case, temporary polarisation takes place and the molecule may written its original position when reagent is removed.