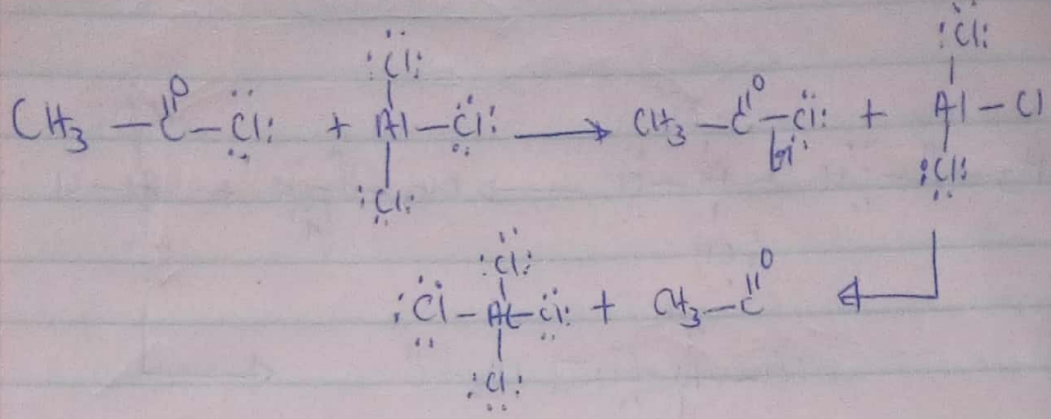
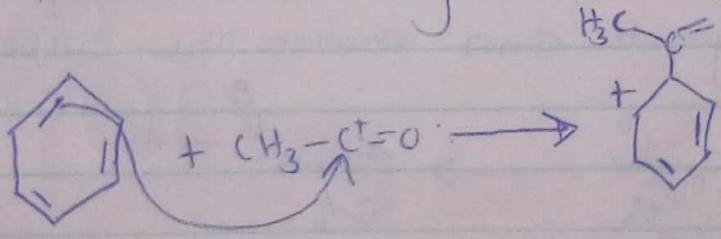
Q4 1

Mechanism step by step

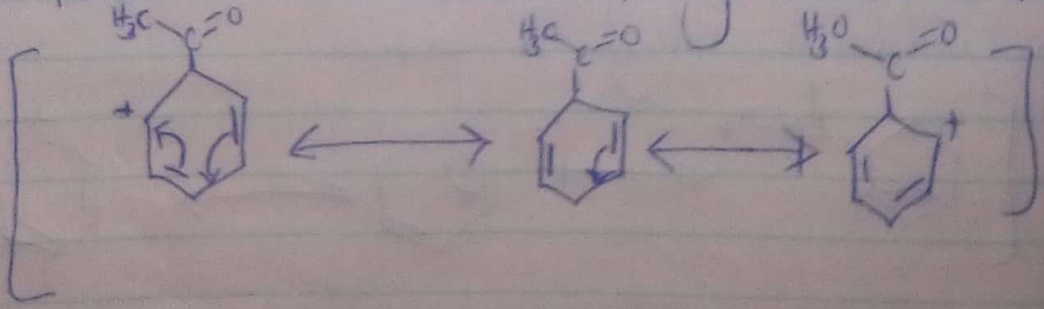
1.) The reaction of the acetyl chloride with aluminium chloride forms an electrophile



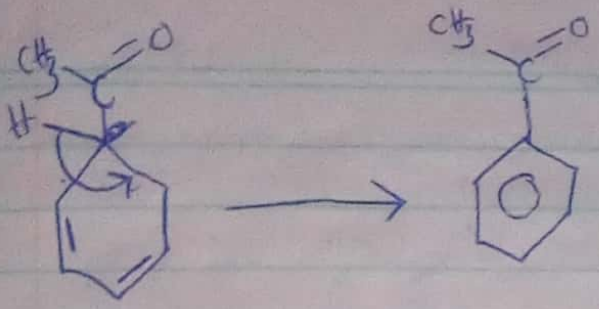
2- The electrophile attracts the π electron system of the benzene ring to form non-aromantic carbocation



3. The positive charge on the carbocation that is formed is delocalised through out the molecule



4 The loss of a proton from the atom to which the acetyle group has bonded restores the aromanticity

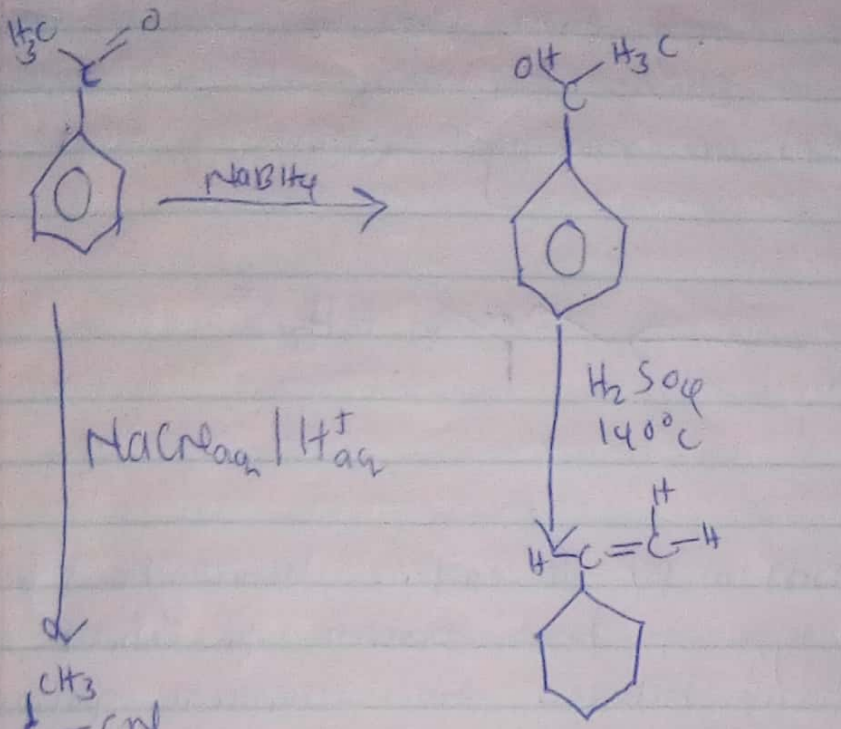


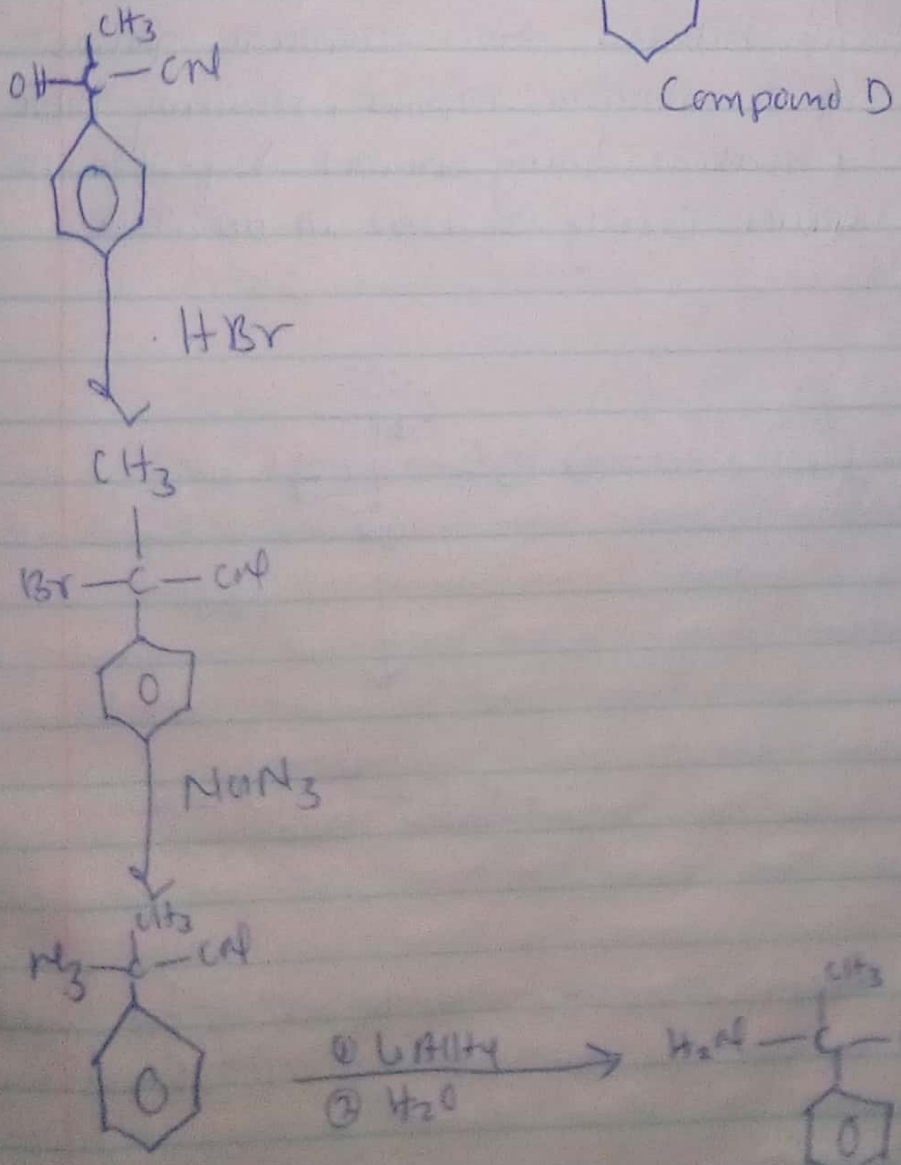
5 The proton reacts with $AlCl_4^-$ to regenerate the $AlCl_3$ catalyst and form the product HCl

$$H^+ + AlCl_4^- \longrightarrow HCl + AlCl_3$$

5^ above shows the regeneration of catalyst.

Quiz 2.



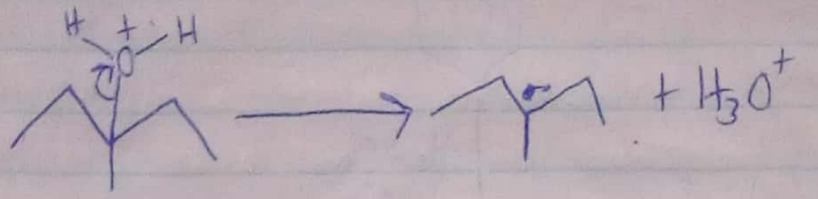


Quiz 3.

What Does Curly arrow Show in reaction mechanism

- Curly arrows shows the direction in which the electrons are moving from.

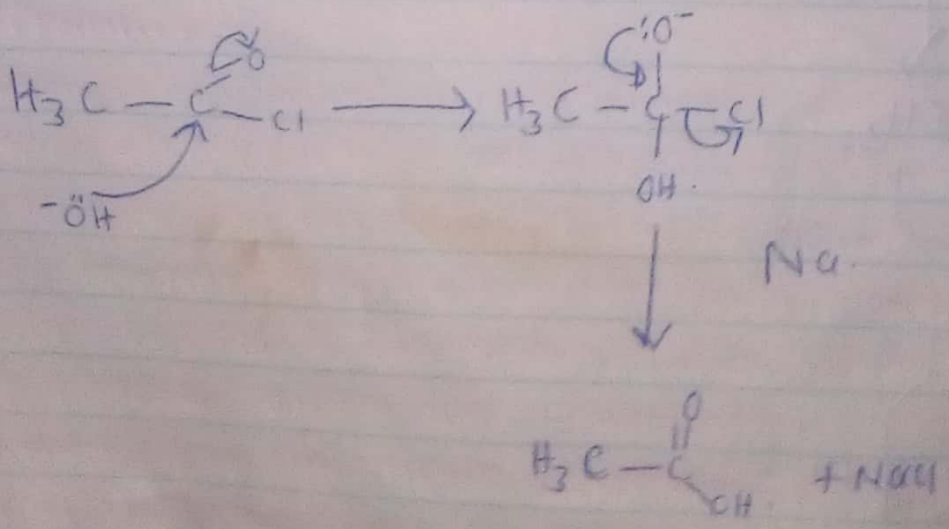
i)



ii) Use mechanism in (i) to explain heterolytic Fission

- This is a type of bond Fission in which a Covalent bond between two chemical species is broken in an unequal manner, resulting in the bond pair of electrons being retained by one of the chemical species. Clearly illustrated in (iii) above.

b i)



The main Function of OH^- is to act as the base or the nucleophile in the reactions 1st Step.

Quiz 4:

Describe in terms of orbital overlap the similarities and differences between the bonding in the Kekule model and the delocalised model of benzene.

The Three main differences:

i) Equal bond lengths in benzene
ii) Resistance to electrophilic addition reaction
iii) Enthalpy of hydrogenation being less exothermic and therefor more energetically stable than predicted.

When talking about this difference we must mean about the electron system. So electron density will be lower because, of resistance to electrophilic addition reaction meaning it would prefer pi bonds.

Differences:

i) Kekule suggests that benzene ring forms alkene bonds which form as a result of alternate of orbitals. While delocalized model assume that benzene ring is not made up of alkene bonds because it will show different characteristic from alkenes due to orbital overlapping.
ii) Problem with the shape. Benzene is a planar molecule and that would be true of the kekule structure. The problem is that C–C single and double bonds are of difference length.
iii) Problem with Stability: According to the delocalised model electrons are more stable as compared to that of kekule

i) Describe two pieces of evidence to support the delocalised model of benzene

I) Bond lengths. a single bond is 0.153nm while a double bond is 0.134nm making Kekule's model of alternating single and double bonds assymetric.

ii) Another evidence shows that benzene to be symetrical so it cannot have this combination.

iii) Resistance to Reaction: benzene will not react with halogens or take part in addition reaction so it does not react ~~with~~ like alkene.

b i $n C_6H_5C=CH_2 \longrightarrow \left[C_6H_5C(H)-C(H) \right]_n$

ii) ~~$n C_6H_5C=CH_2$ polymerization $-H_2O$ $\left[C_6H_5 \right]$~~

ii) $nC_6H_5CCH_3C_6H_5COOH \xrightarrow[-H_2O]{\text{polymerization}} \left[H_2N-C(CH_3)(C_6H_5)-COOH \right]_n$

(iii) Compound D Linear polymer.
Compound E Condensation polymer.