13. Halogenoalkenes

- Discrepancies between number of electrons and electron cloud size exist, i.e. CH3Br and CH3CH2CH2CH2CH2CH2CH3 have similar number of electrons, but electron cloud size of heptane, which has 23 atoms is much larger, therefore id-id is greater and boiling point is higher.
- Bromo/Iodo/Polychloroalkanes are denser than water
- Monochloroalkanes are less dense than water
- A carbocation with a benzene ring attached to the C with positive charge is stabilised by charge dispersal. (resonance effect) The empty p-orbital of the positively charged C atom overlaps with the p-orbital of the C in the benzene ring so that **pi electrons in the benzene ring can delocalise** to the C with positive charge and thus **disperse the positive charge**.
- Halogenoarenes are less reactive towards nucleophilic substitution because of the **partial double bond character** of the C-X bond (p-orbital of the halogen overlaps with the pi electron cloud of the benzene ring, lone pair of electrons in the p-orbital of the halogen can delocalise into the benzene ring, resulting in the partial double bond character in the C-X bond, and thus more energy required to break the C-X bond. Furthermore, the electron-rich ring causes electron repulsion between electrons in the benzene ring and the approaching electron-rich nucleophile)
- NOTE THE ABOVE ^^^ is usually tested when asking which route will give a greater yield.
- In testing for a specific halogen (Br, I or Cl)
    - ➢ Heat with NaOH (aq) for hydrolysis of the C-X bond to form X-
    - ➢ Cool the mixture (prevent decomposition of AgNO3 added later)
    - ➢ Acidify with HNO3 (neutralised excess NaOH or Ag+ may react with OH- to form brown ppt of Ag2O)
    - ➢ Add AgNO3
    - ➢ AgCl is white
    - ➢ AgBr is cream
    - ➢ AgI is yellow