

CLASS - B.Sc. 2nd semester

SECTION - "A"

SUBJECT - CHEMISTRY

TOPIC - PHYSICAL PROPERTIES
OF ALKYL & ARYL HALIDES

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PHYSICAL PROPERTIES.

① Physical state →

(i) Lower Haloalkanes → Gases state

{ CH_3Cl , CH_3Br , $\text{C}_2\text{H}_5\text{Cl}$ and some chlorofluoromethanes and chlorofluoroethanes are gases at ambient

temperatures, while other chloro, bromo and iodo compounds are liquids or solids.

(ii) Higher Haloalkanes → Liquids or solid form.

(iii) Haloarenes are either liquid or solid.

(Reason → $n-2$ Carbon chain n state will change)

(2) Melting points and Boiling points

Q. Why the mp. & b.p. of haloalkanes are higher than parent alkanes.

[Reason] → The molecular mass of alkyl halide

are higher than parent alkane as well as we

know that m.pt. & b.p. (specially for b.p.)

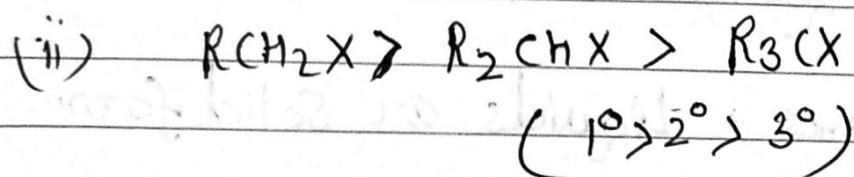
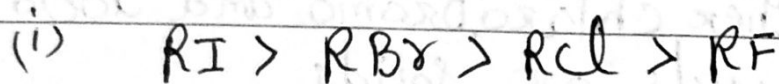
depends upon Force of attraction.

[Van der Waals Force & Molar mass]

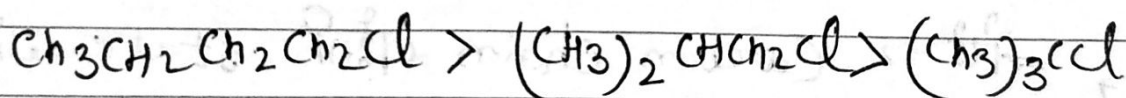
So mainly due to greater magnitude of Van der Waals forces of attraction they show high m.pt & b.p.

(ii) Questions will ~~also~~ prepare in the form of arrange in either increasing or decreasing order.

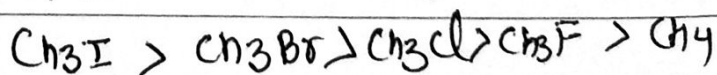
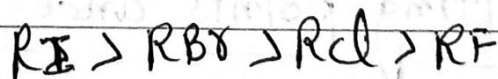
e.g. → Boiling points.



(iii) For isomeric alkyl halides.



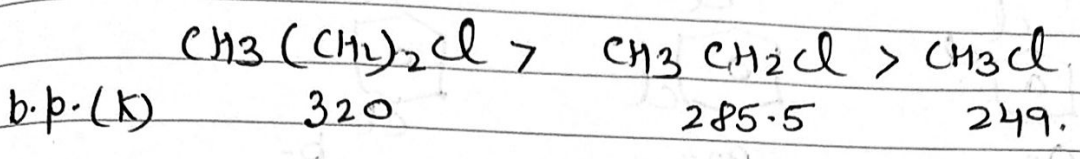
[Reason] → For same alkyl gp. the b.p. decreases in the order



b.p. (K) 315 277 249 195 111

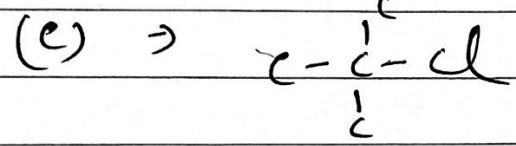
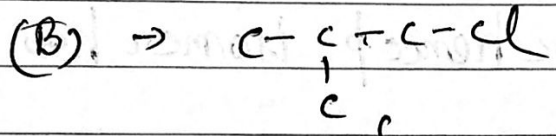
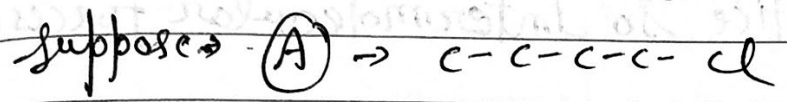
Because with increase in size as well as mass of halogens the magnitude of Van der Waals forces of attraction increases.

(ii) But if the nature of halogen is same the b.p. increases with increase in size of alkyl group.



(iii) For isomeric alkyl halides the b.p. decreases with branching.

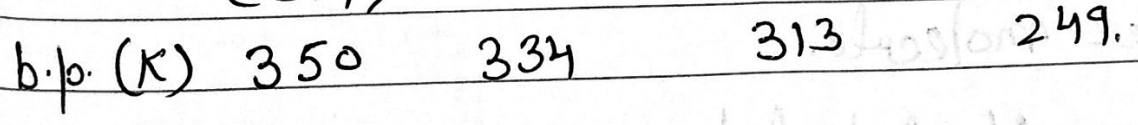
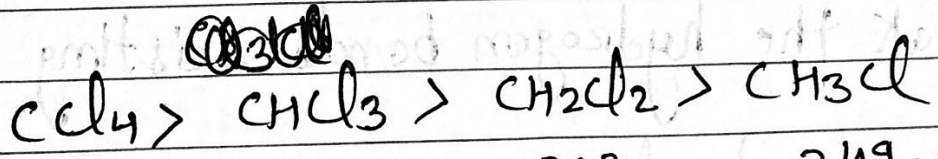
b.p. \propto $\frac{1}{\text{Branching}}$



order of b.p. \rightarrow A $>$ B $>$ C.

Because with branching the surface area of alkyl halides decreases so the magnitude of Van der Waals forces of attraction decreases.

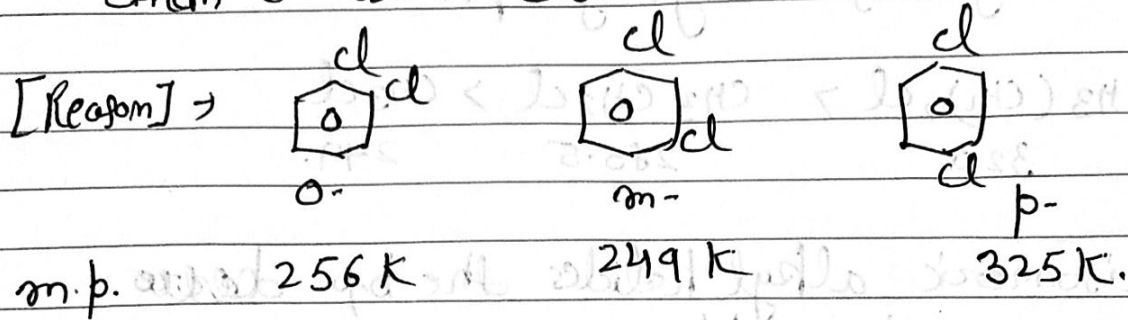
(iv) As the no. of halogen atom increases the b.p. also shows same order.



(v) b.p. of o-, m- & p- isomers are nearly equal).

(vi) why the melting point of p-isomer is higher

than o- or m-isomer.



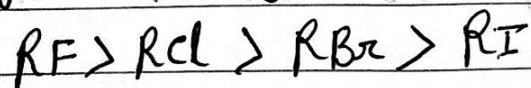
Because due to symmetry p-isomer has good packing in crystal lattice so intermolecular forces of attraction are stronger hence p-isomer has high m.p.

(3) Solubility.

a. Alkyl halides are polar molecule still insoluble in water. Explain it.

[Reason] \rightarrow Alkyl halides are polar molecule $[R^{\delta+}-X^{\delta-}]$ but insoluble in water because they ~~neither~~ neither form hydrogen bonding with water nor they break the hydrogen bonds existing between water molecule.

(4) Stability of alkyl halides



[Reason] \rightarrow Because the strength of C-X bond decreases $C-F > C-Cl > C-Br > C-I$