Haloalkanes and Haloarenes

CHAPTER 10

TRY YOURSELF

ANSWERS

- 1. (a) 1-Bromo-4-fluoro-2-iodobenzene
- (b) 1-Bromo-2-chloro-4-iodobenzene
- (c) 1, 4-Dibromobenzene
- (d) 1-Chloro-2-methylbenzene

2. (a)
$$CH_3 - CH_3 - CH_2 - CH_2 - CH_3$$

(b) $CH_3 - CH_3 - CH_3 - CH_3$
Br
CH₃
Br
CH₃
CH₃

(c) $CH_3 - CH_2 - CH_2 - CH_2 - CH_2$

3. The X in an alkyl halides is bonded to an sp^3 hybridised carbon of an alkyl group. In allyl halides, there is a C = C bonded to the C bearing the X. In vinyl halides, X is bonded to an sp^2 hybridised C of an alkene.

c

4.

$$CH_{3}CH_{2}CH_{3} \xrightarrow{CI_{2}}{UV} CH_{3} \xrightarrow{I}{CH} CH_{3} + CH_{3}CH_{2}CH_{2}CI$$

$$(Major) \qquad (Major) \qquad (M$$

This reaction is called allylic halogenation reaction because halogenation occurs at the allylic position of an alkene.

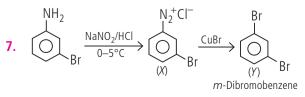
5. Direct reaction of benzene with I_2 is slow ($F_2 > CI_2 > Br_2 > I_2$) and reversible in nature.

$$C_6H_5 + I_2 \rightleftharpoons C_6H_5I + HI$$

6. It is a method to prepare alkyl iodide by reacting alkyl chloride or bromide with Nal in acetone.

$$R \longrightarrow X + \text{Nal} \longrightarrow R \longrightarrow R + \text{Na}X$$

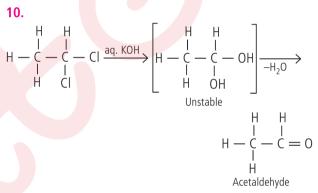
NaCl and NaBr are less soluble in acetone and precipitate to prevent the backward reaction.



8. Boiling point of haloarenes increases as we go from fluoro to iodo compounds. This is because magnitude of van der Waals' forces increases with the increase in size and mass of the halogen atom.

 $C_6H_5F < C_6H_5CI < C_6H_5Br < C_6H_5I$

9. Haloalkanes dissolve in organic solvents because the intermolecular attractions between haloalkanes and organic solvent molecules have the same strength as in the separate haloalkanes and solvent molecules.



11. CH_3CH_2I offers least hinderance to the approaching nucleophile. So, it will react most rapidly in S_N2 reaction.

12.
$$CH_3CH_2CH_2Br + alc. KOH \rightarrow$$

n-Propylbromide
 $CH_3CH = CH_2 + KBr + H_2O$
Propene

13. (a) \checkmark Tertiary halide reacts faster than secondary halide because of the greater stability of *tert*. carbocation.

(b) Because of greater stability of secondary carbocation than primary.

C1

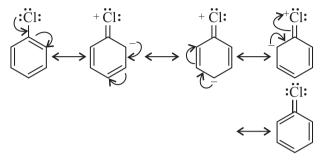
14. (i)
$$\bigcirc$$
 $-CH_2CH_3 + CI_2 \xrightarrow{h\upsilon} \bigcirc -CH - CH_3$
1-Chloro-1-phenylethane

(ii)
$$\bigcirc$$
 -CI + CH₃CH₂CI $\xrightarrow{2Na}$ \bigcirc -CH₂CH₃
(iii) \bigcirc -CI $\xrightarrow{Ni/Al Alloy}$ \bigotimes Benzene

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15. Haloarenes are much less reactive than haloalkanes towards nucleophilic substitution reactions due to the following reasons.

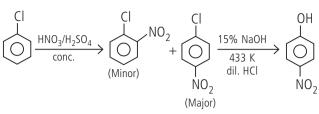
(i) Resonance effect : In haloarenes the electron pairs on halogen atom are in conjugation with π -electrons of the ring and the following resonating structures are possible.



C — Cl bond acquires a partial double bond character due to resonance. As a result, the bond cleavage in haloarene is difficult than haloalkane and therefore, are less reactive towards nucleophilic substitution reaction.

(ii) In haloarenes, halogen is attached to sp^2 -hybridised carbon while in haloalkanes, halogen is attached to sp^3 -hybridised carbon.

16.



17. *n*-Hexyl chloride reacts with alcoholic AgNO₃ solution to give a precipitate of AgCl while chlorobenzene does not .

 $C_6H_5CI + alc. AgNO_3 \longrightarrow No reaction$

 $CH_3CH_2CH_2CH_2CH_2CH_2CH_2$ AgNO₃ \rightarrow AgCl (Precipitate)

18. Trade name : Gammaxene

IUPAC name : 1, 2, 3, 4, 5, 6-Hexachlorocyclohexane

19. $CH_3CH_2OH + I_2 \longrightarrow CH_3CHO + 2HI$ Ethanol

$$CH_3CHO + 3I_2 \longrightarrow I_3C - CHO + 3HI$$

$$I_3C - CHO + KOH \longrightarrow CHI_3 + HCOOK$$

lodoform

20. Because of its low boiling point and low inflammability.

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