

CHEMISTRY STUDY MATERIALS FOR CLASS 12

(NCERT Exemplar Problems of Chapter - 10)

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Haloalkanes and Haloarenes

Multiple Choice Questions (Single Correct Answer Type)

Question 30. Which is the correct increasing order of boiling points of the following compounds?

1-Iodobutane, 1-Bromobutane, 1-Chlorobutane, Butane

- (a) Butane < 1-Chlorobutane < 1-Bromobutane < 1 - Iodobutane
- (b) 1-Iodobutane < 1-Bromobutane < 1-Chlorobutane < Butane
- (c) Butane < 1-Iodobutane < 1-Bromobutane < 1-Chlorobutane
- (d) Butane < 1-Chlorobutane < 1-Iodobutane < 1-Bromobutane

Solution: (a) The higher the surface area, the higher will be the intermolecular forces of attraction and thus boiling point too. Boiling point increases with increase in molecular mass of halogen atom for the similar type of alkyl halide. Butane has no halogen atom and rests of all three compounds are halo derivatives of butane. Atomic mass of iodine is highest so the boiling point of 1-iodobutane is maximum among all the given compounds.

Question 31. Which is the correct increasing order of boiling points of the following compounds?

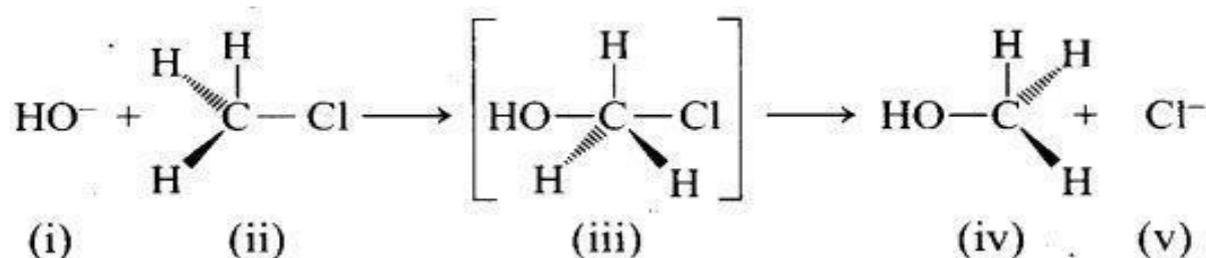
1-Bromoethane, 1-Bromopropane, 1-Bromobutane, Bromobenzene

- (a) Bromobenzene < 1-Bromobutane < 1-Bromopropane < 1-Bromoethane
- (b) Bromobenzene < 1-Bromoethane < 1 -Bromopropane < 1-Bromobutane
- (c) 1-Bromopropane < 1-Bromobutane < 1-Bromoethane < Bromobenzene
- (d) 1-Bromoethane < 1-Bromopropane < 1-Bromobutane < Bromobenzene

Solu: (d) Boiling point increases with increase in molecular mass of the alkyl halide.

MORE THAN ONE CORRECT ANSWER TYPE

Consider the following reaction and answer the questions no. 32-34



Question 32. Which of the statements are correct about above reaction?

- (a) Both (i) and (v) are nucleophiles
- (b) In (iii), carbon atom is sp^3 hybridised
- (c) In (iii), carbon atom is sp^2 hybridised
- (d) Both (i) and (v) are electrophiles

Solution: (a, c) HO^- and Cl^- are nucleophiles. In (iii), C atom is sp^2 hybridised due to formation of C – OH bond and breaking of C – Cl bond simultaneously.

So, in transition state, C atom is bonded to only 3 H atoms completely.

Ques 33. Which of the following statements are correct about this reaction?

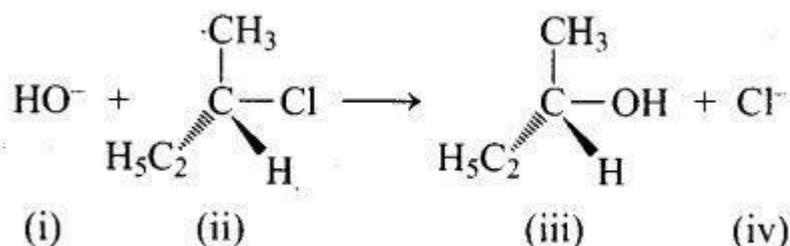
- (a) The given reaction follows S^2 mechanisms.
- (b) (ii) and (iv) have opposite configuration.
- (c) (ii) and (iv) have same configuration.
- (d) The given reaction follows S^1 mechanism.

Solution: (a, b) In the given reaction, alkyl halide is primary in nature. Here, a transitory state is observed in which one bond is broken and one bond is formed synchronously. in one step. So, it follows S^2 mechanism. In this mechanism, nucleophile attacks the carbon at 180° to the leaving group. So the reactant and product have opposite configuration.

Question 34. Which of the following statements are correct about the reaction intermediate?

- (a) Intermediate (iii) is unstable because in this carbon is attached to 5 atoms.
- (b) Intermediate (iii) is unstable because carbon atom is sp^2 hybridised.
- (c) Intermediate (iii) is stable because carbon atom is sp^2 hybridised.
- (d) Intermediate (iii) is less stable than the reactant (ii).

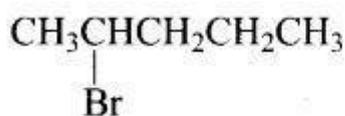
Solution: (a, d) In the given reaction intermediate (iii) is unstable because the carbon atom is attached to 5 atoms and is less stable than reactant (ii).



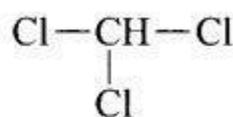
Question 37. Haloalkanes contain halogen atom(s) attached to sp³ hybridised carbon atom of an alkyl group. Identify haloalkane from the following compounds.

- (a) 2-Bromopentane (b) Vinyl chloride (chloro ethene)
 (c) 2-Chloroacetophenone (d) Trichloromethane

Solution: (a, d)



2-Bromopentane



Trichloromethane

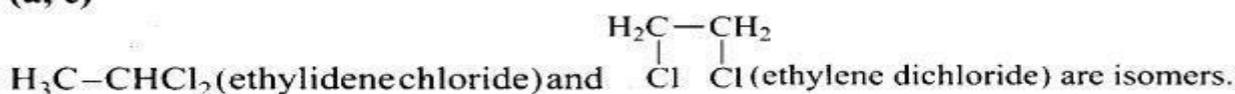
In both of these compounds halogen atoms are attached to sp³ hybridised carbon atom of alkyl group.

Question 38. Ethylene chloride and ethylidene chloride are isomers.

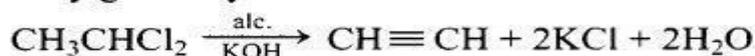
Identify the correct statements.

- (a) Both the compounds form same product on treatment with alcoholic KOH
 (b) Both the compounds form same product on treatment with aqueous NaOH
 (c) Both the compounds form same product on reduction
 (d) Both the compounds are optically active

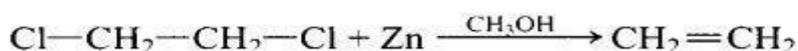
Solution: (a, c)



(i) They give ethyne on treatment with alcoholic KOH.



(ii) On reduction with Zn dust in alcohol they give ethylene.



Question 39. Which of the following compounds are gem-dihalides?

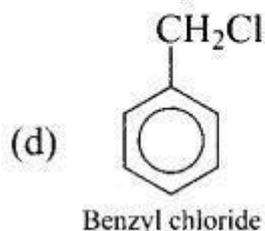
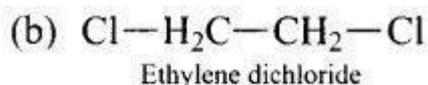
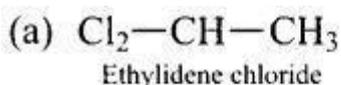
(a) Ethylidene chloride

(b) Ethylene dichloride

(c) Methylene chloride

(d) Benzyl chloride

Solution: (a, c) Gem-dihalides are those dihalides in which two halogen atoms are bonded to the same carbon atom.



So, in (a) and (c) two halogen atoms are present on the same carbon atom and they are termed gem-dihalides.

Question 40. Which of the following are secondary bromides?

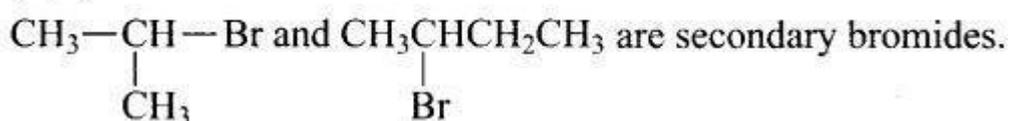
(a) $(\text{CH}_3)_2\text{CHBr}$

(b) $(\text{CH}_3)_3\text{CCH}_2\text{Br}$

(c) $\text{CH}_3\text{CH}(\text{Br})\text{CH}_2\text{CH}_3$

(d) $(\text{CH}_3)_2\text{CBrCH}_2\text{CH}_3$

Solution: (a, c)



Question 41. Which of the following compounds can be classified as aryl halides ?

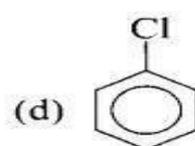
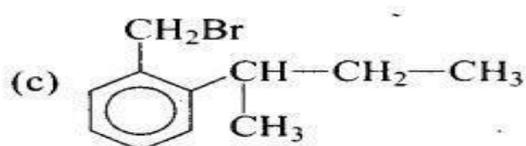
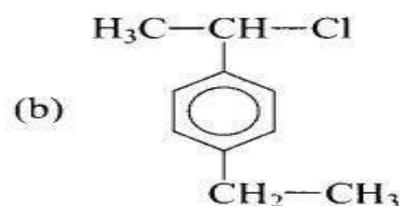
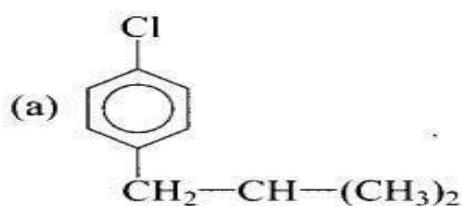
(a) $p\text{-ClC}_6\text{H}_4\text{CH}_2\text{CH}(\text{CH}_3)_2$

(b) $p\text{-CH}_3\text{CHCl}(\text{C}_6\text{H}_4)\text{CH}_2\text{CH}_3$

(c) $o\text{-BrH}_2\text{CC}_6\text{H}_4\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_3$

(d) $\text{C}_6\text{H}_5\text{Cl}$

Solution: (a, d)



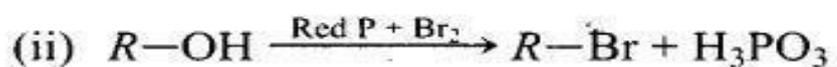
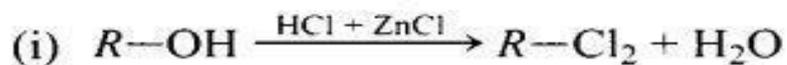
In compound (a) and compound (d), halogen atom is directly bonded to aromatic ring therefore these compounds are classified as aryl halides.

Question 42. Alkyl halides are prepared from alcohol by treating with

(a) $\text{HCl} + \text{ZnCl}_2$ (b) $\text{Red P} + \text{Br}_2$

(c) $\text{H}_2\text{SO}_4 + \text{KI}$ (d) all the above

Solution: (a, b)



Question 43. Alkyl fluorides are synthesized by heating an alkyl chloride/ bromide in presence of or (a) CaF_2 (b) CoF_2 (c) Hg_2F_2 (d) NaF

Solution: (b, c) The synthesis of alkyl fluorides is accomplished by heating an alkyl chloride or bromide in presence of metallic fluoride such as AgF , Hg_2F_2 , CoF_2 , or SbF_3 . The reaction is known as Swarts reaction.
