

CBSE Class 12 Chemistry Chapter 10 Haloalkanes and Haloarenes Worksheet with Answers – Set 4

Q1. A silver salt of fatty acid on heating with an alkyl halide gives

- (a) Ether
- (b) Ester
- (c) Alcohol
- (d) None of the above

Answer:

(b) A silver salt of fatty acid on heating with an alkyl halide gives ester.

Q2. Chlorination of CS_2 gives

- (a) CCl_4
- (b) CS_2Cl_2
- (c) CH_4
- (d) None of the above

Answer:

(a) Chlorination of CS_2 gives CCl_4 .

Q3. Sodium ethoxide reacts with ethyl iodide to yield

- (a) CH_3CH_3
- (b) $\text{C}_2\text{H}_5\text{OCH}_3$
- (c) $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$
- (d) None of the above

Answer:

(c) Sodium ethoxide reacts with ethyl iodide to yield $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$.

Q4. Propyl iodide and isopropyl iodide are

- (a) Position isomers
- (b) Functional isomers
- (c) Chain isomers
- (d) None of the above

Answer:

(a) Propyl iodide and isopropyl iodide are position isomers.

Q5. A magnesium alkyl halide is known as

- (a) Grignard reagent
- (b) Fenton reagent
- (c) Twichell reagent
- (d) None of the above

Answer:

(a) A magnesium alkyl halide is known as a Grignard reagent.

Q6. What is a Lucas reagent?

Answer:

Lucas reagent is a solution of anhydrous zinc chloride in concentrated hydrochloric acid. It is used to differentiate and categorise primary, secondary and tertiary alcohols.

Q7. What is Finkelstein's reaction?

Answer:

A Finkelstein reaction is used to synthesise alkyl iodide from alkyl bromide or chloride with NaI in the presence of dry acetone. It is a bimolecular nucleophilic substitution reaction.



Q8. Why is the C-Cl bond length of chloro benzene shorter than that of methyl chloride?

Answer:

The C-Cl bond length of chloro benzene is shorter than that of methyl chloride because chloro benzene has resonance, i.e. there is delocalisation of electrons. It acquires partial double bond character. In contrast, methyl chloride has a single bond. Thus, the -Cl bond length of chloro benzene will be smaller than that of methyl chloride.

Q9. Why is the dipole moment of chlorobenzene lower than that of cyclohexyl chloride?

Answer:

The dipole moment of chlorobenzene is lower than that of cyclohexyl chloride because the polarity of the C-Cl bond in chlorobenzene is less as C being sp^2 hybridised possesses more s character. In contrast, cyclohexyl chloride is sp^3 hybridised, i.e. has a minor character.

Q10. Why are S_N1 reactions accompanied by racemisation in optically active alkyl halides?

Answer:

In S_N1 reactions, the nature of carbocation formed is planar. Thus, the nucleophile can attack from either side, resulting in the formation of both kinds of enantiomers. Therefore, the product formed is a racemic mixture of an equal proportion of two optically active enantiomers.

Q11. Which one of the following among $(CH_3)_3C-Br$ and $(CH_3)_3C-I$ will be more reactive towards S_N1 ? Give reason.

Answer:

$(CH_3)_3C-I$ is more reactive towards S_N1 reaction because iodide is a better leaving group than chloride. Thus, it will eliminate readily, increasing the reactivity of $(CH_3)_3C-I$ over $(CH_3)_3C-Br$.

Q12. What will happen if p-nitro chlorobenzene is heated with aqueous NaOH at 443 K followed by acidification?

Answer:

The presence of an electron-withdrawing group ($-NO_2$) at ortho and para positions increases the reactivity of haloarenes for nucleophilic substitution reaction leading to the formation of para nitro phenol.

Q13. Why dextro and levorotatory isomers of Butan-2-ol are challenging to isolate by fractional distillation?

Answer:

The dextro and levorotatory isomers of Butan-2-ol are challenging to separate by fractional distillation because they possess identical physical properties like melting point, boiling point, solubility, refractive index etc. They only differ for the rotation of plane polarised light. Therefore, dextro and laevo – rotatory isomers of Butan-2-ol are hard to separate by fractional distillation.

Q14. Among the given compounds, 2-Bromo pentane, 2-Bromo-2-methyl butane, and 1-Bromo pentane.

- Which of the following is most reactive towards an S_N2 reaction?
- Which of the following is optically active?
- Which of the following is most reactive towards β -elimination reaction?

Answer:

- 1-Bromopentane will be most reactive towards S_N2 as it is least hindered. Typically, a primary alkyl halide is the most reactive towards the S_N2 reaction.
- 2-Bromopentane has a chiral carbon. So it is optically active.
- 2-Bromo-2-methyl pentane will give a stable elimination product, i.e. the most stable alkene. Thus, it will be most reactive toward the β -elimination reaction.

Q15. Among $CH_3CH(Cl)CH_2CH_3$ and $CH_3CH_2CH_2Cl$, Which one of the following compounds will be more reactive towards the S_N2 reaction? Give reason.

Answer:

Primary alkyl halides are more reactive toward the S_N2 reaction because primary alkyl halides are less hindered by alkyl groups than 2° or 3° alkyl halides, which have one more bulky groups that create a hindrance for a halogen to get detached.

Hence the $CH_3CH_2CH_2Cl$ is more reactive toward the S_N2 reaction.

Q16. What is chirality? Explain with an example.

Answer:

Chirality is the property of a molecule to have a non-superimposable mirror image. These molecules contain one asymmetric carbon atom. Example: Butan-2-ol.

Q17. Differentiate between S_N1 and S_N2 reactions.

Answer:

S. No.	S_N1 Reaction	S_N2 Reaction
1.	It is a two-step mechanism.	It is a one-step mechanism.
2.	The rate of S_N1 reaction depends on the concentration of the alkyl halide.	The rate of S_N2 reaction depends on the concentration of the alkyl

		halide and nucleophile.
3.	It is unimolecular.	It is bimolecular.
4.	The rate depends on the halide structure: $3^\circ > 2^\circ > 1^\circ > \text{CH}_3\text{X}$.	The rate depends on the halide structure: $\text{CH}_3\text{X} > 1^\circ > 2^\circ > 3^\circ$.
5.	The polar solvents favour the reaction.	The non-polar solvents favour the reaction.
6.	The reaction can occur with a weak base.	The reaction requires a strong base.

Q18. What is the maximum number of isomers possible in the monochlorination of methyl cyclobutane?

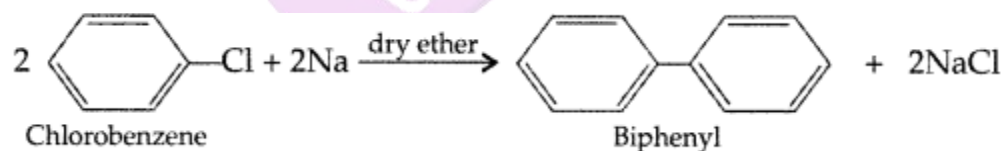
Answer:

The maximum number of isomers possible on monochlorination of methyl cyclobutane is 8.

Q19. Convert chlorobenzene to biphenyl.

Answer:

We can convert chlorobenzene to biphenyl by the Fittig reaction. Two molecules of chlorobenzene will react with the sodium metal in the presence of dry ether to yield biphenyl and sodium chloride.



Q20. Convert 2-bromobutane to but-2-ene.

Answer:

We can convert 2-bromobutane to but-2-ene by reacting it with the alcoholic KOH via an elimination reaction.

