

Chemistry Worksheets Class 12 on Chapter 10 Haloalkanes and Haloarenes with Answers - Set 1

Q1. A Grignard reagent can be prepared by reacting magnesium with

- (a) Methylamine
- (b) Diethyl ether
- (c) Ethyl iodide
- (d) Ethyl alcohol

Answer:

(c) A Grignard reagent can be prepared by reacting magnesium with ethyl iodide.

Q2. The S_N2 order for halides is

- (a) $R-F > R-Cl > RBr > RI$
- (b) $RI > RBr > RCl > RF$
- (c) $RBr > RI > RCl > RF$
- (d) $RCl > RBr > RF > RI$

Answer:

(b) The S_N2 order for halides is $RI > RBr > RCl > RF$. Iodine is a good nucleophile and a good leaving group. Thus, it eliminates easily from an alkyl halide favouring S_N2 elimination reaction.

Q3. Which of the following is ethyl dihalide?

- (a) CH_3CHBr_2
- (b) $CH_2(Br)CH_2(Br)$
- (c) $CH_3CH(Br)CH_2(Br)$
- (d) None of the above

Answer:

(a) CH_3CHBr_2 is an ethyl dihalide.

Q4. Chloroform on reaction with conc HNO_3 gives

- (a) Chloropicrin
- (b) Nitromethane
- (c) Picric Acid
- (d) Acetylene

Answer:

(a) Chloroform on reaction with conc HNO_3 gives Chloropicrin.

Q5. Alkyl halides on treatment with a suspension of Ag_2O moist in ether give

- (a) Alkanal
- (b) Alkanol
- (c) Alkanes
- (d) Alkoxy alkanes

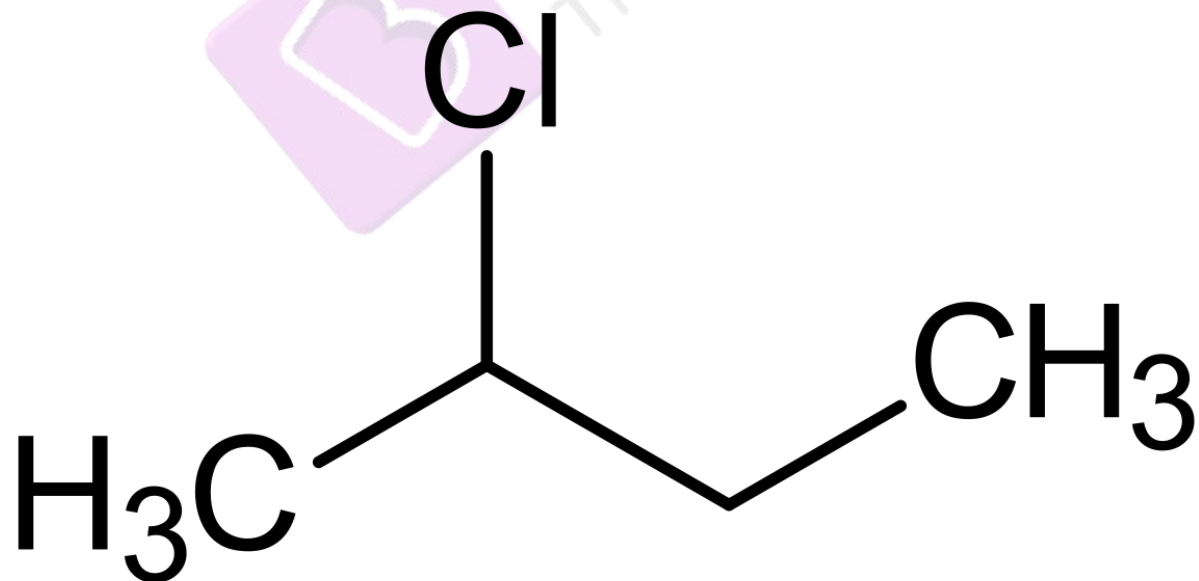
Answer:

(d) Alkyl halides on treatment with a suspension of Ag_2O moist in ether give alkoxy alkanes.

Q6. An alkyl halide $\text{C}_4\text{H}_9\text{Cl}$ is optically active. Draw its possible structure.

Answer:

An alkyl halide with the molecular formula $\text{C}_4\text{H}_9\text{Cl}$ optically active is 2-chloro butane.
Structure of 2-chloro butane.



Q7. Why are alkyl halides insoluble in water even though they have a polar C-X bond?

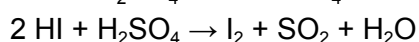
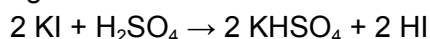
Answer:

Alkyl halides are insoluble in water even though they have a polar C-X bond because they can not form a hydrogen bond with water. Thus, they are insoluble in water.

Q8. Why is sulphuric acid not used in the reaction of alcohol and KI?

Answer:

Sulphuric Acid is not used in the reaction of alcohol and KI because sulphuric acid is a potent oxidising agent. It reacts with KI to form HI, further oxidising to form Iodine.



Q9. Write the IUPAC name of DDT.

Answer:

The IUPAC name of DDT is 2, 2-Bis-(4-chlorophenyl)-1, 1, 1-trichloroethane.

Q10. Mention two uses of iodoform.

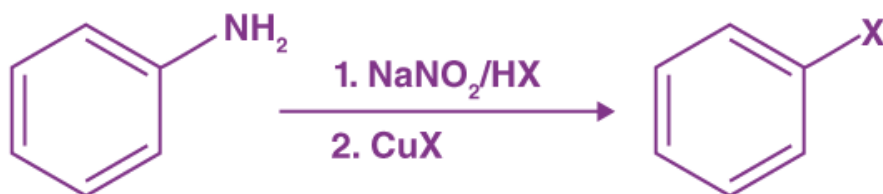
Answer:

Uses of Iodoform:

1. It is used as a disinfectant.
2. It is also used to sterilise instruments used in surgery.

Q11. What is sandmeyer's reaction?

Answer: The Sandmeyer reaction is an organic reaction used to synthesise aryl halides from aryl diazonium salts using copper chlorides as a reagent.



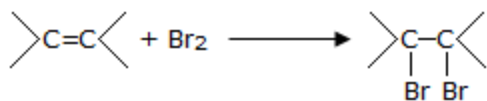
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Q12. Write any two tests to identify the existence of a double bond in a molecule.

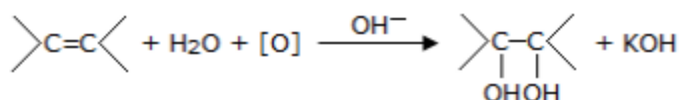
Answer:

We can identify the existence of double bonds by the following test.

1. Bromine water test: When bromine is added to an unsaturated compound in the presence of CCl_4 , an addition reaction occurs, leading to decolourisation of the brown colour of bromine.



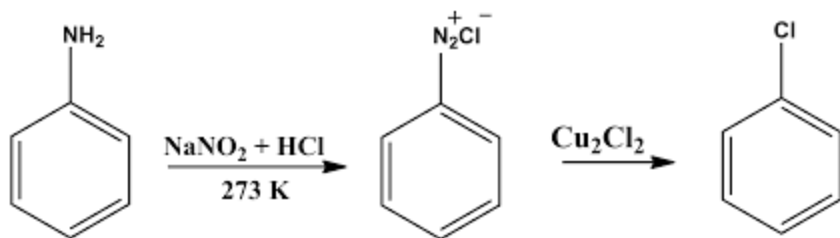
2. Bayer's reagent test: When an alkaline KMnO_4 is added to an unsaturated compound, the pink colour of alkaline KMnO_4 disappears. It is due to the formation of a dihydroxy derivative.



Q13. Convert aniline to chlorobenzene.

Answer:

We can convert aniline to chlorobenzene by reacting aniline with nitrous acid in acidic conditions at 0° followed by heating it with Cu_2Cl_2 .



Q14. Why is allyl chloride hydrolysed more readily than n-propyl chloride?

Answer:

Allyl chloride is hydrolysed more readily than n-propyl chloride because, in allyl chloride, the carbocation generated by the hydrolysis of allyl chloride is stabilised by the resonance, whereas no such stabilisation occurs in n-propyl chloride.

Q15. Out of 2-Bromopentane, 2-Bromo-2-methylbutane, and 1-Bromopentane.

- Which of them will be most reactive towards $\text{S}_\text{N}2$ reaction?
- Which of them will be optically active?
- Which of them will be most reactive towards beta elimination reaction?

Answer:

- 1-Bromopentane will be most reactive towards $\text{S}_\text{N}2$ reaction as it is least hindered.
- 2-Bromo-2-methylbutane has a chiral carbon centre. So it is optically active.
- 2-Bromo-2-methylbutane will be most reactive towards beta elimination reaction.

Q16. Which one of the following compounds is more reactive toward $\text{S}_\text{N}2$ reaction and why?
 $\text{CH}_3\text{CH}(\text{Cl})\text{CH}_2\text{CH}_3$ and $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$

Answer:

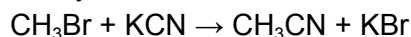
Primary alkyl halides are more reactive toward $\text{S}_\text{N}2$ reaction because primary alkyl halides are less hindered by alkyl groups than 2° or 3° alkyl halides, which have one more bulky groups, which creates a hindrance for a halogen to get detached.

Hence the second compound, i.e. $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$, is more reactive toward the $\text{S}_\text{N}2$ reaction.

Q17. What happens when methyl bromide is treated with KCN

Answer:

Methyl bromide reacts with KCN to form methyl cyanide and potassium salt.



Q18. Why is the dipole moment of chlorobenzene less than that of cyclohexyl chloride?

Answer:

The dipole moment of chlorobenzene is less than that of cyclohexyl chloride because the polarity of the C-Cl bond in chlorobenzene is less. Carbon, being sp^2 hybridised, has more s character, while in cyclohexyl chloride, it is sp^3 hybridised and has less s character.

Thus, the dipole moment of chlorobenzene is less than that of cyclohexyl chloride

Q19. Write the IUPAC name of the following compounds.

- (a) $\text{CH}_3\text{CH}(\text{Cl})\text{CH}(\text{Br})\text{CH}_3$
- (b) $\text{CHF}_2\text{CBrClF}$
- (c) $\text{ClCH}_2\text{C}=\text{CCH}_2\text{Br}$
- (d) $(\text{CCl}_3)_3\text{CCl}$
- (e) $\text{CH}_3\text{C}(\text{p-ClC}_6\text{H}_4)_2\text{CH}(\text{Br})\text{CH}_3$

Answer:

- (a) 2-Bromo-3-chlorobutane
- (b) 1-Bromo-1-chloro-1,2,2-trifluoroethane
- (c) 1-Bromo-4-chloro but-2-yne.
- (d) 2-(Trichloromethyl)-1, 1,1,2,3,3,3- heptachloro propane.
- (e) 2-Bromo-3,3-bis-(4-chlorophenyl) butane

Q20. The substitution reaction of alkyl halide mainly occurs by SN_1 or SN_2 mechanism. Whatever mechanism alkyl halides follow for the substitution reaction to occur, the polarity of the carbon halogen bond is responsible for these substitution reactions. The rate of SN_1 reactions is governed by carbocation stability, whereas for SN_2 reactions, the steric factor is the deciding factor. If the starting material is a chiral compound, we may end up with an inverted product or racemic mixture depending upon the type of mechanism followed by alkyl halide. Cleavage of ethers with HI is also governed by steric factors and stability of carbocation, which indicates that in organic chemistry, these two significant factors help us decide the kind of product formed.

- (a) Predict the stereochemistry of the product formed if an optically active alkyl halide undergoes a substitution reaction by the S_N1 mechanism.
- (b) Name the instrument used for measuring the angle by which the plane polarised light is rotated.
- (c) Predict the primary product formed when 2-Bromopentane reacts with alcoholic KOH.
- (d) Mention one use of CHI_3 .
- (e) Write the structures of products formed when anisole is treated with HI.

Answer: (a) An S_N1 reaction proceeds in two steps.

- In the first step, the C-X bond of the tertiary reactant compound undergoes heterolysis to form a carbocation.
- In the second step, the attachment of nucleophiles to carbocation occurs on either side. So, two types of products are formed per the nucleophile attachment.

Thus, if the reactant is optically active, then a racemic mixture with two opposite orientations (+ and -) is formed due to opposite nucleophile attachments to the carbocation.

(b) A polarimeter is an instrument used for measuring the angle by which the plane polarised light is rotated.

(c) Pent-2-ene will be formed as a major product when 2-Bromopentane reacts with alcoholic KOH.
 $CH_3CH(Br)CH_2CH_2CH_3 + KOH (alc.) \rightarrow CH_3CH=CHCH_2CH_3$

(d) CHI_3 is also known as iodoform. It is a yellow crystalline solid. It is used as an antiseptic for minor skin diseases and is also used as a disinfectant.

(e) $C_6H_5OCH_3 + HI \rightarrow C_6H_5OH + CH_3I$