CBSE Class 12 Chemistry Chapter 10 Haloalkanes and Haloarenes Worksheet with Answer – Set 3

Q1. n-propyl bromide reacts with ethanolic KOH to form
(a) Propane
(b) Propene
(c) Propyl alcohol
(d) None of the above

Answer:

(b) n-propyl bromide reacts with ethanolic KOH to form propene.

Q2. The formation of alkane by the action of zinc on alkyl halide is known as
(a) Wurtz reaction
(b) Kolbe's reaction
(c) Frankland's reaction
(d) None of the above

Answer:

(c) The formation of alkane by the action of zinc on alkyl halide is known as Frankland's reaction.

Q3. Chloroform, when treated with benzene in the presence of anhydrous $AlCl_3$, the product formed is
(a) Chloro benzene
(b) A mixture of ortho and para chloro toluene
(c) Tri phenyl methane
(d) None of the above

Answer:

Chloroform when treated with benzene in the presence of anhydrous $AlCl_3$, the product formed is tri phenyl methane.

Q4. Phosgene is a common name for
(a) Carbon dioxide and phosphane
(b) Phosphoryl chloride
(c) Carbonyl chloride
(d) None of the above

Answer:

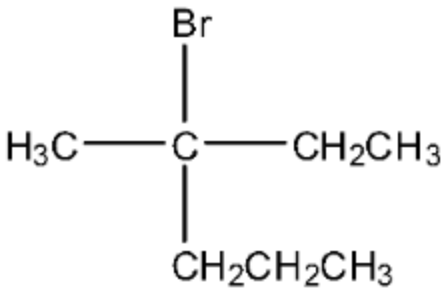
(c) Phosgene is a common name for carbonyl chloride.

Q5. The reactivity of alkyl halides depends upon
(a) The nature of the alkyl group only
(b) The nature of the halogen atom only
(c) The nature of the alkyl group and halogen atoms
(d) None of the above

Answer:

(c) The reactivity of alkyl halides depends upon the nature of the alkyl group and halogen atoms.

Q6. Write the IUPAC names of the following compound.



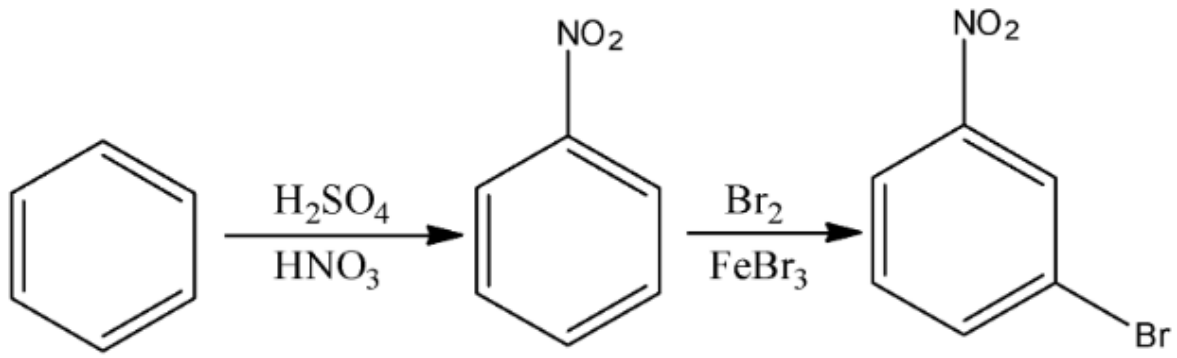
Answer:

The IUPAC name of the above compound is 3-Bromo-3-Methylhexane.

Q7. How will you convert benzene to 3-bromo nitro benzene?

Answer:

We can convert benzene to 3-Bromo nitro benzene by reacting it with concentrated sulfuric acid and nitric acid to form nitrobenzene. Nitro benzene then reacts with bromine in the presence of $FeBr_3$ to form 3-Bromo nitro benzene.



Q8. What will happen when bromine attacks $CH_2 = CH – CH_2 – C \equiv CH$?

Answer:

When bromine attacks the molecule of $CH_2 = CH – CH_2 – C \equiv CH$, an addition will take place leading to the formation of $CH_2 = CH – CH_2 – C (Br) = CH (Br)$ molecule.

Reaction: $CH_2 = CH – CH_2 – C \equiv CH + Br_2 \rightarrow CH_2 = CH – CH_2 – C (Br) = CH (Br)$.

Q9. How will you distinguish between C_2H_5Br and C_6H_5Br? Also, write the chemical equation involved.

Answer:

We can distinguish between C_2H_5Br and C_6H_5Br by heating them with the aqueous solution of sodium hydroxide. C_2H_5Br reacts with the aqueous sodium hydroxide solution to give ethanol and sodium bromide, which reacts with the silver nitrate to give a yellow precipitate of silver bromide. In contrast, C_6H_5Br does not react with the aqueous sodium hydroxide solution.
$C_2H_5Br + NaOH \rightarrow C_2H_5OH + NaBr + AgNO_3 \rightarrow C_2H_5OH + NaNO_3 + AgBr$
$C_6H_5Br + NaOH \rightarrow$ No Reaction

Q10. How will you distinguish between carbon tetrachloride and chloroform? Also, write the chemical equation involved.

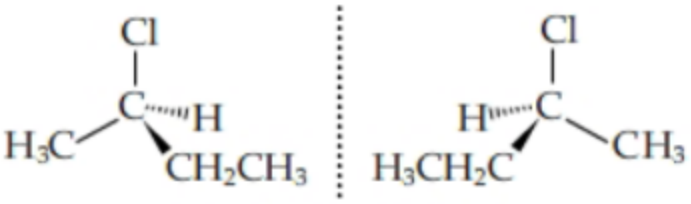
Answer:

We can distinguish carbon tetrachloride and chloroform via the carbyl amine test. Chloroform reacts with aniline and alcoholic KOH to form phenyl isocyanide which has an awful smell. In contrast, carbon tetrachloride does not react with aniline and alcoholic KOH.
$CHCl_3 + C_6H_5NH_2 + 3\ KOH\ (Alc) \rightarrow C_6H_5NC + 3\ KCl + 3\ H_2O$
$CCl_4 + C_6H_5NH_2 + 3\ KOH\ (Alc) \rightarrow$ No reaction

Q11. Justify the optical activity of 2 - Chloro butane.

Answer:

Optical activity is the ability of a compound to rotate in the plane polarisation of a beam of light that passes through it. For a compound to be optically active, one carbon must be chiral. It happens when there are four different atoms or groups attached to it. It must be asymmetrical. 2−Chlorobutane is an optically active molecule. The carbon at position 2 is chiral. Hence it is optically active.



2-Chlorobutane

Q12. What is an ambident nucleophile? Explain with an example.

Answer:

A nucleophile which can perform nucleophilic attacks from two or more places in the molecule (or ion) is known as an Ambident nucleophile. The attack from these nucleophiles can usually result in the formation of more than one product.
Cyanide is an example of an ambident nucleophile.

Q13. What is beta elimination?

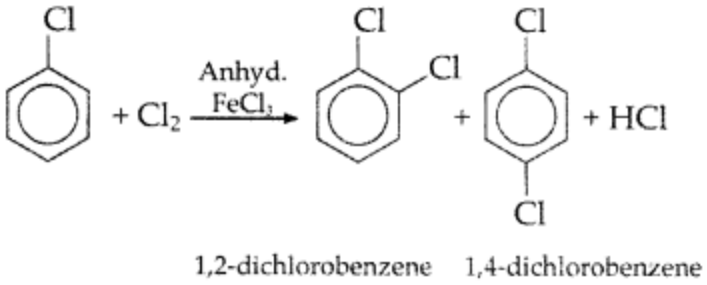
Answer:

When haloalkane or alkyl halide with a β- hydrogen atom is heated with an alcoholic solution of potassium hydroxide (i.e. in the presence of alcoholic KOH), the OC2H5− ion acts as a base and eliminates hydrogen from β- carbon atom. This elimination is known as β- elimination. It is also called dehydrohalogenation.

Q14. What happens when chlorobenzene is treated with Cl_2 / $FeCl_3$?

Answer:

When chlorobenzene is treated with Cl_2 / $FeCl_3$, a substitution reaction takes place, leading to the formation of 1,2 dichloro benzene and 1,4 dichloro benzene.



1,2-dichlorobenzene 1,4-dichlorobenzene

Q15. Why is Grignard reagent prepared under anhydrous conditions?

Answer:

The Grignard reagent is prepared under anhydrous conditions because it is very reactive. It reacts with the moisture to form the corresponding alkane.
$RMgX + H_2O \rightarrow RH + Mg(OH)X$

Q16. What happens when n-butyl chloride is treated with alcoholic KOH?

Answer:

When n-butyl chloride is treated with alcoholic KOH, an elimination reaction leads to the formation of butene potassium chloride and water.
$CH_3CH_2CH_2CH_2Cl + KOH\ (Alc) \rightarrow CH_3CH_2CH = CH_2 + KCl + H_2O$

Q17. What happens when methyl bromide is treated with sodium in the presence of dry ether?

Answer:

When methyl bromide is treated with sodium in the presence of dry ether, the Wurtz reaction will take place, leading to the elimination of the bromide ion and the formation of the successive alkane.

$$\underset{\text{Methylbromide}}{CH_3-Br} + 2Na + Br-CH_3 \xrightarrow[\text{(wurtz reaction)}]{\text{Dry ether}} CH_3-CH_3 + 2NaBr$$

Q18. How would you differentiate between SN_1 and SN_2 mechanisms of substitution reactions?

Answer:

S. No.	SN_1 Reaction	SN_2 Reaction
1.	It is a unimolecular reaction.	It is a bimolecular reaction.
2.	It obeys first-order kinetics.	It obeys second order kinetics.
3.	It takes place in two steps.	It takes place in a single step.
4.	The rate of reaction depends on the concentration of substrate.	The rate of reaction depends on the concentration of substrate and the nucleophile.
5.	It takes place via the formation of a carbocation.	It takes place in a single transition state.
6.	It leads to the formation of a racemic mixture.	It leads to an inversion of configuration.
7.	It is favoured in a polar protic solvent.	It is favoured in a polar aprotic solvent.
8.	It can take place with a weak base.	It requires a strong base.
9.	The rate depends on the halide structure: $3^o > 2^o > 1^o > CH_3X$.	The rate depends on the halide structure: $CH_3X > 1^o > 2^o > 3^o$.

Q19. How will you convert propene to 1-iodopropane?

Answer:

We can convert propene to 1-iodopropane by reacting it with hydrobromic acid in the presence of hydrogen peroxide to form n-propyl bromide. N-propyl bromide reacts with the sodium iodide in the presence of the acetone to form the required product, i.e. 1-iodopropane.

$$CH_2 = CH—CH_3 \xrightarrow[H_2O_2]{+HBr} CH_3CH_2CH_2Br \xrightarrow[\text{acetone}]{+NaI} \underset{\text{Iodopropane}}{CH_3CH_2CH_2I}$$

Q20. How will you differentiate between an alkyl halide and an aryl halide?

Answer:

S. No.	Alkyl Halide	Aryl Halide

1.	Alkyl halides are open-chain hydrocarbons in which the hydrogen atom is replaced with the halogen atom.	Aryl halides are aromatic hydrocarbons in which the hydrogen atom is replaced with the halogen atom.
2.	The halogen atom is attached to the sp^3 hybridised carbon atom.	The halogen atom is attached to an sp^2 hybridised carbon atom.
3.	They are linear or branched.	They are ringed.
4.	They undergo nucleophilic substitution reactions.	They do not undergo nucleophilic substitution reactions.