

Alkyl Halide Chemistry Questions with Solutions

Q1. What is the order of S_N2 reaction of the alkyl halide?

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

Answer: (b) The order of S_N2 reaction of the alkyl halide is $RI > RBr > RCl > RF$.

Explanation: Iodine is a good nucleophile and a good leaving group. Thus, it eliminates easily from an alkyl halide favouring S_N2 elimination reaction.

Q2. Chloroform is used as an

- (a) Antiseptic
- (b) Anaesthetic
- (c) Antipyretic
- (d) None of the above

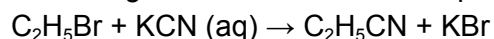
Answer: (b) Chloroform is used as an anaesthetic.

Q3. Methyl chloride reacts with silver acetate to yield

- (a) Acetic acid
- (b) Methyl acetate
- (c) Acetyl chloride
- (d) None of the above

Answer: (b) Methyl chloride reacts with silver acetate to yield methyl acetate.

Q4. The given reaction is an example of?



- (a) Elimination reaction
- (b) Nucleophilic substitution reaction
- (c) Electrophilic substitution reaction
- (d) None of the above

Answer: (c) The given reaction: $C_2H_5Br + KCN(aq) \rightarrow C_2H_5CN + KBr$ is an example of electrophilic substitution reaction.

Q5. An alkyl halide can be converted into alcohol by the

- (a) Addition reaction
- (b) Substitution reaction

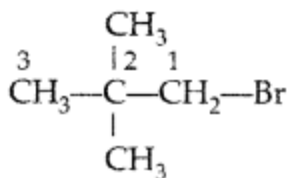
(c) Dehydrohalogenation reaction

(d) None of the above

Answer: (b) An alkyl halide can be converted into alcohol by the substitution reaction.

Q6. Write the IUPAC name of $(\text{CH}_3)_3\text{CCH}_2\text{Br}$.

Answer: The IUPAC name of $(\text{CH}_3)_3\text{CCH}_2\text{Br}$ is 1-Bromo-2, 2-dimethyl propane.



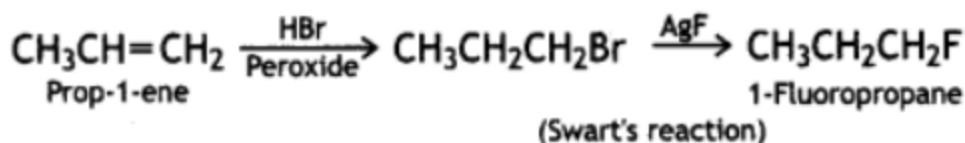
1-Bromo-2, 2-dimethyl propane

Q7. Why do we keep chloroform in the dark coloured bottles?

Answer: We keep chloroform in the dark coloured bottles because it reacts with atmospheric oxygen to produce poisonous phosgene gas.

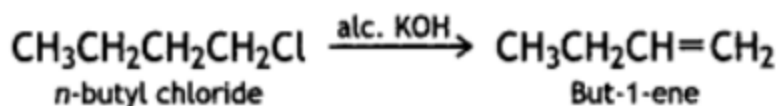
Q8. Convert Prop-1-ene to 1-fluoro propane.

Answer: We can convert Prop-1-ene to 1-fluoro propane by reacting Prop-1-ene with hydrogen bromide in the presence of hydrogen peroxide, followed by the reaction with AgF.



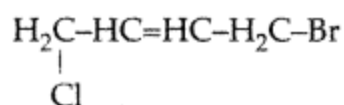
Q9. What happens when n-butyl chloride reacts with alcoholic KOH?

Answer: An elimination reaction takes place when n-butyl chloride reacts with alcoholic KOH to form an unsaturated But-1-ene.



Q10. Draw the structure of 1-Bromo-4-chloro but-2-ene

Answer: The structure of 1-Bromo-4-chloro but-2-ene is mentioned below.



Q11. Distinguish 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.

Q12. Match the following.

Column I	Column II
Vinyl halide	$\text{CH}_3\text{CH}=\text{CHCH}_2\text{Cl}$
Alkyl halide	$\text{C}_6\text{H}_5(\text{CH}_2\text{Cl})$
Allyl halide	$\text{CH}_2=\text{CHX}$
Benzyl halide	$\text{CH}_3-\text{CH}_2\text{X}$

Answer:

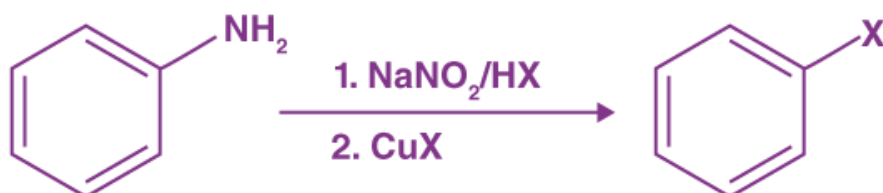
Column I	Column II
Vinyl halide	$\text{CH}_2=\text{CHX}$
Alkyl halide	$\text{CH}_3-\text{CH}_2\text{X}$
Allyl halide	$\text{CH}_3\text{CH}=\text{CHCH}_2\text{Cl}$
Benzyl halide	$\text{C}_6\text{H}_5(\text{CH}_2\text{Cl})$

Q13. Why is alkyl halide insoluble in water?

Answer: An alkyl halide is insoluble in water because it can not form a hydrogen bond with water. Thus, it is insoluble in water.

Q14. What is sandmeyer's reaction?

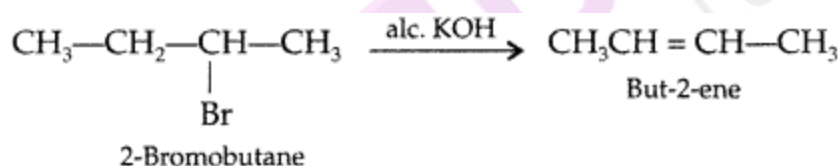
Answer: The Sandmeyer reaction is an organic reaction used to synthesise aryl halides from aryl diazonium salts using copper chlorides as a reagent.



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Q15. Convert 2-Bromo butane to but-2-ene.

Answer: We can convert 2-Bromo butane to but-2-ene by reacting it with alcoholic KOH. When alcoholic KOH reacts with 2-Bromo butane an elimination reaction takes place, leading to the elimination of HBr and the required but-2-ene is formed.



Practise Questions on Alkyl Halide

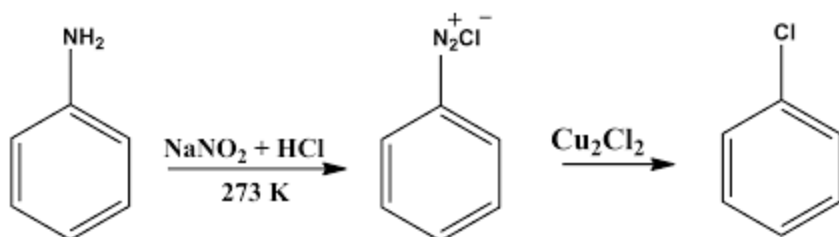
Q1. Arrange the following compounds in the increasing order of reactivity towards an SN^2 reaction.
2-Bromo-2- methyl butane, 1-Bromo pentane, 2-Bromo pentane

Answer: The order of reactivity of 2-Bromo-2- methyl butane, 1-Bromo pentane, 2-Bromo pentane in the increasing order of reactivity towards an SN^2 reaction will be 2-Bromo-2- methyl butane < 2-Bromo pentane < 1-Bromo pentane.

Q2. 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 .



Q3. Why is allyl chloride hydrolysed more readily than n-propyl chloride?

Answer: Allyl chloride has a high reactivity because the carbocation generated by hydrolysis is stabilised by resonance, whereas n-propyl chloride has no such stabilisation.

On the other hand, n-propyl chloride does not undergo ionisation to produce stable n-propyl carbocation, and Hence allyl chloride is hydrolysed more readily than n-propyl chloride.

Q4. What is β elimination of alkyl halide?

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 OC_2H_5^- ion acts as a base and eliminates hydrogen from β - carbon atom. This elimination is known as β - elimination.

It is also called dehydrohalogenation.

Q5. Explain the optical activity of 2-Chlorobutane.

Answer: Optical activity is the ability of a compound to rotate 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.

