

# QB365 Question Bank Software Study Materials

## Haloalkanes and Haloarenes Important 2 Marks Questions With Answers (Book Back and Creative)

11th Standard

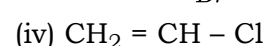
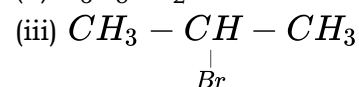
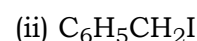
Chemistry

Total Marks : 60

### 2 Marks

30 x 2 = 60

1) Classify the following compounds in the form of alkyl, allylic, vinyl, benzylic halides



**Answer :** (i)  $\text{CH}_3 - \text{CH} = \text{CH} - \text{Cl}$

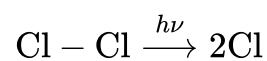
(ii)  $\text{C}_6\text{H}_5\text{I}$  - Benzyl iodide  $\rightarrow$  Benzylic Halides

(iii)  $\text{CH}_3 - \underset{\text{Br}}{\text{CH}} - \text{CH}_3$  - 2 - bromo propane  $\rightarrow$  alkyl

(iv)  $\text{CH}_2 = \text{CH} - \text{Cl}$  - Vinyl chloride  $\rightarrow$  Vinyl

2) Why chlorination of methane is not possible in dark?

**Answer :** The Chlorination of methane is carried out by free radical mechanism. The initiation step to form free radical needs high energy which is supplied by light energy.

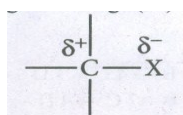


So this reaction is not possible in dark.

3) Give reasons for polarity of C-X bond in halo alkane.

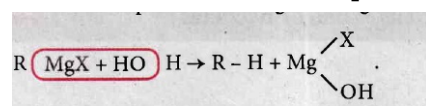
**Answer :** Carbon halogen bond is a polar bond as halogens are more electro negative than carbon. The carbon atom exhibits a partial positive charge ( $\delta^+$ ) and halogen atom a partial negative charge ( $\delta^-$ )

The C - X bond is formed by overlap of  $\text{sp}^3$  orbital of carbon atom I with half filled p-orbitat of the halogen atom. The atomic size of halogen increases from fluorine to iodine, which increases the C - X bond length. Larger the size, greater is the bond length, and weaker is the bond formed. The bond strength of C - X decreases from C - F to C - I in  $\text{CH}_3\text{X}$



4) Why is it necessary to avoid even traces of moisture during the use of Grignard reagent?

**Answer :** If moisture is present, the Grignard reagent will react with water to give alkanes.



So, moisture should not be present

5) Mention any three methods of preparation of haloalkanes from alcohols.

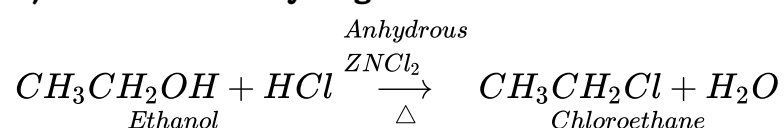
**Answer :** Alcohols can be converted into haloalkanes by reacting it with any one of the following reagent

1. hydrogen halide

2. Phosphorous halides

3. Thionyl chloride

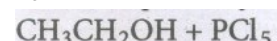
**a) Reaction with hydrogen halide:**

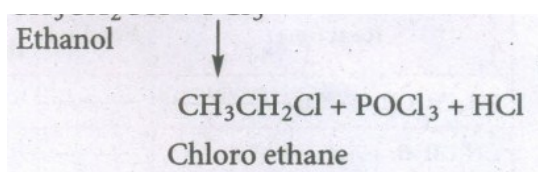


Mixture of con. HCl and anhydrous  $\text{ZnCl}_2$  is called Lucas reagent

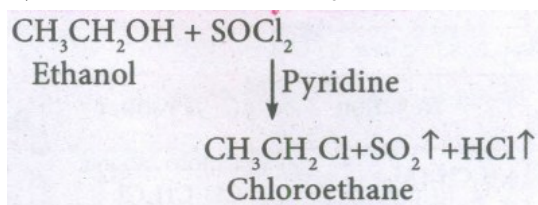
**b) Reaction with phosphorous halides :**

Alcohols react with  $\text{PX}_5$  or  $\text{PX}_3$  to form haloalkane.  $\text{PBr}_3$  and  $\text{PI}_3$  are usually generated in situ (produced in the reaction mixture) by the reaction of red phosphorus with bromine and iodine, respectively.





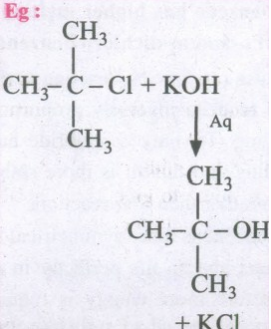
**c) Reaction with thionyl chloride :**



This reaction is known as Darzen's halogenation

- 6) Compare  $\text{S}_{\text{N}}1$  and  $\text{S}_{\text{N}}2$  reaction mechanisms.

**Answer :**

$\text{S}_{\text{N}}1$ Reaction	$\text{S}_{\text{N}}2$ product
It is unimolecular reaction	It is a bimolecular reaction.
Its mechanism occurs in two steps	It is a one step process
It involves the formation of an intermediate (Carbocation)	It involves the formation of transition state.
Rate = $k[\text{Alkyl halide}]$	Rate = $k[\text{Alkyl halide}] [\text{Nucleophile}]$
Products have both retained and inverted configuration	Products have inverted configuration.
Carbocation rearrangement occurs.	No carbocation rearrangement occurs.
Reactivity : Methyl < $1^\circ$ < $2^\circ$ < $3^\circ$	Reactivity : Methyl > $1^\circ$ > $2^\circ$ > $3^\circ$
Eg: 	Eg: $\text{CH}_3\text{Cl} + \text{KOH} \xrightarrow{\text{Aq}} \text{CH}_3\text{OH} + \text{KCl}$

- 7) Discuss the aromatic nucleophilic substitutions reaction of chlorobenzene.

**Answer :** Halo arenes do not undergo nucleophilic substitution reaction readily is due to C-X bond in aryl halide is short and strong and also the aromatic ring is a centre of high electron density.

The halogen of haloarenes can be substituted by  $\text{OH}^-$ ,  $\text{NH}_2^-$ , or  $\text{CN}^-$  with appropriate nucleophilic reagents at high temperature and pressure.

- 8) Account for the following

- (i) t-butyl chloride reacts with aqueous KOH by  $\text{S}_{\text{N}}1$  mechanism while n-butyl chloride reacts with  $\text{S}_{\text{N}}2$  mechanism.  
 (ii) p-dichloro benzene has higher melting point than those of o- and m-dichloro benzene.

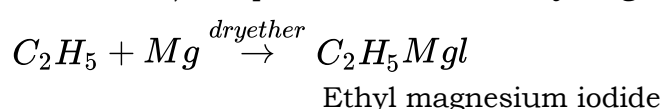
**Answer :** (i) This is because rate of  $\text{S}_{\text{N}}2$  reaction is directly proportional to delta inversely proportional to steric crowding. Tert-butyl & chloride has vast steric crowding and thus it is more stable. for  $\text{S}_{\text{N}}1$  reaction rather than  $\text{S}_{\text{N}}2$  reaction.

(ii) p-dichloro benzene is more symmetrical than o and m isomers and so fits perfectly in crystal lattice. Therefore more energy is required to break the crystal lattice of p-dichlorobenzene and so has higher melting point.

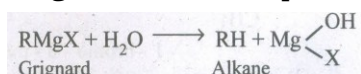
- 9) In an experiment ethyl iodide in ether is allowed to stand over magnesium pieces. Magnesium dissolves and product is formed

- a) Name the product and write the equation for the reaction.  
 b) Why all the reagents used in the reaction should be dry? Explain  
 c) How is acetone prepared from the product obtained in the experiment.

**Answer :** a) The product formed is ethylmagnesium iodide (Grignard reagent)



b) The Grignard carbon is highly basic and reacts with acidic protons of polar solvents like water to form an alkane so all reagents should be pure and dry.

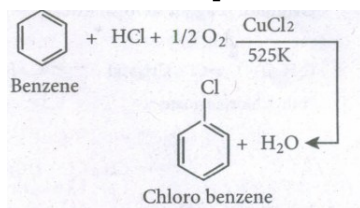


- 10) Write a chemical reaction useful to prepare the following:

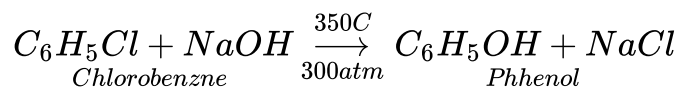
- i) Freon-12 from Carbon tetrachloride  
 ii) Carbon tetrachloride from carbon disulphide



**Answer :** i) Raschig process Chloro benzene is commercially prepared by passing a mixture of benzene vapour, air and HCl over heated cupric chloride is reaction is called Raschig process.

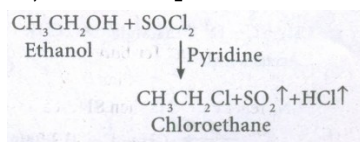


ii) Dows Process :



This reaction is known as Dow's Process

iii) Darzens process :

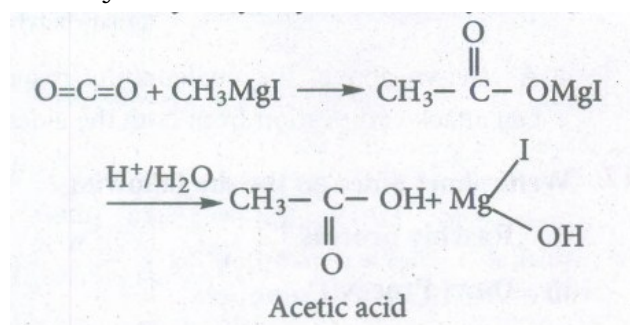


This reaction is known as Dow's process

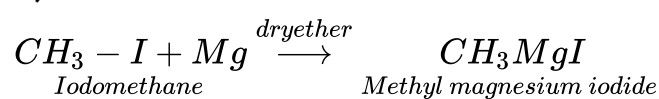
15) Starting from  $CH_3MgI$ , How will you prepare the following?

- i) Acetic acid
- ii) Acetone
- iii) Ethyl acetate
- iv) Iso propyl alcohol
- v) Methyl cyanide.

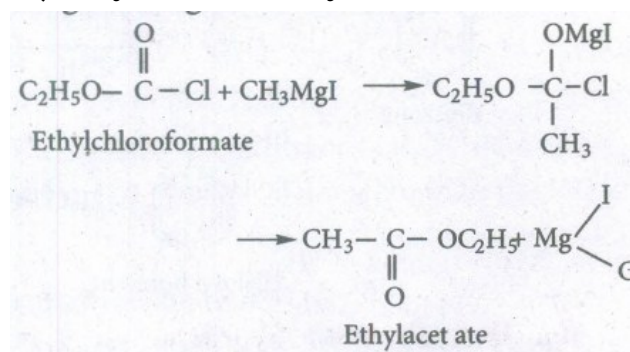
**Answer :** i) **Acetic acid:** Solid carbon dioxide reacts with Grignard reagent to form addition product which on hydrolysis yields carboxylic acids.



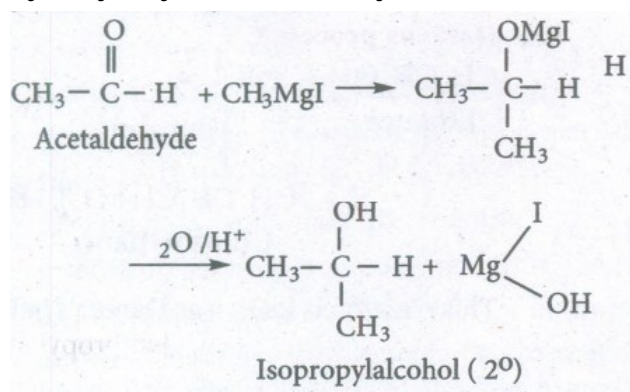
ii) **Acetone :**



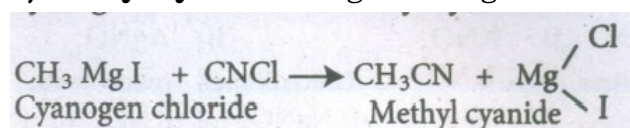
iii) **Ethyl acetate:** Ethylchloroformate reacts with Grignard reagent to form esters.



iv) **Iso propyl alcohol :** Aldehydes other than formaldehyde, react with Grignard reagent to give addition product which on hydrolysis yields secondary alcohol.



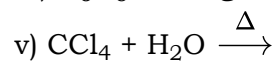
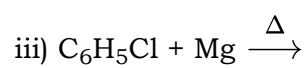
v) **Methyl cyanide :** Grignard reagent reacts with cyanogen chloride to form alkyl cyanide



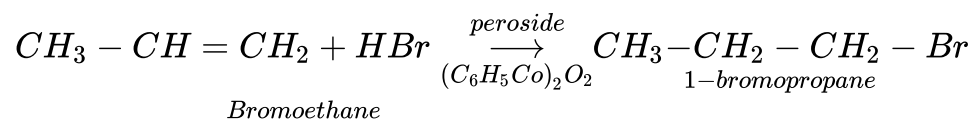
16) Complete the following reactions

- i)  $CH_3 - CH = CH_2 + HBr \xrightarrow{\text{Peroxide}}$
- ii)  $CH_3 - CH_2 - Br + NaSH \xrightarrow[H_2O]{\text{alcohol}}$

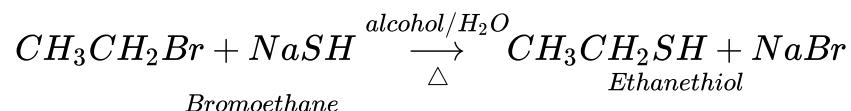




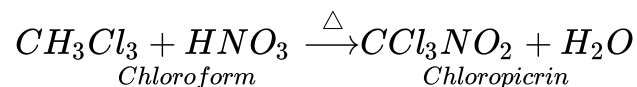
**Answer :** i) The addition of HBr to an alkene in the presence of organic peroxide, gives the anti Markovniko's product is effect is called peroxide effect.



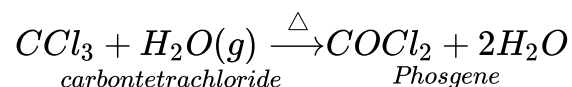
ii) Haloalkanes react with sodium or potassium hydrogen sulphide to form thio alcohols.



iii) Chloroform reacts with nitric acid to form chloropicrin.(Trichloro nitro methane)



iv) Carbon tetrachloride reacts with hot water or with hot water vapour producing the poisonous gas, phosgene.



17) Explain the preparation of the following compounds

i) DDT

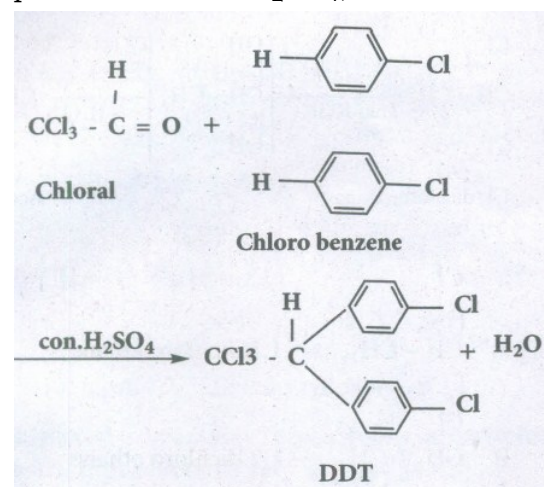
ii) Chloroform

iii) Biphenyl

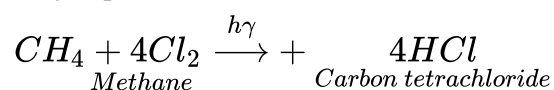
iv) Chloropicrin

v) Freon-12

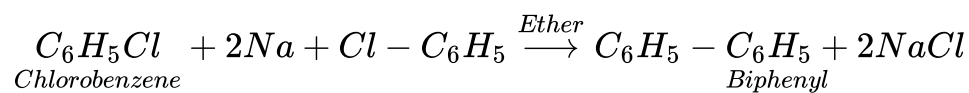
**Answer :** i) DDT: DDT can be prepared by heating a mixture of chlorobenzene with chloral (Trichloro acetaldehyde) in the presence of con.  $H_2SO_4$ ,



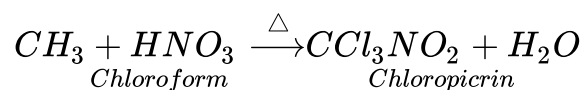
ii) Chloroform :The reaction of methane with excess of chlorine in the presence of sunlight will give carbon tetrachloride as the major product.



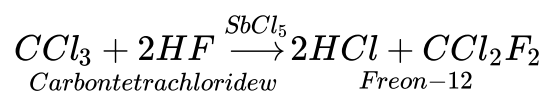
iii) Bipheenyl :



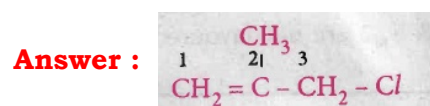
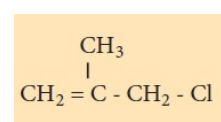
iv) Chloropicrin : Chloroform reacts with nitric acid to form chloropicrin.(Trichloro nitro methane)



v) Freon-12 :Freon - 12 is prepared by the action of hydrogen fluoride on carbon tetrachloride in . the presence of catalytic amount of antimony pentachloride. is is called swartz reaction



18) Write the IUPAC name of the following

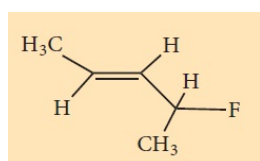


3 - Chloro - 2- Methyl - I - Propene

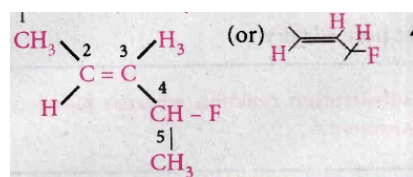
19) Chloroform is kept with a little ethyl alcohol in a dark coloured bottle why?

**Answer :** Chloroform undergoes oxidation in presence of light and air to form phosgene (a poisonous chemical) which makes chloroform unfit for use as anaesthetic. So it is kept in dark Coloured bottles filled upto the brim. lo/o ethanol is added to retard oxidation. It converts, phosgene if formed, into harmless lethyl carbonate.

20) Write the IUPAC name of the following



**Answer :**



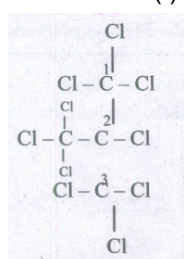
4-fluoro -2- pentene

21) Write the IUPAC names of the following compounds.

(i)  $(\text{CCl}_3)_3 \text{CCl}$

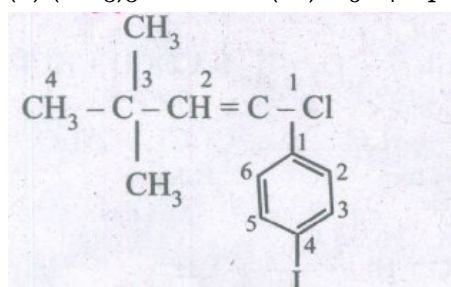
(ii)  $(\text{CH}_3)_3 \text{CCH} = \text{C}(\text{Cl}) \text{C}_6\text{H}_4\text{I}$ - p

**Answer :** (i)  $(\text{CCl}_3)_3 \text{CCl}$



2-(trichloromethyl)- 1,1,1,2,3,3,3-hepta chloropropane

(ii)  $(\text{CH}_3)_3 \text{CCH} = \text{C}(\text{Cl}) \text{C}_6\text{H}_4\text{I}$ - p



1-Chloro -1-(4-iodophenyl)-3,3-dimethylbut-1-ene.

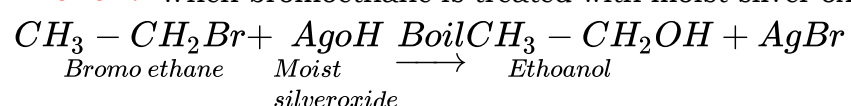
22) Explain-Finkelstein reaction.

**Answer :** Chloro (or) bromoalkane on heating with sodium iodide in dry acetone gives iodo alkane. This reaction is called Finkelstein reaction.



23) What happens when bromoethane is treated with moist silver oxide?

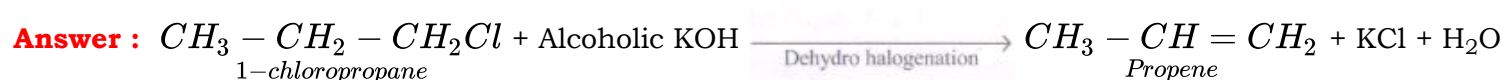
**Answer :** When bromoethane is treated with moist silver oxide, ethanol will be formed as product:



24) State-Saytzeff's rule.

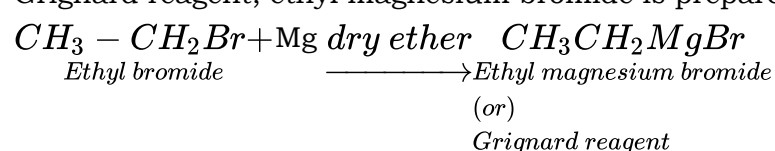
**Answer :** Some haloalkanes when treated with alcoholic KOH yield a mixture of olefins with different amounts. It is explained by Saytzeff's rule which states that in a dehydrohalogenation reaction, the preferred product is that alkene which has more number of alkyl group attached to the doubly bonded carbon atom.

25) How will you convert 1-chloropropane to propene?



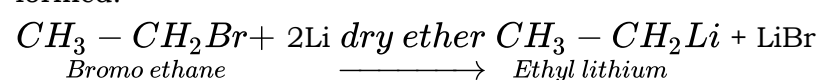
26) What is Grignard reagent? How is it prepared from ethyl bromide?

**Answer :** When a solution of haloalkane in ether is treated with magnesium, we will get alkyl magnesium halide known as Grignard reagent, ethyl magnesium bromide is prepared from ethyl bromide as:

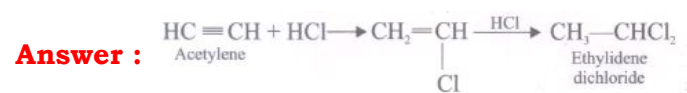


27) How will you prepare ethyl lithium?

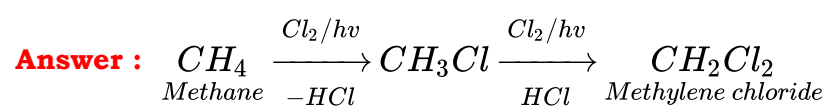
**Answer :** When bromoethane is treated with an active metal like lithium in the presence of dry ether, then ethyl lithium will be formed.



28) How will you prepare ethylidene dichloride from acetylene?

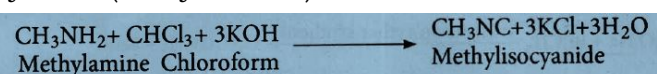


29) Convert methane to methylene chloride.



30) Explain: Carbylamine reaction (or) How is a primary amine tested?

**Answer :** Chloroform reacts with aliphatic or aromatic primary amine and alcoholic caustic potash, to give foul smelling alkyl isocyanide (carbylamines)



This reaction is used to test primary amine.