CBSE Test Paper-02

Class - 12 Chemistry (Haloalkanes and Haloarenes)

1. Carbon tetra chloride has a dipole moment
   a. μ= 0
   b. μ = 1
   c. μ = 2
   d. μ= 4
2. Dichloromethane (Methylene chloride) is
   a. refrigerant
   b. degreasing agent
   c. pesticide
   d. solvent
3. The best method for the conversion of an alcohol into an alkyl chloride is by treating the alcohol with
   a. $SOCl_2$ in presence of pyridine
   b. PCl_3
   c. Dry HCl in the presence of anhydrous $ZnCl_2$
   d. PCl_5
4. Liver when chronically exposed to chloroform gets damaged because
   a. chloroform is not metabolised in the liver
   b. chloroform depresses central nervous system
   c. chloroform develops sores in the liver
   d. chloroform gets converted to carbonyl chloride which is a poison
5. To prepare alkanes containing odd number of carbon atoms, Wurtz reaction is not preferred because
   a. a lot of reaction mixture goes wasted
   b. a mixture of three different alkyl halides has to be used
   c. a mixture of four different alkyl halides has to be used
   d. a mixture of two different alkyl halides has to be used
6. Give the IUPAC name of the following compound:

$$CH_3 - \underset{\underset{CH_3}{|}}{C} = \underset{\underset{Br}{|}}{C} - CH_2OH$$

7. Name the following halides according to IUPAC system and classify them as alkyl, allyl, benzyl (primary, secondary, tertiary), vinyl or aryl halides.
   p - $ClC_6H_4CH_2$ $CH(CH_3)_2$
   m - Cl $CH_2C_6H_4CH_2C(CH_3)_3$
8. Name the following halide according to IUPAC system and classify it as alkyl, allyl, benzyl (primary, secondary, tertiary) vinyl or aryl halide.
   CH_3 $CH(CH_3)CH(Br)$ CH_3
9. Give the structures of 2,3 - dibromo - 1 - chloro -3- methylpentane
10. Write the structure of the major organic product in each of the:
    CH_3 - CH_2 - CH_2Cl + NaI (in acetone)
11. Write the structure of the major organic product in the following reaction:
    $CH_3CH(Br)CH_2CH_3$ + NaOH $\xrightarrow{water}$
12. In the following pairs of halogen compounds, which would undergo S_N2 reaction faster?
    i. $CH_3CH_2CH_2Cl$ or $(CH_3)_2CH$-Cl
    ii. $CH_3CH_2CH_2I$ or $CH_3CH_2CH_2Br$
13. A hydrocarbon C_5H_{10} does not react with chlorine in dark but gives a single monochloro compound C_5H_9Cl in bright sunlight. Identify the hydrocarbon.
14. Mention the problems related to extensive use of DDT.
15. Give the IUPAC names of the following compounds:
    i. $CH_3CH(Cl)CH(Br)CH_3$
    ii. $CHF_2CBrClF$
    iii. $ClCH_2C = CCH_2Br$
    iv. $(CCl_3)_3CCl$
    v. $CH_3C(p-ClC_6H_4)_2CH(Br)CH_3$
    vi. $(CH_3)_3CCH = CCl(p-C_6H_4I)$

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Solutions

1. (a) μ= 0

   Explanation: CCl_4 is symmetrical hence dipole moment is zero.

2. (d) solvent

   Explanation: Methylene chloride is an organic compound with the formula CH_2Cl_2. This colorless, volatile liquid with a moderately sweet aroma is widely used as a solvent, as a paint remover, as a propellant in aerosols, and as a process solvent in the manufacture of drugs. It is also used as a metal cleaning and finishing solvent.

3. (a) $SOCl_2$ in presence of pyridine

   Explanation: The hydroxyl group of an alcohol is replaced by halogen on reaction with concentrated halogen acids, phosphorus halides or thionyl chloride. Thionyl chloride ($SOCl_2$) is preferred because the other two products SO_2 and HCl are escapable gases. Hence the reaction gives pure alkyl halides.

   $ROH + SOCl_2 \rightarrow RCl + SO_2(g) + HCl(g)$

4. (d) chloroform gets converted to carbonyl chloride which is a poison

   Explanation: Chronic chloroform exposure may cause damage to the liver (where chloroform is metabolised to phosgene)

   $CHCl_3 + O_2 \rightarrow 2COCl_2 + 2HCl$

5. (d) a mixture of two different alkyl halides has to be used

   Explanation: Alkyl halides on treatment with sodium metal in dry ethereal (free from moisture) solution give higher alkanes. This reaction is known as Wurtz reaction and is used for the preparation of higher alkanes containing even number of carbon atoms. Many side products are formed when two different alkyl halides are used. So this method is not preferred to prepare alkanes having odd number of C atoms.

6. $\overset{4}{C}H_3 - \underset{\underset{CH_3}{|}}{\overset{3}{C}} = \underset{\underset{Br}{|}}{\overset{2}{C}} - \overset{1}{C}H_2OH$

   2 - bromo - 3 - methyl - but - 2 - en - 1 - ol

7. i. IUPAC name: 1-chloro-4-(2-methylpropyl)benzene, aryl halide

ii. IUPAC name: 1-Chloromethyl-3-(2, 2-dimethylpropyl) benzene, 1° benzylic halide

8. IUPAC name: 2-Bromo-3-methylbutane
   It is a 2° alkyl halide because the halogen is attached to a secondary C.

9. As we can figure out the parent chain contains 5 C as it is a pentane. Also at position 1, -Cl is attached, at position 2 and 3, -Br is attached and at position 3 -CH_3 position is attached. So the structure of the compound must be

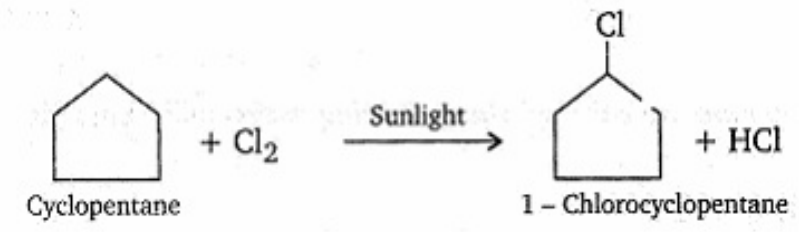
$$CH_3 - CH_2 - \underset{Br}{\overset{CH_3}{\overset{|}{\underset{|}{C}}}} - \underset{Br}{\underset{|}{CH}} - CH_2Cl$$

10. $$\underset{1-Chloropropane}{CH_3CH_2CH_2Cl} + NaI \xrightarrow[\left(\begin{smallmatrix} Finkelstein \\ reaction \end{smallmatrix}\right)]{\begin{smallmatrix} acetone \\ heat \end{smallmatrix}} \underset{1-Iodopropane}{CH_3CH_2CH_2I} + NaCl$$

11. $$\underset{2-\text{Bromobutane}}{CH_3CH(Br)CH_2CH_3} + NaOH \xrightarrow{water} \underset{\text{Butan - 2 - ol}}{CH_3CH(OH)CH_2CH_3} + NaBr$$

12. i. $CH_3CH_2CH_2Cl$: It is primary halide and therefore undergoes S_N2 reaction faster.
    ii. $CH_3CH_2CH_2I$: As iodine is a better leaving group because of its large size, it will be released at a faster rate in the presence of incoming nucleophile as compared to Br.

13. Since the hydrocarbon gives only one monochloro compound, it indicates that all hydrogen atoms in the hydrocarbon are equivalent. Thus, the compound is cyclopentane with the molecular formula C_5H_{10}.

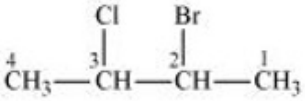


14. i. Many species of insects developed resistance to DDT.
    ii. It was also discovered to have a high toxicity towards fish.
    iii. The chemical stability of DDT and its fat solubility compounded the problem.
    iv. DDT is not metabolised very rapidly by animals; instead, it is deposited and stored

in the fatty tissues.

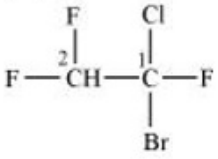
v. If ingestion continues at a steady rate, DDT builds up within the animal over time.

15. **(i)**



2-Bromo-3-chlorobutane

(ii)

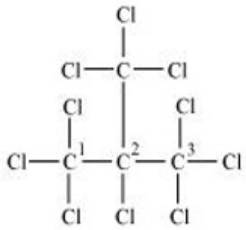


1-Bromo-1-chloro-1, 2, 2-trifluoroethane

(iii)

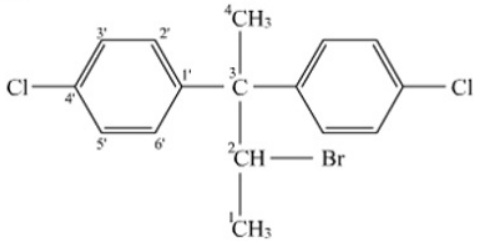
1-Bromo-4-chlorobut-2-yne

(iv)



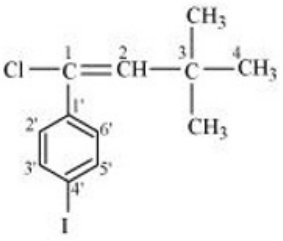
2-(Trichloromethyl)-1,1,1,2,3,3,3-heptachloropropane

(v)



2-Bromo-3, 3-bis(4-chlorophenyl) butane

(vi)



1-chloro-1-(4-iodophenyl)-3, 3-dimethylbut-1-ene