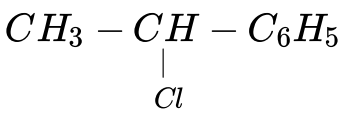
CBSE Test Paper-05

Class - 12 Chemistry (Haloalkanes and Haloarenes)

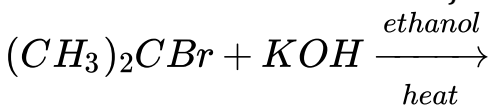
1. Which one of the following is not a chiral molecule?
   a. bromochloro – iodomethane
   b. propan – 2 – ol
   c. Butan – 2 – ol
   d. 2 – chlorobutane
2. Ethyl benzene cannot be prepared by _____.
   a. Clemmensen reduction
   b. Wurtz – Fittig reaction
   c. Friedel – Crafts reaction
   d. Wurtz reaction
3. Which of the following compounds has highest boiling points?
   a. $CH_3CH_2CH_2Cl$
   b. $CH_3CH_2CH_2CH_2Cl$
   c. $(CH_3)_3Cl$
   d. $CH_3CH(CH_3)CH_2Cl$
4. p – Dichlorobenzene has _____ than those of o – and m – isomers
   a. higher melting point and lower solubility
   b. low melting point and low solubility
   c. lower melting point and higher solubility
   d. higher melting point and higher solubility
5. Which branched chain isomer of the hydrocarbon with molecular mass 72u gives only one isomer of mono substituted alkyl halide?
   a. Tertiary butyl chloride
   b. Neohexane
   c. Isohexane
   d. Neopentane
6. Name the following halide according to IUPAC system and classify it as alkyl, allyl, benzyl (primary, secondary, tertiary) vinyl or aryl halide.

$(CH_3)_3CCH_2CH(Br)\ C_6H_5$

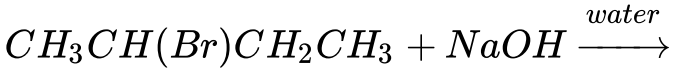
7. What is meant by resolution?
8. Give IUPAC names of:



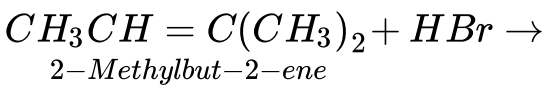
9. Write the structure of the major organic product in the following reaction:



10. Write the structure of the major organic product in the following reaction:

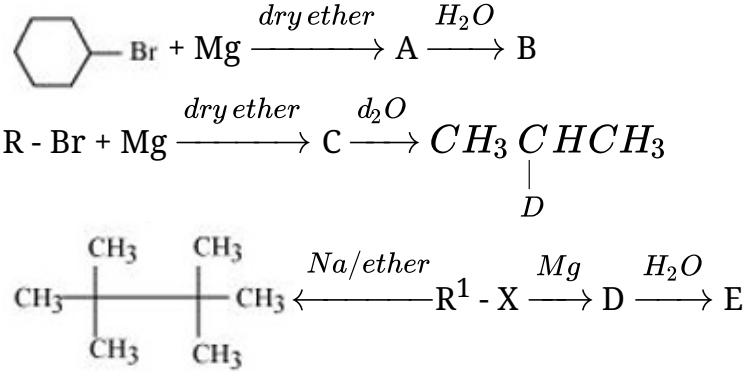


11. Write the structure of the major organic product in each of the:



12. How will you effect the following conversions?
    i. Chlorobenzene to p-nitrophenoI.
    ii. Bromobenzene to biphenyl.
    iii. Propene to propan-1-ol
13. Explain the following with the help of suitable examples:
    a. Swarts reaction
    b. Finkelstein reaction
14. An organic compound A on heating with NH_3 and cuprous oxide at high pressure gives compound B. The compound B on treatment with ice-cold solution of $NaNO_2$ and HCl gives C, which on heating with copper turning and HCl gives A again. Identify A, B & C. compound.

15. Identify A, B, C, D, E, R and R^1 in the following:



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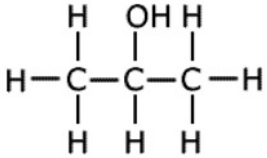
Solutions

1. (b) propan – 2 – ol

   Explanation: 

   This is not chiral molecule because functional group carbon that is carbon having alchohal group has 2 same groups on either side and there is symmetry about this carbon that is why this is not chiral.
2. (d) Wurtz reaction

   Explanation: Alkyl halides react with sodium in dry ether to give hydrocarbons containing double the number of carbon atoms present in the halide. This reaction is known as Wurtz reaction.

   $2RX + 2Na \rightarrow R - R + 2NaX$

   So $C_6H_5CH_2CH_3$ is not prepared by Wurtz reaction.
3. (b) $CH_3CH_2CH_2CH_2Cl$

   Explanation: The forces of attraction between the molecules of a compound get stronger as they get bigger in size and have more electrons. Also for a straight chain compound, the points of interaction between the molecules is more than for a branched compound having the same molecular formula. Thus $CH_3CH_2CH_2CH_2Cl$ has the highest melting point since it is the longest chain compound among the given options.
4. (a) higher melting point and lower solubility

   Explanation: The para-isomers of dihalobenzenes are high melting as compared to their ortho- and meta-isomers. It is due to symmetry of para-isomers that fits in crystal lattice better as compared to ortho- and meta-isomers. These compounds have lower solubility in water but higher solubility in organic solvents.
5. (d) Neopentane

   Explanation: Neopentane has all same type of hydrogen and has molecular weight 72u

6. IUPAC name: 1-Bromo-3, 3-dimethyl-1-phenylbutane
   It is a 2° benzylic halide

7. Resolution is a process of separating racemic mixture into dextrorotatory and laevorotatory optical isomers by a suitable method.

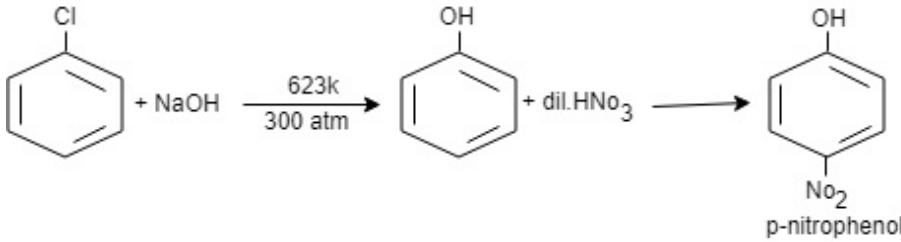
8. 1-Chloro-1-phenylethane

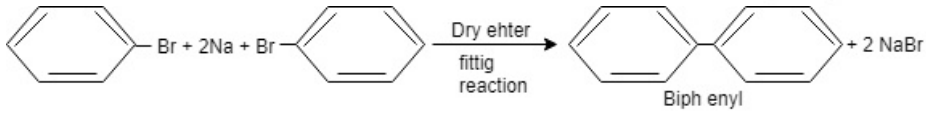
9. $$(CH_3)_3CBr + KOH \xrightarrow[heat]{ethanol} \underset{\text{2 - methylpropene}}{CH_3 - \overset{CH_3}{\overset{|}{C}} = CH_2} + KBr + H_2O$$

10. $$\underset{\text{2-Bromobutane}}{CH_3CH(Br)CH_2CH_3} + NaOH \xrightarrow{water} \underset{\text{Butane - 2 - ol}}{CH_3 - \overset{OH}{\overset{|}{C}}H - CH_2CH_3} + NaBr$$

11. $$\underset{2-Methylbut-2-ene}{CH_3CH = C(CH_3)_2} + HBr \xrightarrow[(Markovnikov\ addition)]{} \underset{2-Bromo-2-\text{methylbutane}}{CH_3 - CH_2 - \overset{Br}{\overset{|}{\underset{CH_3}{\underset{|}{C}}}} - CH_3}$$

12. Steps involved in the following conversions are as under:

i. 

ii. 

iii. $$CH_3 - CH = CH_2 \xrightarrow[Peroxide]{HBr} CH_3CH_2CH_2Br \xrightarrow[\Delta]{ar\cdot KOH} \underset{\text{Pr}opan-l-ol}{CH_3CH_2CH_2OH}$$

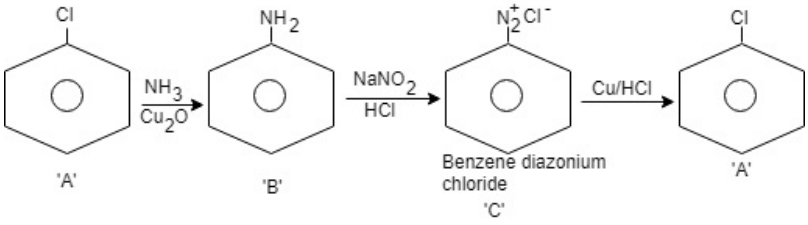
13. Swarts reaction: The synthesis of alkyl fluorides is best accomplished by heating an alkyl chloride/bromide in the presence of a metallic fluoride such as AgF, Hg_2F_2 or SbF_3. The reaction is termed as Swarts reaction.

    $$H_3C - Br + AgF \rightarrow H_3C - F + AgBr$$

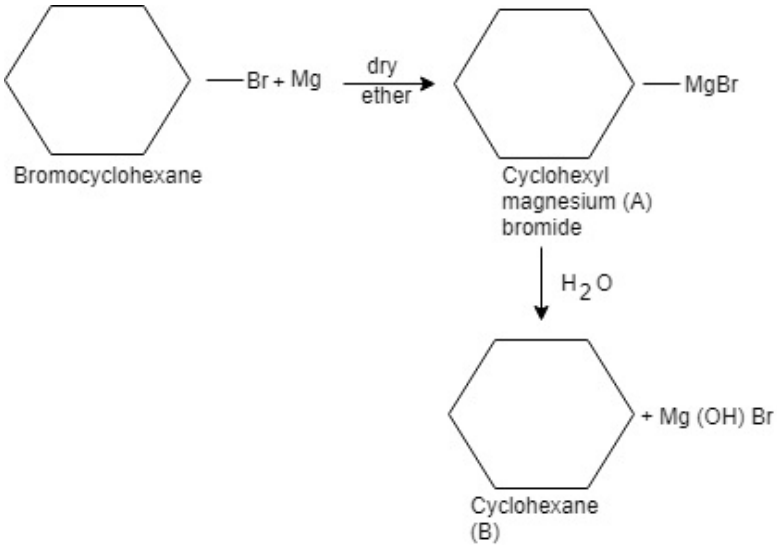
    Finkelstein reaction: When alkyl bromide reacts with NaI in presence of acetone as

solvent, alkyl iodide is formed. $C_2H_5Br + NaI \xrightarrow{Acetone} C_2H_5I + NaBr$

14. $A \xrightarrow[Cu_2O]{NH_3} B \xrightarrow[0-5^\circ C]{NaNo_2/HCl} C \xrightarrow{Cu/HCl} A$



15.



An alkyl halide on treatment with Mg in dry ether gives the Grignard reagent. So A is cyclohexyl magnesium bromide as shown which on treatment with water gives the alkane i.e. cyclohexane (B)

Since D of D_2O gets attached to the carbon atom to which MgBr is attached, C is

$$CH_3\underset{\underset{MgBr}{|}}{C}HCH_3$$

Isopropyl magnesium bromide

Therefore, compound D formed on reaction of the halide with Mg is

$$CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - MgBr$$

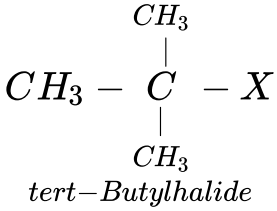
$tert-Butylmagnesiumbromide$

Therefore, the compound R - Br is

$$CH_3\underset{\underset{Br}{|}}{C}HCH_3$$

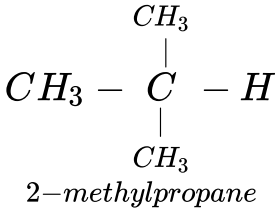
Isopropyl bromide

When an alkyl halide is treated with Na in the presence of ether, a hydrocarbon containing double the number of carbon atoms as present in the original halide is obtained as product. This is known as Wurtz reaction. Therefore, the halide, R^1 - X, is



$tert-Butylhalide$

And, compound E formed on reaction of tert-butyl magnesium bromide is



$2-methylpropane$