CHEMISTRY

BOOKS - PRADEEP CHEMISTRY (HINGLISH)

HALOALKANES AND HALOARENES

CURIOSITY QUESTION

1. Natural blood has not been synthesized so far. Are there any blood substitution?

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2. Due to depletion of ozone layer, chlorofluorocarbons (CFCs or freons-12) are being phased out as refrigerants, and propellants? Suggest some substitutes.

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3. Why is chloroform not used as anaesthetic these days? What is the commonly used anaesthetic?

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4. Carbon dioxide is commonly used as a fire extinguisher. Suggest some better fire extinguishers.

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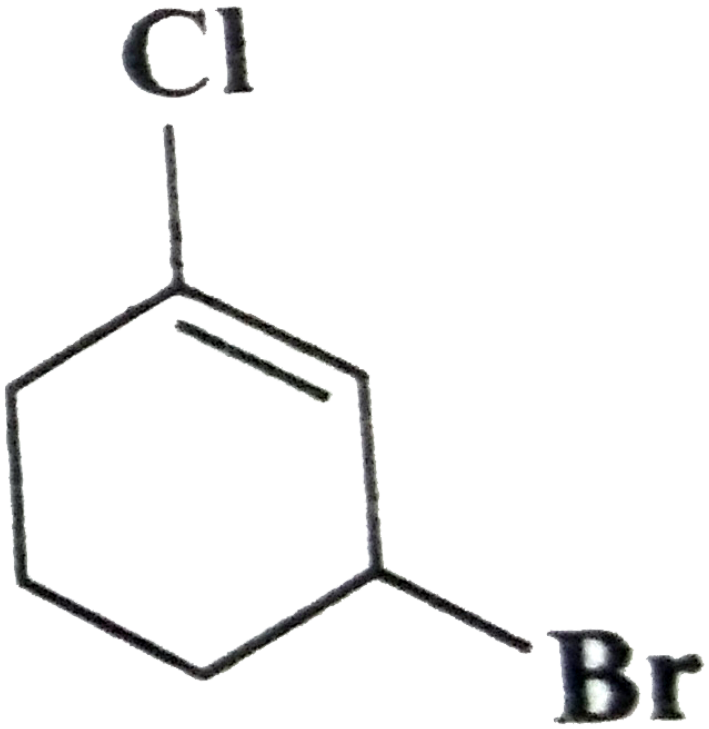
TEST YOUR GRIP (MULTIPLE CHOICE QUESTIONS)

1. The IUPAC name of the compound shown below is



A. 2-bromo-6-chlorocyclohex-1-ene

B. 6-bromo-2-chlorocyclohexene

C. 3-bromo-1-chlorocyclohexene

D. 1-bromo-3-chlorocyclohexene

Answer: C

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2. Reaction of hydrogen bromide with propene in the absence of peroxide is a/an

A. free radical addition

B. nucleophilic addition

C. electrophilic substitution

D. electrophilic addition

Answer: D

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3. When HCl gas is passed through propene in the presence of benzoyl peroxide, it gives :

A. 2-Chloropropane

B. Allyl chloride

C. No reaction

D. n-Propyl chloride.

Answer: A

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4. Addition of HBr gives same product in the presence or absence of peroxide when alkene is

A. 1-butene

B. 2-methylpropene

C. propene

D. 2-butene

Answer: D

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5. The addition of HBr is the easiest with

A. $CH_2 = CHCl$

B. $ClCH = CHCl$

C. $CH_3 - CH = CH_2$

D. $(CH_3)_2C = CH_2$.

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6. A compound is formed by substitution of two chlorine for two hydrogens in propane. The number of possible isomeric compounds is

A. 4

B. 3

C. 5

D. 2

Answer: C

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7. Which of the following halogen exchange reaction will occur in acetone ?

A. $R - I + NaCl$

B. $R - F + KCl$

C. $R - Cl + NaI$

D. $CH_3 - F + AgBr$

Answer: C

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8. Fluorobenzene (C_6H_5F) can be synthesized in the laboratory ,

A. by heating phenol with HF and KF

B. From aniline by diazotisation followed by heating the diazonium salt with HBF_4

C. by direct fluorination of benzene with F_2 gas

D. by reacting bromobenzene with NaF solution

Answer: B

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9. When chlorine is passed through propene at $400^\circ C$ which of the following is formed?

A. PVC

B. Allyl chloride

C. Vinyl chloride

D. 1,2-Dichloroethane.

Answer: B

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10. Which of the following compounds has the highest boiling point?

A. $CH_3CH_2CH_2Cl$

B. $CH_3CH_2CH_2CH_2Cl$

C. $CH_3CH(CH_3)CH_2Cl$

D. $(CH_3)_3CCl$

Answer: B

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11. Which of the following possesses highest melting point ?

A. Chlorobenzene

B. o-Dichlorobenzene

C. m-Dichlorobenzene

D. p-Dichlorobezene

Answer: D

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12. Which of the following are arranged in the decreasing order of dipole moment ?

A. CH_3Cl, CH_3Br, CH_3F

B. CH_3Cl, CH_3F, CH_3Br

C. CH_3Br, CH_3Cl, CH_3F

D. CH_3Br, CH_3F, CH_3Cl

Answer: B

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13. Reactivity order of halides of dehydrohalogenation is

A. $R-F>R-Cl>R-Br>R-I$

B. $R-I>R-Br>R-Cl>R-F$

C. $R-I>R-Cl>R-Br>R-F$

D. $R-F>R-I>R-Br>R-Cl$

Answer: B

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14. Among the following the strongest nucleophilic is

A. C_2H_5SH

B. CH_3COO^-

C. CH_3NH_2

D. $NCCH_2^-$

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15. Which one of the following forms propanenitrile as the major product ?

A. Ethyl bromide+Alcoholic KCN

B. Propyl bromide+alcoholic KCN

C. Propyl bromide + Alcoholic AgCN

D. Ethyl bromide+alcoholic AgCN

Answer: A

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16. Which of the following is most reactive toward nucleophilic substitution reaction ?

A. $CH_2 = CH - Cl$

B. C_6H_5Cl

C. $CH_3CH = CHCl$

D. $ClCH_2 - CH = CH_2$

Answer: D

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17. The correct increasing order of reactivity of halides for S_N2 reaction is

A. $CH_3CH_2X < (CH_3)_2CHX < CH_2 = CHCH_2X < PhCH_2X$

B. $(CH_3)_2CHX < CH_3CH_2X < CH_2 = CHCH_2X < PhCH_2X$

C. $PhCH_2X < (CH_3)_2CHX < CH_3CH_2X < CH_2 = CHCH_2X$

D. $CH_2 = CHCH_2X < PhCH_2X < (CH_3)_2CHX < CH_3CH_2X$

Answer: D

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18. Which of the following events does not occur during S_N2 reaction mechanism?

A. Back side attack of nucleophile

B. Formation of carbonium ion

C. One step continuous process

D. 100% inversion of configuration

Answer: B

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19. Which of the following is not chiral?

A. 2-Hydroxypropanoic acid

B. 2-Butanol

C. 2,3-Dibromobutane

D. 3-Bromopentane

Answer: D

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20. Chlorobenzene on treatment with sodium in dry ether gives diphenyl. The name of the reaction is

A. Fittig reaction

B. Wurtz-Fittig reaction

C. Gatterman reaction

D. Sandmeyer Reaction

Answer: A

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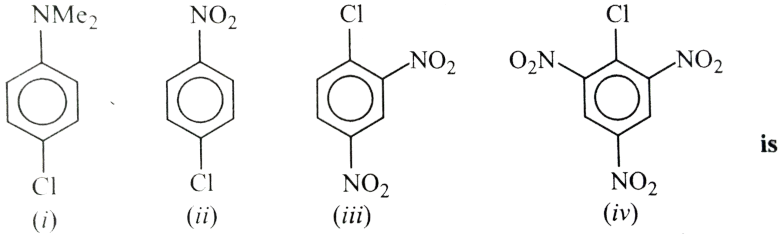
21. Order of reactivity towards nucleophilic substitution reaction of the compounds



is

A. igtiigtiiigtiv

B. iigtigtiiigtiv

C. ivgtiiigtiigti

D. iiigtivgtiigti

Answer: C

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22. Which of the following is not an example of Wurtz-Fittig reaction?

A. $C_6H_5CH_2Cl + CH_3Cl \xrightarrow{\text{Na/ether}}$

B. $C_6H_5CH_2Cl + C_6H_5Cl \xrightarrow{\text{Na/ether}}$

C. $C_6H_5Cl + CH_3Cl \xrightarrow{\text{Na/ether}}$

D. None of the above

Answer: A

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23. In one step ethyne can be obtained from

A. ethanol

B. ethanal

C. chloroform

D. ethyl bromide

Answer: C

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TEST YOUR GRIP (FILL IN THE BLANKS)

1. The boiling points of alkyl halides are higher than those of corresponding alkanes because of____.

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2. Alkyl halides are insoluble in water because they do not form____with water.

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3. Small quantity of alcohol is added to chloroform to remove___formed as a result of exposure to air and light.

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4. Alkyl halides are____reactive than haloarenes but____reactive than____towards nucleophilic substitute ion reactions.

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5. With aqueous KOH, alkyl halides undergo____reaction but with hot alcoholic KOH, they undergo____reaction.

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6. With potassium cyanide, alkyl halides give____while with silver cyanide____are the major products.

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7. (i) $CH_3CH_2I \xrightarrow{NaCN} ? \xrightarrow[\text{Partial hydrolysis}]{OH^-,} ?$

(ii) $CH_3CH_2Br \xrightarrow{KCN} ? \xrightarrow{LiAlH_4} ?$

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8. Nitroalkanes are formed when alkyl alides react with___while alkyl nitrites are formed when alkyl halides are treated with____.

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9. Formation of phenol from chlorobenzene is an example of____aromatic substitution and occurs through___intermediate.

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10. The reaction of p-nitrochlorobenzene with sodium methoxide to form p-nitroanisole occurs by ____reaction.

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11. Preparation of chlorobenzene from benzenediazonium chloride with cuprous chloride and aq. HCl is known as____reaction.

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12. The well known refrigerant freon has the structure____.

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13. Vinyl chloride on reaction with the dimethyl copper gives.....

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14. DDT stands for____.

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15. _____ is used to eradicate malaria.

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16. Hydrolysis of 2-brmo-3-methylbutane yields only_____.

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17. Butanenitrile can be prepared by heating____with alcoholic KCN.

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18. Toluene reacts with chlorine in presence of catalyst $FeCl_3$ to form_____.

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19. Chlorobenzene and sodium react in dry ether medium to form____.

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20. Chlorobenzene reacts with____in presence of conc. H_2SO_4 to form DDT.

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21. Iodobenzene on heating with copper powder forms dipenyl. The reaction is called_____.

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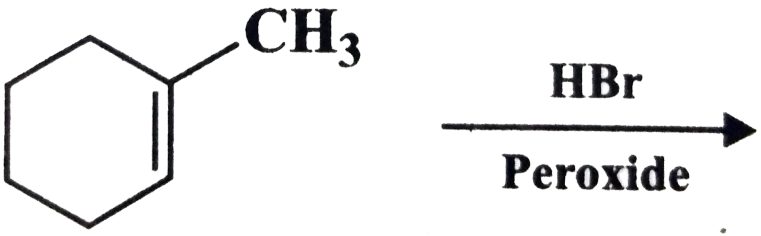
CONCEPTUAL QUESTIONS

1. Write down the structure of the product of the following reactions:

(i) 3-Methyl-1-butene $\xrightarrow{\text{HBr}}$?



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2. Complete the following reaction:

$$CH_3 - CH = CH_2 \xrightarrow[\text{Peroxide}]{\text{HBr}} X \xrightarrow[\text{Acetone}]{NaI} Y.$$

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3. CHF_3 is less acidic than $CHCl_3$. Explain.

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4. What will be the major organic product of the following reaction?

$$C_6H_5C_2H_5 \xrightarrow[(ii)\,NaCN]{(i)\,Br_2,hv}$$

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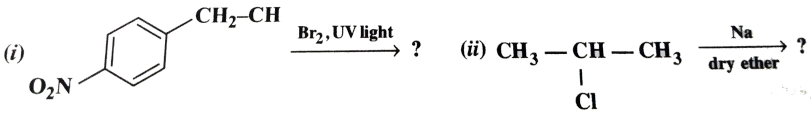
5. Write the major product (s) in the following reactions:



(ii). $CH_3 - \underset{\underset{Cl}{|}}{CH} - CH_3 \xrightarrow[\text{dry ether}]{Na} ?$

(iii) $CH_3 - CH_2 - Br \xrightarrow{AgCN} ?$

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6. Arrange the following halides in order increasing S_{N^2} reactivity $CH_3Cl, CH_3Br, CH_3CH_2Cl, (CH_3)_2CHCl.$

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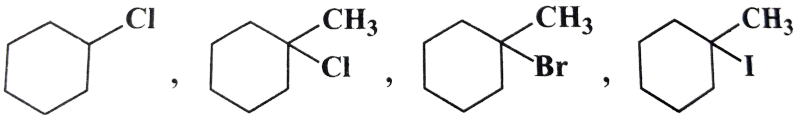
7. Predict the order of reactivity of the following compounds in S_N1 reactions.



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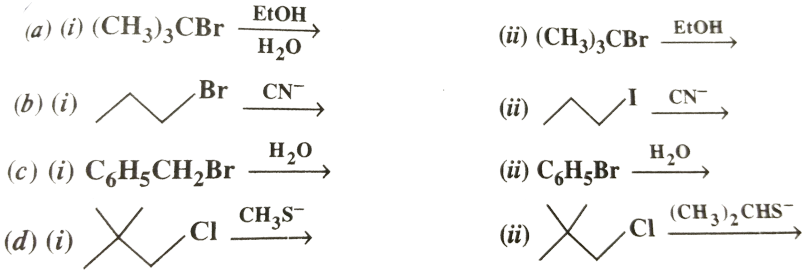
8. Which reaction in each pair shown below will show the faster rate of disappearance of starting material?



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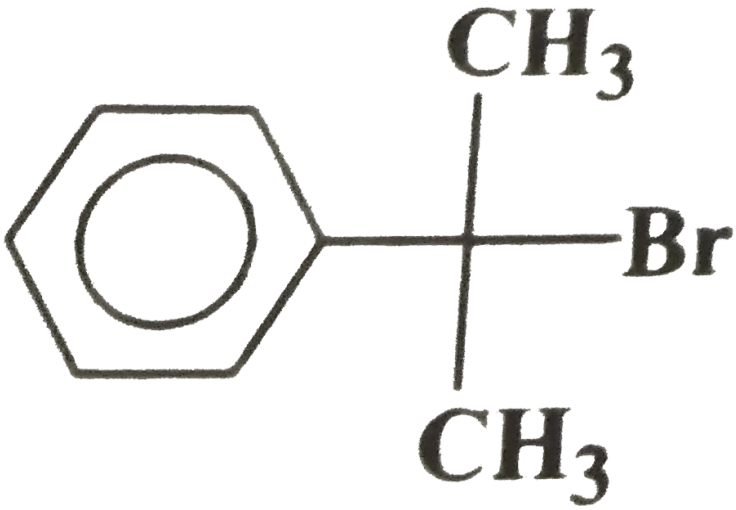
9. The following reactions involve reactions of an alkyl bromide with two possibler eagents. Which reaction in each pair will show the faster rate of disappearance of the alkyl bromide?

(a). $CH_3Br +$ (i) CH_3O^- (assume protic solvent), (ii) CH_3S^- (assume protic solvent), (iii) The reaction rates would be the same.

(b). $-Br+$ (i) EtOH in H_2O (ii) EtOH (iii) The reactons rates would be the same.



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10. The following reaction gives two products.

$C_6H_5CH_2CHClC_6H_5 \xrightarrow{\text{Alcoholic KOH, heat}}$

Write the structures of the products.

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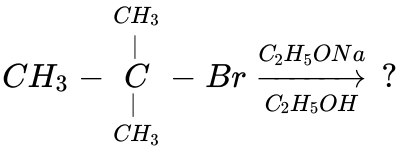
11. Write down the structure of the product of the following reaction.



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12. An alkyl halide (A), on reaction with magnesium in dry ether followed by treatment with ethanol gave 2-methylbutane. Write all the possible structures of A.

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13. An alkyl halides (P) reacts with magnesium metal in presence of dry ether followed by treatment of ethanol gives propane. Write the structure of the alkyl halide (X).

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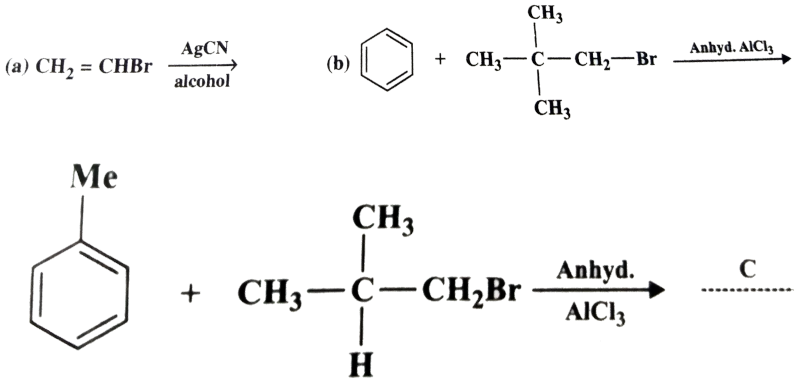
14. Write the major product of the following reaction:

(a) $CH_2 = CHBr \xrightarrow[\text{alcohol}]{AgCN}$



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15. Differentiate between chiral and achiral molecules.

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16. Identify and indicate the presence of centre of chirality, if any, in the following molecules? How many stereoisomers are possible for each ?

(i) 2-Aminobutane (ii) 3-Bromopent-1-ene (iii) 1, 2-Dichloropropane, (iv) 3-Methyl-1-pentene

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17. What is meant by chirality of a compound ? Give an example.

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18. What are enantiomers? Draw the structures of the possible enantiomers of 3-methylpent-1-ene.

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19. Distinguish between enantiomers and diastereomers.

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20. Differentiate between retention and inversion.

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21. $(\pm)$-2-Butanol is optically inactive. Give reasons.

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22. Optically active 2-iodo butane on treatment with NaI in acetone gives a product which does not show optical activity. Explain briefly.

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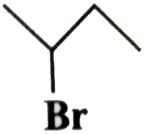
23. (i) Which alkyl halide from the followng pair is chiral and undergoes faster S_N2 reaction?

(a) 

(b) 

(ii) Out of S_N1 and S_N2 which reaction occurs with

(a) inversion of configuration (b) racemisation?

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24. Out of the various possible isomers of C_7H_7Cl containing a benzene ring, the weakest C-Cl bond is present in

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25. p-Chloronitrobenzene undergoes nulceophilic substitution faster than chlorobenzene. Explain giving the resonating structures as well.

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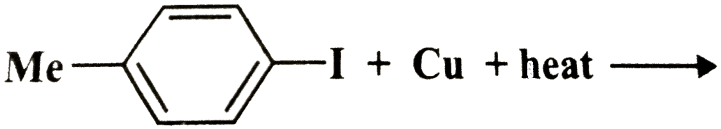
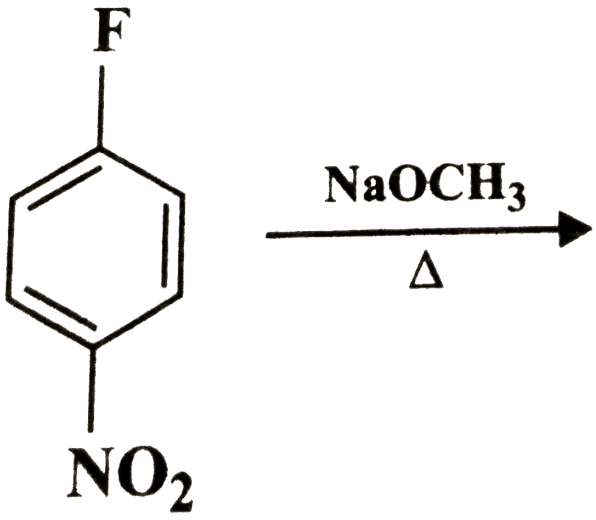
26. (i) Complete the following, giving the structures of the pincipal organic products.



(ii) What would be the major products in the following reactions?



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NCERT QUESTIONS AND EXERCISES WITH ANSWERS (NCERT INTEXT SOLVED QUESTIONS)

1. Draw the structures of all the eight structural isomers that have the molecular formula C_5H_{11} Br. Name each isomer according to IUPAC

system and classify them as primary, secondary or tertiary bromide.

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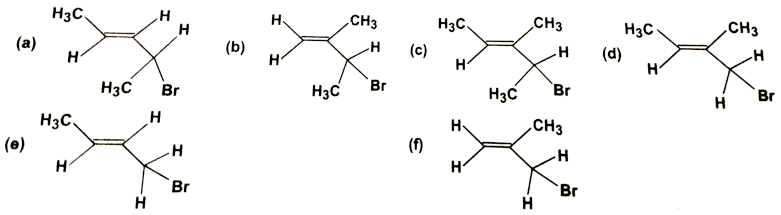
2. Write IUPAC anmes of the following:



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3. Identify all the possible monochloro structural isomers expected to be formed on free radical monochlorination of $(CH_3)_2CHCH_2CH_3$.

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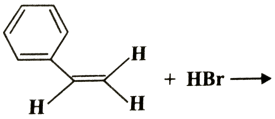
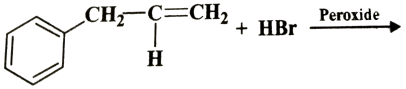
4. Write the products of the following reactions:

(i) 

(ii) $CH_3—CH_2—CH=CH_2 + HCl \longrightarrow$

(iii) 

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5. Haloalkanes react with KCN to form alkyl cyanides as main product while AgCN forms isocyanides as the chief product. Explain.

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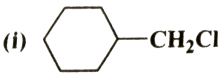
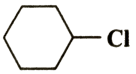
6. In the following pairs of halogen compounds which is faster undergoing S_N2 reaction?

(i)  

(ii)  

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7. Predict the order of reactivity of the following compounds in S_N1 and S_N2 reactions:

(i) The four isomeric bromobutanes

(ii)

$C_6H_5CH_2Br, C_6H_5CH(C_6H_5)Br, C_6H_5CH(CH_3)Br, C_6H_5C(CH_3)(C_6H$

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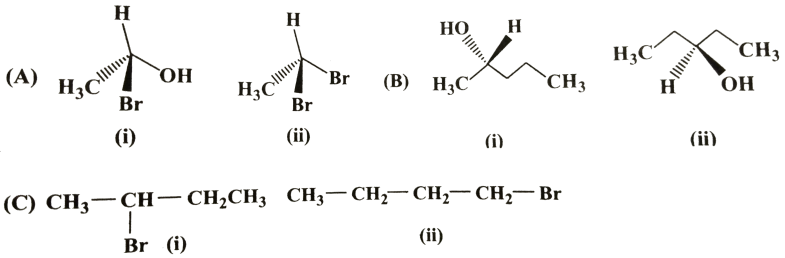
8. Identify chiral and achiral molecules in each of the following pairs compounds.



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9. Although chlorine is an electron-withdrawing group, yet it is ortho-, para-directing in electrophilic aromatic substitution reactions. Why?

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NCERT QUESTIONS AND EXERCISES WITH ANSWERS (NCERT INTEXT UNSOLVED QUESTIONS)

1. Write the structures of the following compounds :

(i) 2-Chloro-3-methylpentane (ii) 1-Chloro-4-ethylcyclohexane (iii) 4-tert-Butyl-3-iodoheptane

(iv) 1-4-Dibromobut-2-ene (v) 1-Bromo-4-sec-butyl-2-methylbenzene

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2. Why is sulphuric acid not used during the reaction of alcohols with KI?

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3. Write structures of different dihalogen derivatives of propane.

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4. Among the isomeric alkanes of molecular formula C_5H_{12}, identify the one that on photochemical chlorination yields

(i) A single monochloride.

(ii) Three isomeric monochlorides.

(iii) Four isomeric monochlorides.

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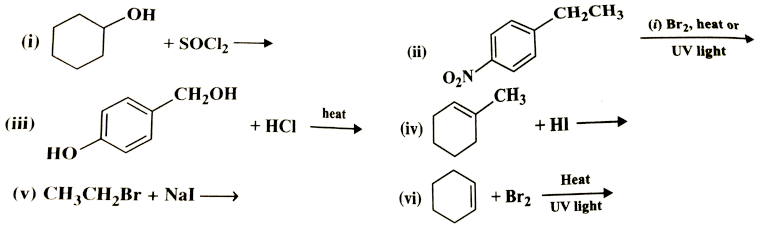
5. Draw the structures of major monohaloge products in each of the following reactions.



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6. Arrange each set of compounds in order of increasing boiling points.

(i) Bromomethane, Bromoform, Chloromethane, Dibromomethane.

(ii) 1-Chloropropane, Isopropyl chloride, 1-Chlorobutane.

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7. Which alkyl halide from the following pairs would you expect to react more rapidly by an SN2 mechanism? Explain your answer.

$(i) CH_3CH_2CH_2CH_2Br$ or $CH_3CH_2\underset{\underset{Br}{|}}{C}HCH_3$, $(ii) CH_3CH_2\underset{\underset{Br}{|}}{C}HCH_3$ or

(iii) $CH_3\underset{\underset{CH_3}{|}}{C}HCH_2CH_2Br$ or $CH_3CH_2\underset{\underset{CH_3}{|}}{C}HCH_2Br$

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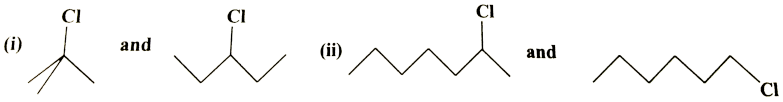
8. In the following pairs of halogen coompounds, which compound undergoes faster S_N1 reaction?



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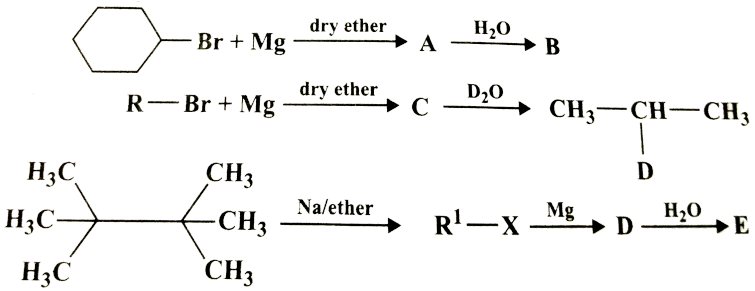
9. Identify A,B,C,D,E,R and R^1 in the following:



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NCERT QUESTIONS AND EXERCISES WITH ANSWERS (NCERT EXERCISES)

1. Name the following halides according to IUPAC system and classify them asalkyl, allyl, benzyl (primary, secondary, tertiary), vinyl or aryl halides:

(i) $(CH_3)_2CHCH(Cl)CH_3$, $(ii)CH_3CH_2CH(CH_3)CH(C_2H_5)Cl$

(iii) $CH_3CH_2C(CH_3)_2CH_2I$, $(iv)(CH_3)_3CCH_2CH(Br)C_6H_5$

(v) $CH_3CH(CH_3)CH(Br)CH_3$, $(vi)CH_3C(C_2H_5)_2CH_2Br$

$(vii)CH_3C(Cl)(C_2H_5)CH_2CH_3$, $(viii)CH_3CH=C(Cl)CH_2CH(CH_3)_2$

(ix) $CH_3CH=CHC(Br)(CH_3)_2(x)p-ClC_6H_4CH_2CH(CH_3)_2$

(xi)

$m-ClCH_2C_6H_4CH_2C(CH_3)_3$, (xii)$o-Br-C_6H_4CH(CH_3)CH_2CH_3$

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2. Give the IUPAC names of the following compounds:

(i) $CH_3CH(Cl)CH(Br)CH_3$

(ii) $CHF_2CBrClF$

(iii) $ClCH_2C\equiv CCH_2Br$

(iv) $(CCl_3)CCl$

(v) $CH_3C(pClC_6H_4)_2CH(Br)CH_3$

(vi) $(CH_3)_3CCH=C(Cl)C_6H_4I-p$

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3. Write the structure of 3-Chloro-2-methylpentane

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4. Which one of the following has the highest dipole moment?

(i) CH_2Cl_2, $(ii)CHCl_3$, $(iii)CCl_4$

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5. 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.

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6. Write the isomers of the compound having formula C_4H_9Br.

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7. Write the equations for the preparation of 1-iodobutane from

(i) 1-butanol , (ii) 1-chlorobutane , (iii) but-1-ene

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8. What are ambident nucleophiles? Explain with an example.

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9. Which compound in each of the following pairs will react faster in S_N2 reaction with ^-OH ?

(i) CH_3Br or CH_3I, $(ii)(CH_3)_3CCl$ or CH_3Cl

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10. Predict all the alkenes that would be formed by dehydrohalogenation of the following halides with sodium ethoxide in ethanol and identify the major alkene:

(i) 1-Bromo-1-methylcyclohexane , (ii) 2-Chloro-2-methylbutane

(iii) 2,2,3-Trimethyl-3-bromopentane

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11. How will you carry out the following conversions in not more than two steps:

(i) Toluene to benzyl alcohol (ii) Ethanol to ethyl fluoride (iii) Benzene to biphenyl

(iv) 1-Chlorobutane to n-octane (v) Benzyl alcohol to phenylethanenitrile

(vi) But-1-ene to But-2-ene

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12. Explain why

(i) the dipole moment of chlorobenzene is lower than that of cyclohexyl chloride?

(ii) alkyl halides, though polar, are immiscible with water?

(iii) Grignard reagents should be prepared under anhydrous conditions?

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13. Give the uses of freon 12, DDT, carbon tetrachloride and iodoform.

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14. Write the structure of the major organic product in each of the following reactions:

(i) $CH_3CH_2CH_2Cl + NaI \xrightarrow[\text{heat}]{\text{acetone}}$

(ii) $(CH_3)_3CBr + KOH \xrightarrow[\text{heat}]{\text{ethanol}}$

(iii) $CH_3CH(Br)CH_2CH_3 + NaOH \xrightarrow{\text{water}}$

(iv) $CH_3CH_2Br + KCN \xrightarrow{\text{aq. ethanol}}$

(v) $C_6H_5ONa + C_2H_5Cl \rightarrow$

(vi) $CH_3CH_2CH_2OH + SOCl_2 \rightarrow$

(vii) $CH_3CH_2CH = CH_2 + HBr \xrightarrow{\text{peroxide}}$

(viii) $CH3CH = C(CH3)2 + HBr \rightarrow$

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15. Explain the following reaction :

$n - BuBr + KCN \xrightarrow{EtOH - H_2O} n - BuCN$

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16. Arrange the compounds of each set in order of reactivity towards S_N2 displacement:

(i) 2-Bromo-2-methylbutane, 1-Bromopentane, 2-Bromopentane

(ii) 1-Bromo-3-methylbutane, 2-Bromo-2-methylbutane, 2-Bromo-3-methylbutane

(iii) 1-Bromobutane, 1-Bromo-2,2-dimethylpropane, 1-Bromo-2-methylbutane, 1-Bromo-3-methylbutane.

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17. Out of $C_6H_5CH_2Cl$ and $C_6H_5CHClC_6H_5$, which is more easily hydrolysed by aqueous KOH.

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18. p-Dichlorobenzene has higher m.p. and solubility than those of -and m-isomers. Discuss.

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19. How the following conversions can be carried out?

(i) Propene to propan-1-ol

(ii) Ethanol to but-1-yne

(iii) 1-Bromopropane to 2-bromopropane (iv) Toluene to benzyl alcohol

(v) Benzene to 4-bromonitrobenzene

(vi) Benzyl alcohol to 2-phenylethanoic acid

(vii) Ethanol to propanenitrile

(viii) Aniline to chlorobenzene

(ix) 2-Chlorobutane to 3, 4-dimethylhexane

(x) 2-Methyl-1-propene to 2-chloro-2-methylpropane

(xi) Ethyl chloride to propanoic acid

(xii) But-1-ene to n-butyliodide

(xiii) 2-Chloropropane to 1-propanol

(xiv) Isopropyl alcohol to iodoform

(xv) Chlorobenzene to p-nitrophenol (xvi) 2-Bromopropane to 1-bromopropane

(xvii) Chloroethane to butane

(xviii) Benzene to diphenyl

(xix) tert-Butyl bromide to isobutyl bromide

(xx) Aniline to phenylisocyanide

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20. The treatment of alkyl chlorides with aqueous KOH leads to the formation of alcohols but in the presence of alcoholic KOH, alkenes are major products. Explain.

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21. Primary alkyl halide C_4H_9Br (a) reacted with alcoholic KOH to give compound (b). Compound (b) is reacted with HBr to give (c) which is an isomer of (a). When (a) is reacted with sodium metal it gives compound (d), C_8H_{18} which is different from the compound formed when n-butyl bromide is reacted with sodium. Give the structural formula of (a) and write the equations for all the reactions.

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22. What happens when

(i) n-butyl chloride is treated with alcoholic KOH,

(ii) bromobenzene is treated with Mg in the presence of dry ether,

(iii) chlorobenzene is subjected to hydrolysis,

(iv) ethyl chloride is treated with aqueous KOH,

(v) methyl bromide is treated with sodium in the presence of dry ether,

(vi) methyl chloride is treated with KCN?

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NCERT EXEMPLAR PROBLEMS WITH ANSWERS, HINTS AND SOLUTIONS (MULTIPLE CHOICE QUESTIONS-I)

1. The order of reactivity of following alcohols with halogen acids is.....

(A) $CH_3CH_2 - CH_2 - OH$ (B) $CH_{3CH_2 - \underset{CH_3}{\underset{|}{CH}} - OH}$

(C) $CH_3CH_2 - \overset{CH_3}{\underset{CH_3}{\overset{|}{\underset{|}{C}}}} - OH$

A. $A > B > C$

B. $C > B > A$

C. $B > A > C$

D. $A > C > B$

Answer: B

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2. Which of the following alcohols will yield the corresponding alkyl chloride on reaction with concentrated HCl at room temperature?

A. $CH_3CH_2 - CH_2 - OH$

B. $CH_3CH_2 - \underset{\underset{CH_3}{|}}{C}H - OH$

C. $CH_3CH_2 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}H - CH_2OH$

D. $CH_3CH_2 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - OH$

Answer: D

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3. Toluene react with a halogen in the presence of iron (III) chloride giving ortho andpara halo compounds. The reactions is

A. Electrophilic elimination reaction

B. Electrophilic substitution reaction

C. Free radical addition reaction

D. Nucleophilic substitution reaction

Answer: B

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4. Which of the following is halogen exchange reaction?

A. $RX + NaI \rightarrow RI + NaX$

B. 

C. $R - OH + HX \xrightarrow{ZnCl_2} R - X + H_2O$

D. 

Answer: A

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5. Which reagent will you use for the following reaction ?

$CH_3CH_2CH_2CH_3 \rightarrow CH_3CH_2CH_2CH_2Cl + CH_3CH_2CHClCH_3$

A. Cl_2 / UV light

B. $NaCl + H_2SO_4$

C. Cl_2 gas in dark

D. Cl_2 gas in the presence of iron in dark

Answer: A

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6. Arrange the following compounds in the increasing order of their densities.

A. $I < II < III < IV$

B. $I < III < IV < II$

C. $IV < III < II < I$

D. $II < IV < III < I$

Answer: A

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7. Arrange the following compounds in increasing order of their boiling points.

A. $II < I < III$

B. $I < II < III$

C. $III < I < II$

D. $III < II < I$

Answer: C

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8. In which of the following molecules carbon atom marked with asterisk (*) is asymmetric?

A. I,II,III,IV

B. I,II,III

C. II,III,IV

D. I, III, IV

Answer: B

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9. Which of the following structures is enantiomeric with the molecule (A) given below:

A. 

B. 

C. 

D. 

Answer: A

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10. Which of the following is an example of vic-dihalide?

A. Dichloromethane

B. 1,2-Dichloroethane

C. Ethylidene chloride

D. Allyl chloride

Answer: B

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11. The position of Br in the compound in $CH_3CH = CHC(Br)(CH_3)_2$ can be classified as

A. Allyl

B. Aryl

C. Vinyl

D. Secondary

Answer: A

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12. Cholorobenzene is formed by reaction of chlorine with benzene in the presence of $AlCl_3$. Which of the following species attacks the benzene ring in this reaction?

A. Cl^-

B. Cl^+

C. $AlCl_3$

D. $[AlCl_4]^-$

Answer: B

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13. Ethylidene chloride is a/an

A. vic-dihalide

B. gem-dihalide

C. allylic halide

D. vinylic halide

Answer: B

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14. What is 'A' in the following reaction?

A. 

B. 

C. 

D. 

Answer: D

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15. A primary alkyl halide would prefer to undergo :-

A. S_N1 reaction

B. S_N2 reaction

C. α-Elimination

D. Racemization

Answer: B

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16. Which of the following alkyl halides will undergo S_N1 reaction most redily ?

A. $(CH_3)_3C - F$

B. $(CH_3)_3C - Cl$

C. $(CH_3)_3C - Br$

D. $(CH_3)_3C - I$

Answer: D

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17. Which is the correct IUPAC name for $CH_3 - \underset{\underset{C_2H_5}{|}}{CH} - CH_2 - Br$?

A. 1-Bromo-2-ethylpropane

B. 1-Bromo-2-ethyl-2-methylethane

C. 1-Bromo-2-methylbutane

D. 2-Methyl-1-bromobutane

Answer: C

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18. What should be the correct IUPAC name for diethylbromomethane?

A. 1-Bromo-1, 1-diethylmethane

B. 3-Bromopentane

C. 1-Bromo-1-ethylpropane

D. 1-Bromopentane

Answer: B

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19. The reaction of toluene with chlorine in the presence of iron and in the absence of light yields .....

A. 

B. 

C. 

D. Mixture (b) and (c)

Answer: D

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20. Chloromethane on treatment with excess of ammonia yields mainly

A. N,N-Dimethylmethanamine

B. N-methylmethanamine $(CH_3 - NH - CH_3)$

C. methanamine (CH_3CH_2)

D. Mixture containing all these in equal proportion

Answer: C

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21. Molecules whose mirror image is non-superimposable over them are known as chiral. Which of the following molecules is chiral in nature?

A. 2-Bromobutane

B. 1-Bromobutane

C. 2-Bromopropane

D. 2-Bromopropan-2-ol

Answer: A

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22. Reactions of $C_6H_5CH_2Br$ with aqueous sodium hydroxide follows.....

A. S_N1 mechanism

B. S_N2 mechanism

C. Any of the above two depending upon the temperature of reaction

D. saytzeff rule

Answer: A

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23. Which of the carbon atoms present in the molecule given below are asymmetric?

A. I,II,III,IV

B. II,III

C. II,IV

D. I,II,III

Answer: B

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24. Which of the following compounds will give racemic mixture on nucleophilic substitution by OH^- ion?

(I) $CH_3 - \underset{\underset{C_2H_5}{|}}{C}H - Br$

(II) $CH_3 - \underset{\underset{C_2H_5}{|}}{\overset{\overset{Br}{|}}{C}} - CH_3$

(III) $CH_3 - \underset{\underset{C_2H_5}{|}}{C} H - CH_2Br$

A. I

B. I,II,III

C. II,III

D. I,III

Answer: A

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25. Arrange the compounds in increasing order of rate of reactions towards nucleophilic substitution.

A. $I < II < III$

B. $III < II < I$

C. $I < III < II$

D. $III < I < II$

Answer: C

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26. Arrange the compounds in increasing order of rate of reactions towards nucleophilic substitution.

A. $I < II < III$

B. $I < II < III$

C. $I < III < II$

D. $III < II < I$

Answer: D

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27. Arrange the compounds in increasing order of rate of reactions towards nucleophilic substitution.

A. $III < II < I$

B. $II < III < I$

C. $I < III < II$

D. $I < II < III$

Answer: D

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28. Arrange the compounds in increasing order of rate of reactions towards nucleophilic substitution.

A. $I < II < III$

B. $II < I < III$

C. $III < II < I$

D. $I < III < II$

Answer: C

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29. Which is the correct increasing order of boiling points of the following compounds?

A. Butane $<$ 1-Chlorobutane $<$ 1-Bromobutane $<$ 1-Iodobutane

B. 1-Iodobutane $<$ 1-Bromobutane $<$ 1-Chlorobutane $<$ Butane

C. Butane $<$ 1-Iodobutane $<$ 1-Bromobutane $<$ 1-Chlorobutane

D. Butane $<$ 1-Chlorobutane $<$ 1-Iodobutane $<$ 1-Bromobutane

Answer: A

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30. Which is the correct increasing order of boiling points of the following compounds ?

1-Bromoethane, 1-Bromopropane, 1-Bromobutane, Bromobenzene

A. Bromobenzene $<$ 1-Bromobutane $<$ 1-Bromopropane $<$ 1-Bromoethane

B. Bromobenzene $<$ 1-Bromoethane $<$ 1-Bromopropane $<$ 1-Bromobutane

C. 1-Bromopropane $<$ 1-Bromobutae $<$ 1-Bromoethane $<$ Bromobenzene

D. 1-Bromoethane $<$ 1-Bromopropane $<$ 1-Bromobutane $<$ Bromobenzene

Answer: D

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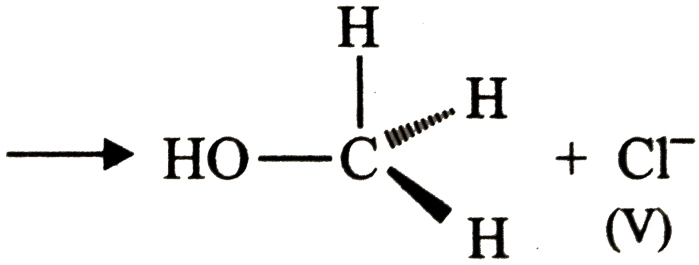
NCERT EXEMPLAR PROBLEMS WITH ANSWERS, HINTS AND SOLUTIONS (MULTIPLE CHOICE QUESTIONS-II)

1.



(IV)

Q. Which of the following statement are correct about this reaction?

A. The given reaction follows S_N2 mechanism.

B. (II) and (IV) have opposite configuration

C. (II) and (IV) have same configuration

D. The given reaction follows S_N1 mechanism.

Answer: A::C

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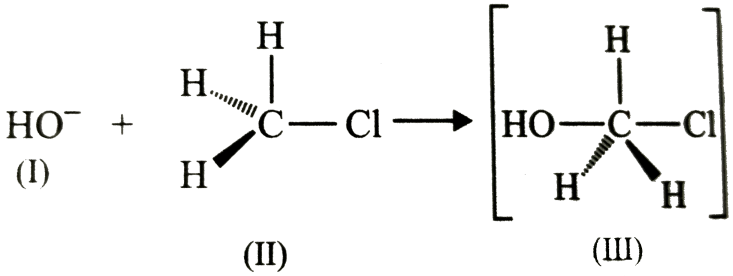
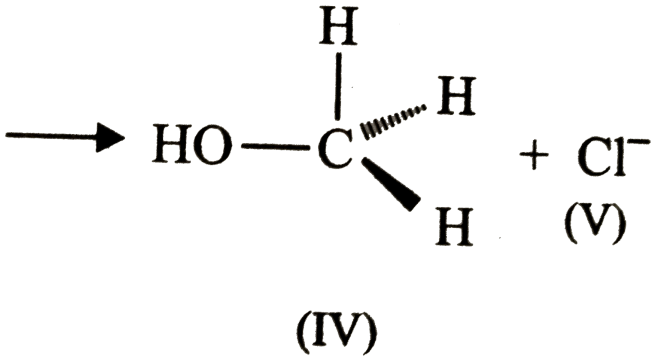


2.



Q. Which of the following statement are correct about the reaction intermediate?

A. Intermediate (III) is unstable because in this carbon is attached to 5 atoms.

B. Intermediate (III) is unstable because carbon atom is sp^2 hybridised.

C. Intermediate (III) is stable because carbon atom is sp^2 hybridised.

D. Intermediate (III) is less stable than the reactant (II).

Answer: A::D

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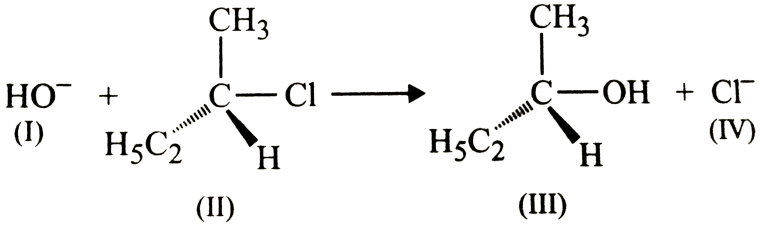
3.



Q. Which of the following statements are correct about the mechanism of this reaction?

A. A carbocation will be formed as an intermediate in the reaction.

B. OH^- will attack the substrate (II) from one side and Cl^- will leave it simultaneously from other side.

C. An nstable intermediate will be formed in which OH^- and Cl^- will b attached by weak bonds.

D. Reaction proceeds through S_N1 mechanism.

Answer: A::D

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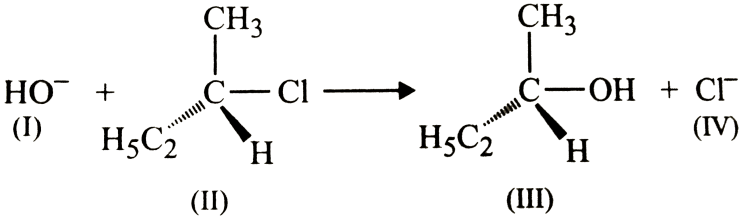
4.



Q. Which of the following statements are correct about the kinetics of this reaction?

A. The rate of reaction depends on the concentration only (II)

B. The rate of reaction depends on concentration of both (I) and (II)

C. Molecularity of reaction is one

D. Molecularity of reaction is two.

Answer: A::C

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5. Haloalkanes contain halogen atom(s) attached to the sp^3hybridised carbon atom of an alkyl group. Identify haloalkene from the following compounds.

A. 2-Bromopentane

B. Vinyl chloride (chloroethene)

C. 2-chloroacetophenone

D. Trichloromethane

Answer: A::D

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6. Ethylene chloride and ethylidene chloride are isomers. Identify the correct statements.

A. both the compounds form same product on treatment with alcoholic KOH

B. Both the compounds form same product on treatment with alcoholic KOH

C. Both the compounds form same product on reduction.

D. Both the compounds are optically active.

Answer: A::C

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7. Which of the following compounds are gem-dihalides?

A. Ethylidene chloride

B. Ethylene dichloride

C. Methylene chloride

D. Benzyl chloride.

Answer: A::C

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8. Which of the following are secondary bromides ?

A. $(CH_3)_2CHBr$

B. $(CH_3)_3CCH_2Br$

C. $CH_3CH(Br)CH_2CH_3$

D. $(CH_3)_2CBrCH_2CH_3$

Answer: A::C

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9. Which of the following compounds can beclassified as aryl halides ?

A. $p - ClC_6H_4CH_2CH(CH_3)_2$

B. $p - CH_3CHCl(C_6H_4)CH_2CH_3$

C. $o - BrH_2C - C_6H_4CH(CH_3)CH_2CH_3$

D. $C_6H_5 - Cl$

Answer: A::D

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10. Alkyl halides are prepared from alcohols by treating with

A. $HCl + ZnCl_2$

B. Red $P + Br_2$

C. $H_2SO_4 + KI$

D. All the above

Answer: A::B

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11. Alkyl fluorides are synthesised by alkyl chloride/bromide in presence of.....or..... .

A. CaF_2

B. CoF_2

C. Hg_2F_2

D. NaF

Answer: B::C

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NCERT EXEMPLAR PROBLEMS WITH ANSWERS, HINTS AND SOLUTIONS (SHORT ANSWER QUESTIONS)

1. Aryl chlorides and bromides can be easily prepared by electrophilic substitution of arenas with chlorine and bromine respectively in the presence of Lewis acid catalyst. But why does preparation of aryl iodides requires presence of an oxidising agent?

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2. Out of o- and p-dibromobenzene which one has higher melting point and why?

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3. Which of the compounds will react faster in S_N1 reaction with ^-OH ion?

$CH_3 - CH_2 - Cl$ or $C_6H_5 - CH_2 - Cl$

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4. Why iodoform has appreciable antiseptic property?

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5. Haloarenas are less reactive than haloalkanes and haloalkenes. Explain.

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6. Discuss the role of Lewiis acids in the preparation of aryl bromides and chlorides in the dark.

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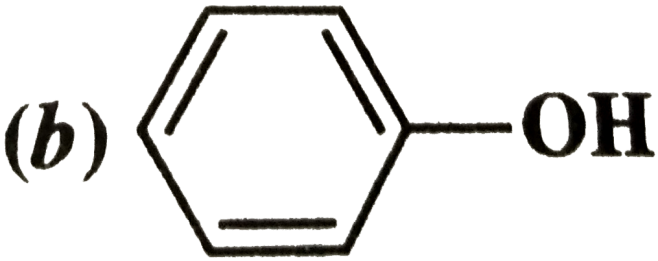
7. Which of the following compounds (a) and (b) will not react with a mixture of NaBr and H_2SO_4 Explain why?

(a) $CH_3CH_2CH_2$

(b) 

(b)

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8. Which of the products will be major product in the reaction given below? Explain

$$CH_3CH = CH_2 + Hi \rightarrow \underset{(A)}{CH_3CH_2I} + \underset{(B)}{CH_3CHICH_3}$$

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9. Why is the solubility of haloalkanes in water very low ?

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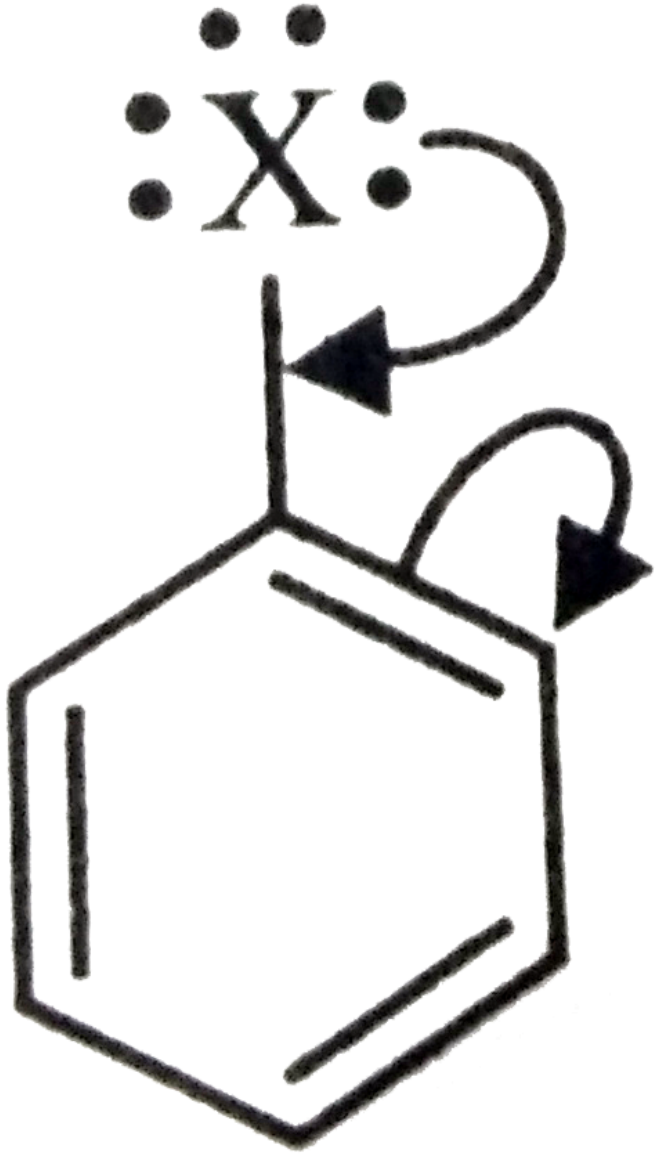
10. Draw other resonance structures related to the following structure and find out whether the functional group present in the molecule is

ortho, para directing or metal directing.



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11. Classify the following compounds as primary, secondary and tertiary halides.

(i) 1-bromobut-2-ene

(ii). 4-Bromopent-2-ene

(iii). 2-Bromo-2-methylpropane

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12. Compound 'A' with molecular formula C_4H_9Br is treated with aq. KOH solution. The rate of this reaction depends upon the the concentration of the compounds 'A' only. When another optically active isomer 'B' of this compound was treated with aq. KOH solution, the rate of reaction was found to be dependent on concentration of compound and KOH both.

(i) Write down the structural formula of both compounds 'A' and 'B'.

(ii) Out of these two compounds, which one will be converted to the product with inverted configuration.

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13. Write the structures and names of the compounds formed when compound 'A' with molecular formula C_7H_8 is treated with Cl_2 in the presence of $FeCl_3$

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14. Identify the product A and B formed in the following reaction:

$$CH_3 - CH_2 - CH = CH - CH_3 + HCI \rightarrow A + B$$

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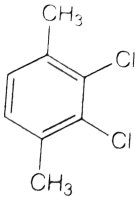
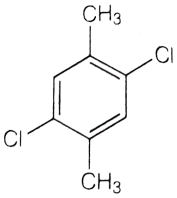
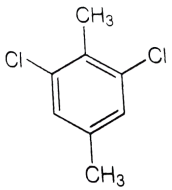
15. Which of the following compounds will have the highest melting point and why?



(I)



(II)



(III)

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16. Write down the structure and IUPAC name for neo-pentylbromide.

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17. A hydrocarbon of molecular mass 72 g mol^{-1} gives a single monochloro derivative and two dichloro derivatives on photo chlorination. Give the structure of the hydrocarbon.

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18. Name of the alkene which will yield 1-chloro-1-methylcyclohexane by its reaction with HCl. Write the reaction involved.

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19. Which of the following haloalkanes reacts with aqueous KOH most easily ? Explain giving reason.

(i). 1-Bromobutane

(ii) 2-Bromobutane

(iii) 2-Bromo-2-methylpropane

(iv). 2-Chlorobutane.

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20. Why can aryl halides not be prepared by reaction of phenol with HCl in the presence of $ZnCl_2$?

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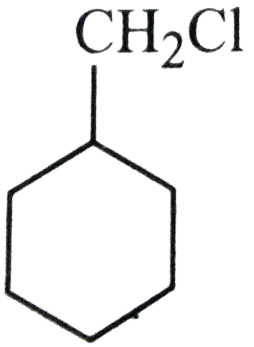
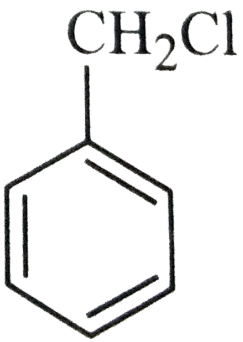
21. Which of the following compounds would undergo S_N1 reaction faster and why?



(A)



(B)

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22. Allyl chloride is hydrolysed more readily than n-propyl chloride. Why ?

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23. Why is it necessary to avoid even traces of moisture during the use of a Grignard reagent?

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24. How do polar solvents help in the first step in S_N1 mechanism?

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25. Write a test to detect the presence of double bond in a molecule.

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26. Diphenyls are potential threat to the envioronment. How are these produced from aryl halides?

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27. What are the IUPAC names of the insecticide DDT and benzene hexachloride? Why is their use banned in India and other countries?

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28. Elimination reaction (especially β - elimination) are as common as the nucleophilic substitution reaction in case of alkyl halides. Specify the reagents used in both cases.

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29. How will you obtain monobromobenzene from aniline ?

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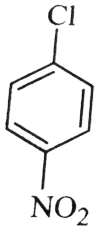
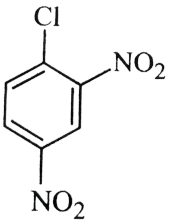
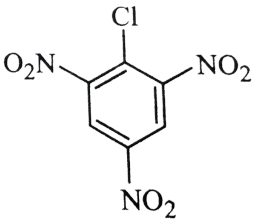
30. Aryl halides are extremely less reactive towards nucleophilic substitution. Predict and explain the order of reactivity of the following compounds towards nucleophilic substitution:



(I)



(II)



(III)

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31. tert-Butylbromide reacts with aq. NaOH by S_N1 mechanism while n butylbromide reacts by S_N2 mechanism. Why?

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32. Predict the major product formed when HCl is added to isobutylene, Explain the mechanism involved.

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33. Discuss the nature of C-X bond in the haloarenes.

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34. How can you obtain iodoethane from ethanol when no other iodine containing reagent except NAI is available in the laboratery?

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35. Cyanide ion acts as an ambident nucleophille. From which end it acts as a strong nucleophile in aqueous medium? Give reason for your answer.

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NCERT EXEMPLAR PROBLEMS WITH ANSWERS, HINTS AND SOLUTIONS (MATCHING TYPE QUESTIONS)

1. Match the compounds given in column I with the effects given in column II.

Column I	Column II
(*a*) Chloramphenicol	(*i*) Malaria
(*b*) Thyroxine	(*ii*) Anaesthetic
(*c*) Chloroquine	(*iii*) Typhoid fever
(*d*) Chloroform	(*iv*) Goiter
	(*v*) Blood substituent

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2. Match the items of column I and column II.

Column I	Column II
(a) S_N1 reaction	(i) *vic*-dibromides
(b) Chemicals in fire extinguisher	(ii) *gem*-dihalides
(c) Bromination of alkenes	(iii) Racemisation
(d) Alkylidene halides	(iv) Saytzeff rule
(e) Elimination of HX from alkyl halide	(v) Chlorobromocarbons

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3. Match the structures of compounds given in Column I with the classes of compounds given in Column II.

Column I	Column II
(a) $CH_3-\underset{\displaystyle X}{\underset{\vert}{CH}}-CH_3$	(i) Aryl halide
(b) $CH_2=CH-CH_2-X$	(ii) Alkyl halide
(c) 	(iii) Vinyl halide
(d) $CH_2=CH-X$	(iv) Allyl halide

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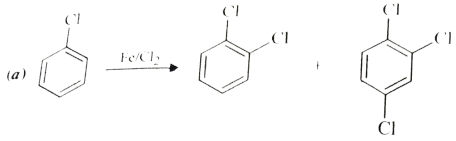
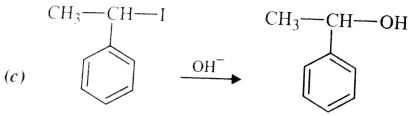
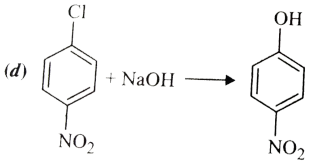
4. Match the reactions given in column I with the types of reactions given in columns II.

Column I

(a) 

(b) $CH_3—CH = CH_2 + HBr \longrightarrow CH_3—\underset{\underset{Br}{|}}{CH}—CH_3$

(c) 

(d) 

Column II

(i) Nucleophilic aromatic substitution

(ii) Electrophilic aromatic substitution

(iii) Saytzeff elimination

(iv) Electrophilic addition

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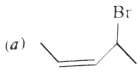
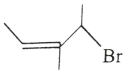
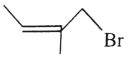
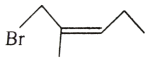
5. Match the structures given in column I with the names given in column II.

Column I	Column II
(a) 	(i) 4-Bromopent-2-ene
(b) 	(ii) 4-Bromo-3-methylpent-2-ene
(c) 	(iii) 1-Bromo-2-methylbut-2-ene
(d) 	(iv) 1-Bromo-2-methylpent-2-ene

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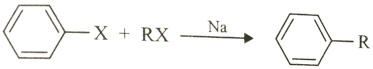
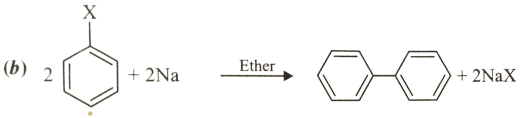
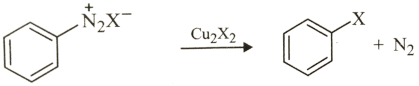
6. Match the reqactions given in column I with the names given in column II.

Column I	Column II
(a) 	(i) Fittig reaction
(b) 	(ii) Wurtz Fittig reaction
(c) 	(iii) Finkelstein reaction
(d) $C_2H_5Cl + NaI \xrightarrow{\text{dry acetone}} C_2H_5I + NaCl$	(iv) Sandmeyer reaction

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7. Assertion(A) The boiling points of alkyl halides decrease in the order $RI > RBr > RCl > RF$

Reason (R) The boiling points of alkyl chlorides, bromides and iodides are considerably higher than that of the hydrocarbon of comparable molecular mass.

A. Assertion and reason both are correct and reason is correct explanation of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion and reason both are correct statements but reason is not

Answer: D

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8. Assertion: KCN reacts with methyl chloride to give methyl isocyanide

Reason: CN^- is an ambident nucleophile.

A. Assertion and reason both are correct and reason is correct explanation of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion is wrong but reason is correct statement.

Answer: D

9. Assertion: tert-Butyl bromide undergoes Wurtz reaction to give 2,2,3,3-tetramethylbutane.

Reason: In Wurtz reaction, alkyl halides react with sodium in dry ether to give hydrocarbon containing double the number of carbon atoms present in the halide.

A. Assertion and reason both are correct and reason is correct explanation of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion is wrong but reason is correct statement.

Answer: D

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10. Assertion: Presence of a nitro group at ortho or para position increases the reactivity of haloarenes towards nucleophilic substitution.

Reason: Nitro group, being an electron withdrawing group decreases the electron density over the benzene ring.

A. Assertion and reason both are correct and reason is correct explanation of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion is wrong but reason is correct statement.

Answer: A

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11. Assertion: In monohaloarenes, further electrophilic substitution occurs at ortho and para position

Reason: Halogen atom is a ring deactivator

A. Assertion and reason both are correct and reason is correct explanation of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion is wrong but reason is correct statement.

Answer: D

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12. Assertion: Aryl iodides can be prepared by reaction of arenes with iodine in the presence of an oxidising agent.

Reason: Oxidising agent oxidises I_2 into HI.

A. Assertion and reason both are correct and reason is correct explanation of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion is wrong but reason is correct statement.

Answer: C

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13. Assertion: It is difficult to replace chlorine by $-OH$ in chlorobenzene in comparison to that in chloroethane

Reason: Chlorine-carbon (C-Cl) bond in chlorobenzene has a partial double bond character due to resonance.

A. Assertion and reason both are correct and reason is correct explanation of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion is wrong but reason is correct statement.

Answer: A

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14. Assertion: Hydrolysis of (-)-2- bromooctane proceeds with inversion of configuration.

Reason: This reaction prioceeds through the formation of a carbocation.

A. Assertion and reason both are correct and reason is correct explanation of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion is wrong but reason is correct statement.

Answer: C

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15. Assertion (A) Nitration of chlorobenzene leads to the formation of m-nitrochlorobenzene.

Reason (R) $-NO_2$ group is a m-directing group.

A. Assertion and reason both are correct and reason is correct explanation of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion is wrong but reason is correct statement.

Answer: D

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NCERT EXEMPLAR PROBLEMS WITH ANSWERS, HINTS AND SOLUTIONS (Assertion and reason type questions)

1. Assertion (A) Phosphorus chlorides (tri and penta) are preferred over thionyl chloride for the preparation of alkyl chlorides from alcohols.

Reason (R) Phosphorus chlorides give pure alkyl halides.

A. Assertion and reason both are correct and reason is correct explanation of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion is wrong but reason is correct statement.

Answer: B

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NCERT EXEMPLAR PROBLEMS WITH ANSWERS, HINTS AND SOLUTIONS (LONG ANSWER QUESTIONS)

1. Some alkyl halides undergo substitutionn whereas some undergo elimination reaction on treatment with bases. Discuss the structural features of alkyl halides with the help of examples which are responsible for this difference.

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2. Some halogen containing compounds are useful in daily life. Some compounds of this class are responsible for exposure of flora and fauna to more and more of UV light which causes destruction to a great extent. Name the class of these halocompounds. In your opinion, what should be done to minimise harmful effects of these compounds.

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3. Aryl halides are less reactive towards nucleophilic substitution reaction as compared to alyl halides due to

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ADDITIONAL QUESTIONS (VERY SHORT ANSWER QUESTIONS)

1. Write the structure of 2-chloro-3-methylpentane.

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2. Write the structural formula of 4-chloro-2-pentene.

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3. Explain why thionyl chloride method is preferred for preparation alkyl chlorides from alcohols?

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4. Under what conditions can 2-methylpropene be converted into iso butyl bromide on reacting with HBr?

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5. how will you prepare 1-bromopropane from propene?

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6. How will you bring about the convertion: methyl bromide to methyl iodide.

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7. What happens when chlorine is passed

through boiling toluene in the presence of sunlight?

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8. n-Butyl bromide has higher boiling point than t-butyl bromide. Give reasons.

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9. Arrange the following in order of increasing boiling point:

(i) $CH_3CH_2CH_2CH_2Br$

(ii) $(CH_3)_3CBr$

(iii) $(CH_3)_2CHCH_2Br.$

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10. Out of ethyl bromide and ethyl chloride which has higher boiling point and why?

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11. Which alkyl halide has the highest density and why?

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12. Haloalkanes dissolve easily in organic solvents, why?

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13. Organic halogen compounds used in industry as solvents are chlorides rather than bromides and iodides. Explain.

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14. Which is a better nucleophile, a bromide ion or an iodide ion?

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15. Because of bigger size and lower electronegativity, iodide ion can donate a pair of electrons more easily than bromide ion and hence iodide ion is a better nucleophile than bromide ion.

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16. What happens when $CH_3 - Br$ is treated with KCN?

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17. What happens when ethyl chloride is treated with aqueous KOH?

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18. Which compound in each of the following pairs will react faster in S_N2 reaction with OH^-?

(a) CH_3Br or CH_3I

(b) $CH_2 = CHBr$ or $CH_2 = CHCH_2Br$.

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19. Which would undergo S_{N^2} reaction faster in the following pair and why?

$$CH_3 - CH_2 - Br \text{ and } CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}} - Br.$$

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20. Arrange the following in order of their

Increasing reactivity in nucleophilic subsitution reactions : $CH_3F, CH_3I, CH_3Br, CH_3Cl$

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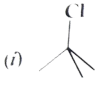
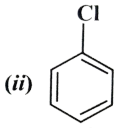
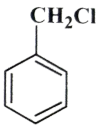
21. In each of the following pairs of compounds, identify the compound which will undergo S_N1 reaction faster?

(i)  and 

(ii)  and 

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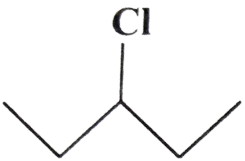
22. Which one of the following reacts faster in an S_N1 reaction and why?

 and 

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23. Out $CH_3-\underset{\underset{CH_3}{|}}{CH}-CH_2-Cl$ and $CH_3-CH_2-\underset{\underset{CH_3}{|}}{CH}-Cl$, which is more reactive towards S_N1 reaction and why?

Watch Video Solution

24. Write the structure of an isomer of compound C_4H_9Br which is most reactive towards S_N1 reaction.

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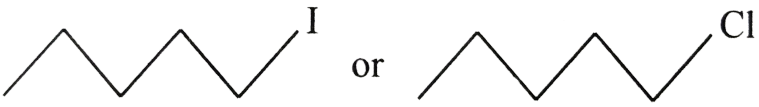
25. A solution of aqueous of KO hydrolysis $CH_3CHClCH_2CH_3$ and $CH_3CH_2CH_2CH_2Cl$. Which one of these is more easily hydrolysed.?

Watch Video Solution

26. In the pair, $(CH_3)_3CCl$ and CH_3Cl, CH_3Cl will react faster in S_N2 reaction with OH^-. Explain.

Watch Video Solution

27. Which one undergoes S_N2 substitution reaction faster and why?



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28. Out of two bromoderivatives

$C_6H_5CH(CH_3)Br$ and $C_6H_5CH(C_6H_5)Br$, which one is more reactive in S_{N^1} reaction and why?

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29. Which compound in each of the following pairs will react faster by S_N1 reactions in aqueous KOH. Give reasons.

(a) $CH_3CH_2 - Br$ or $CH_3CH_2 - Cl$

(b) $CH_3CH_2CH_2CH_2 - X$ or $(CH_3)_3C - X$

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30. What is the reagent used for dehydrohalogenation of an alkyl halide?

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31. Write a chemical reaction to illustrate Saytzeff's rule.

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32. How do you convert: 2-Bromobutane to but-2-ene?

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33. Name the alkyl halide which can be used to prepare methane and ethane in single steps.

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34. What is meant by plane polarized light ? What type of waves show this property ? Describe a method for producing a beam of plane polarized light.

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35. What is an asymmetric or chiral carbon?

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36. What is the condition to be satisfied for a compound to be chiral?

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37. What type of isomerism is shown by lactic acid.

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38. What do prefixes (+),(-) and $(\pm)$ before an organic compound mean?

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39. What is a racemic mixture? Give an example

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40. S_N1 reactions are accompanied by racemization in optically active halides.

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41. What is the lowest molecular mass alkane that is chiral? Is there another alkane of the same molecular formula which is also chiral? If so, then give its structure also.

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42. An acid of molecular formula, $C_5H_{10}O_2$ is optically active. What is its structure?

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43. A carboxylic acid of the formula, $C_3H_5O_2Br$ is optically active. What is its structure?

Watch Video Solution

44. Give the structure of lowest molecular mass alcohol which is chiral?

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45. $C(C_6H_{12})$, and optically active dydrocarbon which on catalytic hydrogenation gives an optically inactive compound, C_6H_{14}.

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46. Which out of the two : 2-cyclopentenol or 3-cyclopentenol has chiral centre.

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47. Why is the seperation of lanthanoids difficult ?

Watch Video Solution

48. Write a chemical reaction in which the iodide ion replaces the diazonium group in a diazonium salt.

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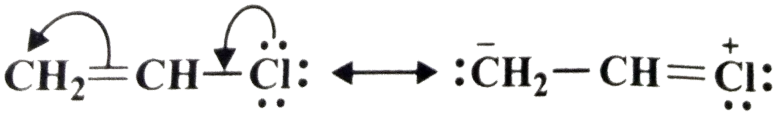
49. What effect should the following resonance of vinyl chloride have on its dipole moment?



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50. Why is vinyl chloride less reactive than ethyl chloride ?

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51. Which of the following is most reactive toward nucleophilic substitution reaction ?

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52. Give reasons:

(i). $C-Cl$ bond length in chlorobenzene is shorter than $C-Cl$ bond length in CH_3-Cl

(ii). The dipole moment of chlorobenzene is less than of cyclohexyl

chloride.

(c). S_{N^1} reactions are are accompanied by racemisation is optically active alkyl halides.

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53. The dipole moment of vinyl chloride is lower than that of methyl chloride. This is due to

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54. Grignard reagent of C_6H_5Cl can be prepared in THF but not in ether. Explain why?

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55. Give reasons:

(a) n-Butyl bromide has higher boiling point than t-butyl bromide.

(b) Racemic mixture is optically inactive.

(c) The presence of nitro group ($-NO_2$) at op positions increases the reactivity of haloarenes towards nucleophilic substitution reactions.

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56. Arrange the following in the increasing order of ease of nucleophilic substitution reaction

Chlorobenzene (I) 2,4,6 trinitrochlorobenzene (II) 2,4 dinitro-chlorobenzene (III) and 4- nitrochlorobenzene (IV)

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57. Give one example (with equation) wurtz-fittig reaction.

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58. How will you convert: chlorobenzene to biphenyl?

Watch Video Solution

59. Arrange the following in increasing order of reactivity towards sulphonation with fuming sulphuric acid.

Benzene, toluene, methoxy benzene, chlorobenzene.

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60. How is DDT prepared?

Watch Video Solution

61. Chloroform is stored in dark coloured bottles. Explain in not more than two sentences.

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62. How will you test pure chloroform?

Watch Video Solution

63. A small amount of ethyl alcohol is usually added to chloroform bottles. Why?

Watch Video Solution

64. Why iodoform show antiseptic properties ?

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ADDITIONAL QUESTIONS (SHORT ANSWER QUESTIONS)

1. Give the IUPAC names off the following:

(i) $CH_3CH_2 - \underset{\underset{Br}{|}}{\overset{\overset{CH_3}{|}}{C}} - \underset{\underset{Br}{|}}{CH} - CH_2 - Cl$

(ii) $CH_3 - \underset{\underset{Cl}{|}}{\overset{\overset{C_2H_5}{|}}{C}} - CH_2 - \underset{\underset{Cl}{|}}{\overset{\overset{C_2H_5}{|}}{C}} - CH_3$

(iii) $CH_2 = CHCH_2Br$

(iv) $(CH_3)_3CCH_2Br.$

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2. Write four structural isomers of compound having molecular formula $C_4H_9Br.$

Watch Video Solution

3. Explain why free radical bromination of n-butane yields 2-bromobutane as the major product.

Watch Video Solution

4. Write the major product of the following reaction:

(i) $CH_3CH_2CH_2OH + SOCl_2 \rightarrow$

(ii) $CH_3CH = CH_2 + HBr \xrightarrow{\text{Peroxide}}$

(iii) $CH_3CH = CH_2 + HBr \xrightarrow[\text{Peroxide}]{\text{absence of}}$

(iv) $CH_3CH_2CH_2CH_2Cl + NaI \xrightarrow{\text{Acetone, heat}}$

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5. What are alkyl halides? How is n-propyl bromide prepared from propylene?

Watch Video Solution

6. Explain the following:

(i) Although haloalkanes are polar in character yet they are insoluble in water. Or alkyl halides are insolube in water though they contain a polar

C-X bond.

(ii) The boiling point of bromoethane is higher than that of chloroethane.

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7. Why do alkyl halides show nucleophilic substitution reactions?

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8. How do the products differ when ethyl bromide reacts separately with:

(i) Aqueous KOH and alcoholic KOH (ii) KCN and AgCN (iii) KNO_2 and $AgNO_2$?

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9. How will you convert ethyl bromide to

(i) ethane

(ii) ethoxythane?

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10. Which among the following reagents convert alkyl halide into alkane ?

Watch Video Solution

11. With the help of chemical equations, show how will you convert:

(i) 1-propanol to 2-bromopropane.

(ii) 2-bromopropane to 1-bromopropane

(iii) 1-bromopropane to 2-bromopropane.

(iv) propanone to iodoform.

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12. Explain the mechanism of S_{N^1} and S_{N^2} reactions with examples.

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13. Write any two differences between S_{N^2} and S_{N^1} reaction.

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14. How would you differentiate between S_N1 and S_N2 mechanisms of substitution reactions? Give one example of each.

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15. Explain the steps involved in the mechanism of hydrolysis of tertiary butyl bromide using aqueous potassium hydroxide.

Watch Video Solution

16. Arrange the following carbanions in order of their decreasing stability.

A) $H_3C - C \equiv C^-$

B) $H - C \equiv C^-$

C) $H_3C - C\overline{H}_2$

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17. tert-Butylbromide reacts with aq. NaOH by S_N1 mechanism while n butylbromide reacts by S_N2 mechanism. Why?

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18. (a) The nucleophilic substitution of primary alkyl chlorides with sodium acetate is catalysed by sodium iodide.

(b) p-Methoxybenzayl bromide reacts faster than p-nitrobenzyl bromide with ethanol to form a ether product.

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19. Out $CH_3 - \underset{CH_3}{\underset{|}{CH}} - CH_2 - Cl$ and $CH_3 - CH_2 - \underset{CH_3}{\underset{|}{CH}} - Cl$, which is more reactive towards S_N1 reaction and why?

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20. S_N1 reactions are accompanied by racemization in optically active halides.

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21. Which would undergo S_{N^2} reaction faster in the following pair and why?

$$CH_3 - CH_2 - Br \text{ and } CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}} - Br.$$

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22. (a) Write the IUPAC names of all the possible structural isomers of C_4H_9Br. Point out opticaly active isomer, if any.

(b) Write the structural formulae and IUPAC names of two optically active halides containing five carbon atoms each in their molecules.

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23. A racemic mixtrue is optically inactive due to :

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24. How is chlorobenzene prepared from:

(i) benzene and (ii) aniline or benzenediazonium chloride ?

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25. Explain the mechanism of nitration of benzene.

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26. Complete the following reaction equations:

(i) $C_6H_5N_2Cl + KI \rightarrow$ ____

(ii) $C_6H_5 - \overset{+}{N} \equiv NCl^- \xrightarrow{CuBr / HBr}$

(iii) $C_6H_5N_2^+Cl^- \xrightarrow{Cu_2Cl_2 / HCl}$

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27. (a) Why does p-dichlorobenzene have a higher m.p than its o-and m-isomers?

(b) Why is ($\pm$) - Butan -2 - ol of is optically inactive?

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28. Give two reasons for low reactivity of aryl halides towards nucleophilic substitution reactions.

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29. Chlorobenzene is extremely less reactive towards nucleophilic substitution reaction. Give two reasons for the same.

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30. Account for the fact that halogen in chlorobenzene is less reactive than in methyl chloride.

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31. Give reasons:

(i). $C-Cl$ bond length in chlorobenzene is shorter than $C-Cl$ bond length in CH_3-Cl

(ii). The dipole moment of chlorobenzene is less than of cyclohexyl chloride.

(c). S_{N^1} reactions are are accompanied by racemisation is optically active alkyl halides.

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32. Account for the fact that C-X bond length in halobenzene is smaller than C-X bond length in $CH_3 - X$.

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33. Why do alkyl halides undergo alkaline hydrolysis more easily than aryl halides.?

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34. Why are haloarenes more stable than haloalkanes and undergo electrophilic substitution at ortho- and para-positions?

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35. Explain as to why haloarenes are much less reactive than halo-alkanes towards nucleophilic substitution reactions.

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36. Arrange the following compounds according to reactivity towards nucleophillic substitution reaction with reagents mentioned :-

4-nitrochlorobenzene> 2,4 dinitrochlorobemzene > 2,4,6, trinitrochlorobenzene with CH_3Ona

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37. the presence of electron withdrawing group at ortho and para positions increases the reactivity of haloarenes towards nucleophilic substitution reaction. Explain.

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38. What is a nucleophilic substitution reaction? Write such a reaction, one each of a monohaloalkane and a haloarene.

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39. What do you undersetand by : (i) nucleophilic substitution ad

(ii) electrophilic substitution reactions?

Illustrate by taking one example in each case.

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40. How will you convert:

(i) n-propyl bromide to iso-propyl bromide

(ii) 1-Bromopropane into propene

(iii) 2-Propanol into 1-bromopropane

(iv) 2-Chlorobutane into butanol ?

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41. In the reaction :

$$R - Br + Cl^- \rightarrow R - Cl + Br^-$$

The rates of reaction of ethyl bromide (I) n-propyl bromide (II) isobutyl bromide (III) and neopentyl bromide (IV) follow the order:

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42. Complete the following reaction equations:

(i) $CH_3CH_2Br + H_2 \xrightarrow{Ni}$

(ii) $CH_3CH_2Br \xrightarrow{\text{Alc. KCN}}$

(iii) $CH_3CH_2Br \xrightarrow{\text{Alc. AgCN}}$

(iv) $CH_3CH_2CH_2Br \xrightarrow[\Delta]{\text{Alc. KOH}}$

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43. What happens when:

(i). Methyl chloride is treated with alcoholic KCN.

(ii). Ethyl chloride is treated with alcoholic KOH.

(iii). Chloroform is heated with Ag powder.

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44. What happens when:

(i) Chlorobenzene is subjected to hydrolysis.

(ii) Ethyl chloride is treated with aqueous KOH?

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45. The modified stem in grasses, strawberry Chrysanthemum is concerned with special functie i.e., br i-Food storage ,br ii- Vegetative propagation, br iii- Assimilation, br iv- Spread to new niches, br v- Perennation,

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46. Identify the compounds X, Y and Z in each of the following sequence of reactions:

(i) $C_2H_4 \xrightarrow{HBr} X \xrightarrow{\text{aq. KOH}} Y \xrightarrow{I_2.NaOH} Z$

(ii) $C_2H_5Br \xrightarrow{\text{alc. KOH}} X \xrightarrow{Br_2} Y \xrightarrow{\text{alc. KOH}} Z$

(iii) $C_6H_6 \xrightarrow{Cl_2/Fe} X \xrightarrow[\text{pyridine, } \Delta]{CuCN} Y \xrightarrow{H^+, H_2O} Z$

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47. Write one use of each of the following:

((i) Chloroform

(ii) Iodoform

(iii) Freon

(iv) DDT.

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ADDITIONAL QUESTIONS (LONG ANSWER QUESTIONS)

1. Give the preparation of the alkyl halide by the reaction of (i) HCl and (ii) PCl_5 on ethanol and give its reaction with: (a) Aq. KOH (b) AgCN

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2. (a) Alkyl halides are amongst the most reactive of the organic compounds. Why?

(b) The treatment of alkyl halides with alcoholic KOH leads to the formation of alkenes. Justify.

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3. (a) With the help of 'hybridisation of carbon atom of C-X bond' show that aryl halides are less reactive than alkyl halides.

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4. Comment upon low reactivity of haloarenes.

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HIGHER ORDER THINKING SKILLS ((QUESTIONS AND PROBLEMS WITH ANSWERS/SOLUTION)

1. Why alkyl halides are generally not prepared in the laboratory by free radical halogenation of alkanes?

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2. Explain why chlorination of n-butane in presence of light at 298 K gives a mixture of 72% of 2-chlorobutane and 28% of 1-chlorobutane.

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3. Wurtz reaction fails in case of tert-alkyl halides. Explain.

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4. Explain the followinng in one or two sentences (i) Displacement of cyanide and amide ion is never observed in nucleophilic substitution reaction.

(ii) RCl is hydrolysed to ROH slowly but the reaction is rapid if a catalytic amount of KI is added to the reaction mixture.

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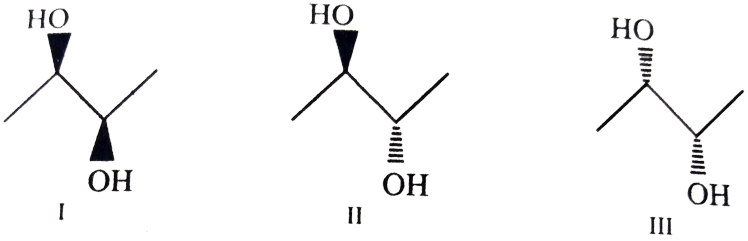
5. Consider the following structure:



Which of these structure is/are : (a) chiral (b) achiral (c) meso compound (d) enantiomers and (e) diasteromers?

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6. (R)-2-Bromooctane reacts with NaSH to form (S)-2-octanethiol with inversion of configuration at the stereocentre. How cann we obtain (R)-2-octanethiol from (R)-2-bromoctane?

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HOTS PROBLEMS

1. Benzene on reaction with HOCl in presence of an acid produces organic compound (A). (A) on treatment with $NaNH_2/liq.\ NH_3$ furnishes another organic compound (B). (B) on treatment with HBF_4 affords an organic compound (C) which on heating with $NaNO_2$ gives organic compound (D). Identify (A), (B), (C) and (D).

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VALUE BASED QUESTIONS WITH ANSWERS

1. Swati's father wanted to go to the hospital to see his ailing friend. Swati insisted to accompany his father. On reaching the hospital, swati noticed a perculiar smell.

after reading the above passage, answer the following questions:

(i) Name the chemical which causes the hospital smell.

(ii) What is the use of this chemical and how does it work?

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2. On Kumbh Mela, Solar Eclipses, festivals and other religious/social events, fairs are held on the banks of holy ponds/rivers for some stipulated days. Lacs of people participate in these fairs to pay homage to their deities. For the convenience of the pilgrims, make-shift, toilets are made in the 'Fair Area' by the district administration. in and around these toilets, a white powder is often, sprinkled.

Read the above passage and answer the following questions:

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3. Mr. Firoze is a retired man who lives in a big house. He has recently replaced all the filament-type bulbs in his house by CFls. His wife and children have a habit of keeping the lights and fans on (even when there is no one in the room) but Mr. Firoze keeps on going to every room periodically to switch them off. A few days back Mr. Firoze had purchased a device which can cook rice and dal without using any usual fuel. He has also installed an equipment on the roof of his house to obtain hot water. Mr. Firoze uses bicycle for short distances like going to nearby market, instead of scooter or car.

(a) What is CFL ? Why has Mr. Firoze replaced all the filament-type bulbs in his big house by CFLs ?

(b) Why does Mr.Firoze keep switching off lights and fans when no one is in the rooms ?

(c) Name the device which Mr. Firoze has purchased to cook rice and dal without using any usual fuel ?

(d) Name the equipment which Mr. Firoze has installed on the house-roof to obtain hot water ?

(e) Why does Mr. Firoze use bicycle for going through short distances ?

(f) What values are displayed by Mr. Firoze by all the above actions ?

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4. A person with unknown blood group under ABO system, has suffered much loss in an accident and needs immediate blood trasfusion. His one friend who has a valid certifacte of his own blood type. What would have been the type of blood group of the donor friend

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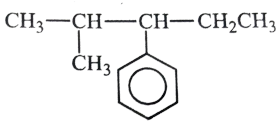
Competition Focus (JEE (MAIN AND ADVANCED)/MEDICAL ENTRANCE SPECIAL (MULTIPLE CHOICE QUESTIONS - I))

1. The incorrect statement for IUPAC system of nomenclature is

A. $\underset{\text{1-Bromoprop-2-ene}}{(Br - CH_2 - CH = CH_2)}$

B. $\underset{\text{4-Bromo-2,4-dimethylhexane}}{CH_3 - CH_2 - \overset{\overset{CH_3}{|}}{\underset{\underset{Br}{|}}{C}} - CH_2 - \overset{\overset{CH_3}{|}}{\underset{\underset{}{|}}{C}} H - CH_3}$



C. 2-Methyl-3-phenylpentane

D. $CH_3 - \underset{\underset{O}{||}}{C} - CH_2 - CH_2 - CH_2COOH$

5-Ozogexanoic acid

Answer: A

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2. Which of the following reaction(s) can be used for the preparation of alkyl halides?

(I) $CH_3CH_2OH + HCl \xrightarrow{\text{anhyd.}ZnCl_2}$

(II) $CH_3CH_2OH + HCl \rightarrow$

(III) $(CH_3)_3COH + HCl \rightarrow$

(IV) $(CH_3)_2CHOH + HCl \xrightarrow{\text{anhyd.}ZnCl_2}$

A. (I) and (II) only

B. (IV) only

C. (III) and (IV) only

D. (I),(III) and (IV) only

Answer: D

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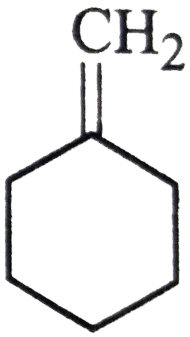
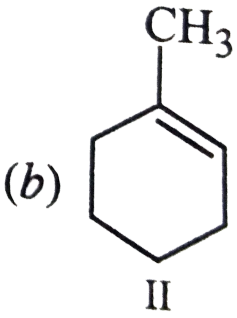
3. In the reaction with HCl, an alkene reacts in accordance with Markownikoff's rule to give a product 1-chloro-1-methylcyclohexane. The possible alkene is:

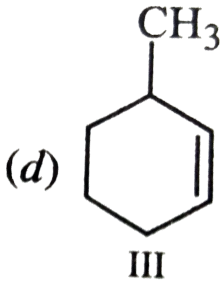
A. 

I

B. 

II

C. I+II



D.

Answer: C

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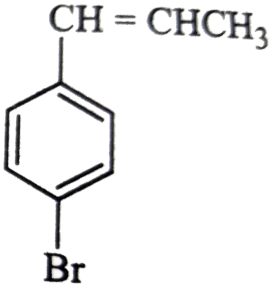
4. The reaction of $C_6H_5CH = CHCH_3$ with HBr produces

A. $C_6H_5CH_2CH_2CH_2Br$



B.

C. $C_6H_5\underset{\underset{Br}{|}}{C}HCH_2CH_3$

D. $C_6H_5CH_2\underset{\underset{Br}{|}}{C}HCH_3$

Answer: C

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5. $CH_3 - \underset{\underset{CH_3}{|}}{C}\ H - CH = CH_2 + HBr \rightarrow$ (product) which is predominate , X is -

A. $CH_3 - \underset{\underset{Br}{|}}{CH} - \underset{\underset{CH_3}{|}}{C}\ H - CH_3$

B. $CH_3 - \underset{\underset{CH_3}{|}}{C}\ H - \underset{\underset{Br}{|}}{CH} - CH_3$

C. $CH_3 - \underset{\underset{Br}{|}}{\underset{\underset{CH_3}{|}}{C}}\ H - CH_2 - CH_2Br$

D. $CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{Br}{|}}{C}} - CH_2CH_3$

Answer: D

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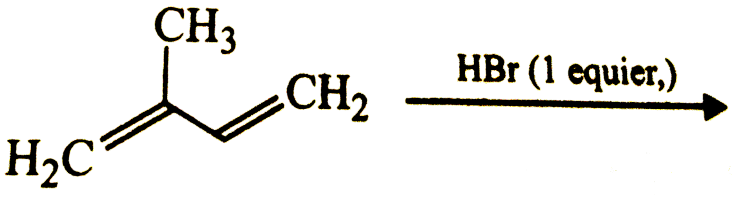
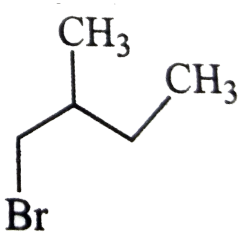
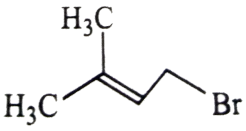
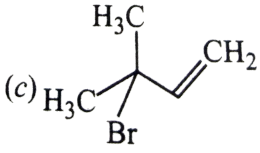
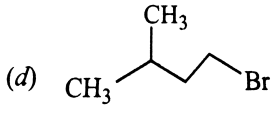
6. 

the major product of the above reaction is

A. 

B. 

C. 

D. 

Answer: B

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7.

$$CH_3 - CH_2 - CH = CH_2 + HBr \xrightarrow{\text{ROOR (peroxide)}} \underset{\text{Major}}{(X)} + \underset{\text{Minor}}{(Y)}\, X \text{ and } Y$$

respectively are

A. $BrCH_2CH_2 - CH = CH_2$ and $C_2H_5 - CHBr - CH_3$

B. $C_2H_5 - CH_2CH_2 - Br$ and $Br - CH_2CH_2CH = CH_2$

C. $C_2H_5 - CH_2CH_2 - Br$ and $C_2H_5 - CHBr - CH_3$

D. $C_2H_5 - CHBr - CH_3$ and $C_2H_5 - CH_2CH_2Br$

Answer: C

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8. In the presence of peroxide, hydrogen chloride and hydrogen iodide do not give anti-Markovnikov's addition to alkenes because:

A. both are highly ionic

B. one is oxidising and the other is reducing

C. one of the steps is endothermic in both the cases

D. all the steps are exothermic in both the reactions.

Answer: C

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9. In the adddition of HBr to propene in the absence of peroxides, the first step involves the addition of-s

A. H^+

B. Br^-

C. H^*

D. Br^*

Answer: A

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10. The intermediate during the addition of HCl to propene in the presence of peroxide is :

A. $CH_3\overset{*}{C}HCH_2Cl$

B. $CH_3\overset{+}{C}HCH_3$

C. $CH_3CH_2\overset{*}{C}H_2$

D. $CH_3CH_2\overset{+}{C}H_2$

Answer: B

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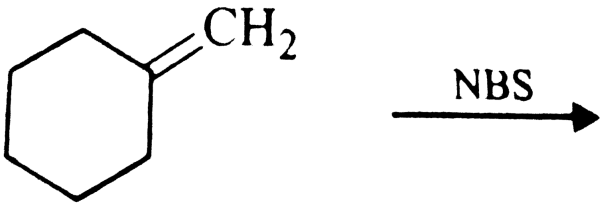
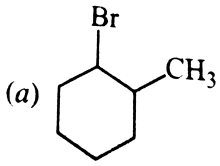
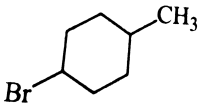
11. What will be the product in the following reaction?



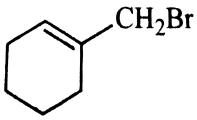
A.



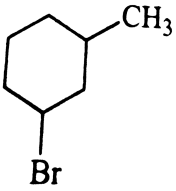
B. (b)



C. (c)



D. (d)



Answer: C

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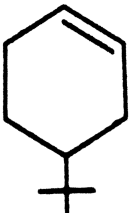
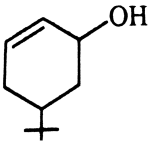
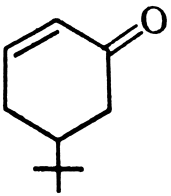
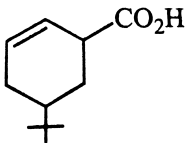
12. The product of the reaction given below is

A. (a) 

B. (b) 

C. (c) 

D. (d) 

Answer: B

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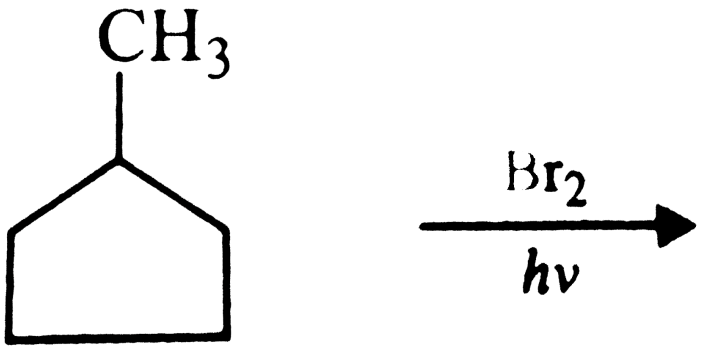
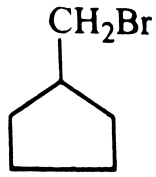
13. In the following reaction,

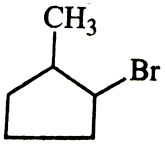


the major product obtained is

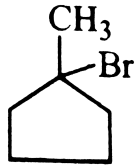
A. (a)



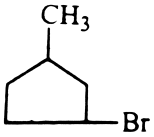
B. (b)



C. (c)



D. (d)



Answer: C

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14. The synthesis of alkyl fluorides is best accomplished by:

A. Finkelstein reaction

B. Swarts reaction

C. Free radical fluourination

D. Sandmeyer's reaction

Answer: B

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15. Which of the following is the correct method of preparation of methyl fluoride

A. $CH_4 + Hf \rightarrow$

B. $CH_3OH + Hf \rightarrow$

C. $CH_4 + F_2 \rightarrow$

D. $CH_3Br + AgF \rightarrow$

Answer: D

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16. Best reagent for nuclear iodination of aromatic compounds is

A. Ki / CH_3COCH_3

B. I_2 / CH_3CN

C. KI / CH_3COOH

D. I_2 / HNO_3

Answer: D

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17. Which of the following sequence of reaction (reagents) can be used for conversion of $C_6H_5CH_2CH_3$ into $C_6H_5CH=CH_2$?

A. $SOCl_2, H_2O$

B. $SO_2Cl_2, alc.\ KOH$

C. $Cl_2/hv, H_2O$

D. $SOCl_2, alc.\ KOH$

Answer: B

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18. The reaction of toluene with Cl_2 in the presence of $FeCl_3$ gives X and the reaction in the presence of light gives Y. Thus, X and Y are :

A. X=benzyl chloride, Y=m-chlorotoluene

B. X-benzal chloride, Y=o-chlorotoluene

C. X-m-chlorotoluene, Y=p-chlorotoluene

D. X=o- and p-chlorotoluene, Y=trichloromethylbenzene.

Answer: D

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19. The compound C_7H_8 undergoes the following reactions :

$$C_7H_8 \xrightarrow{3Cl_2/\Delta} A \xrightarrow{Br_2/Fe} B \xrightarrow{Zn/HCl} C$$

The product 'C' is

A. o-Bromotoluene

B. m-Bromotoluene

C. p-Bromotoluene

D. 3-Bromo-2,4,6-trichlorotoluene.

Answer: B

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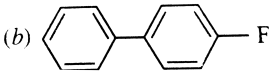
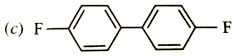
20. $Ph - NH_2 \xrightarrow[0^\circ C]{HNO_2} A \xrightarrow[BF_3]{HF} B \xrightarrow{\Delta} C$, C is :

A. $Ph - \overset{+}{N} \equiv NBF_4^-$

B. 

C. 

D. Ph-F

Answer: D

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21. Arrange the given set of compounds in order of increasing boiling points.

1. -chloropropane

II. Iso - propyl chloride

III. 1 - chlorobutane

A. $II < III < I$

B. $I < II < III$

C. $II < I < III$

D. $III < I < II$

Answer: C

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22. Among the following, the molecule with the highest dipole moment is :

A. CH_3Cl

B. CH_2Cl_2

C. $CHCl_3$

D. CCl_4

Answer: A

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23. Which of the following reactions is an example of nucleophilic substitution reaction?

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

B. $RX + H_2 \rightarrow RH + HX$

C. $RX + M > oRMgX$

D. $RX + KOH \rightarrow ROH + KX$

Answer: D

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24. $CH_3Br + Nu^- \rightarrow CH_3Nu + Br^-$

The decreasing order of the rate of the above reaction with nucleophiles $\left(Nu^-\right)$ A to D is :

$\left[Nu^- = (A)PhO^-, (B)AcO^-, (C)HO^-, (D)CH_3O^-\right]$

A. DgtCgtAgtB

B. DgtCgtBgtA

C. AgtBgtCgtD

D. BgtDgtCgtA

Answer: A

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25. In the following group :

$-OAc(I),\ -OMe(II),\ -OSO_2(III),\ -OSO_2CF_3(IV)$

The order of leaving group ability is :

A. IgtIIgtIIIgtIV

B. IVgtIIIgtIgtII

C. IIIgtIIgtIgtIV

D. IIgtIIIgtIVgtI

Answer: B

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26. The most reactive nucleophile among the following is

A. CH_3O^-

B. $C_6H_5O^-$

C. $(CH_3)_2CHO^-$

D. $(CH_3)_3CO^-$

Answer: A

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27. For the following

$(i)I^-(ii)Cl^-(iii)Br^-$

the increasing order of nucleophilicity would be:

A. $Br^- < Cl^- < I^-$

B. $I^- < Br^- < Cl^-$

C. $Cl^- < Br^- < I^-$

D. $I^- < Cl^- < Br^-$

Answer: C

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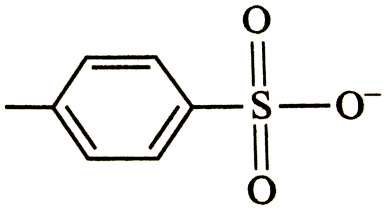
28. The decreasing order of nucleophilicity among the nucleophiles

(1) $CH_3-\underset{\underset{O}{\|}}{C}-O^-$ (2) CH_3O^-

(3) CN^- (4) 

is

A. (1),(2),(3),(4)

B. (4),(3),(2),(1)

C. (2),(3),(1),(4)

D. (3,(2),(1),(4)

Answer: D

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29. Which one is most reactive towards S_N1 reactions ?

A. $C_6H_5CH_2Br$

B. $C_6H_5CH(C_6H_5)Br$

C. $C_6H_5CH(CH_3)Br$

D. $C_6H_5C(CH_3)(C_6H_5)Br$

Answer: D

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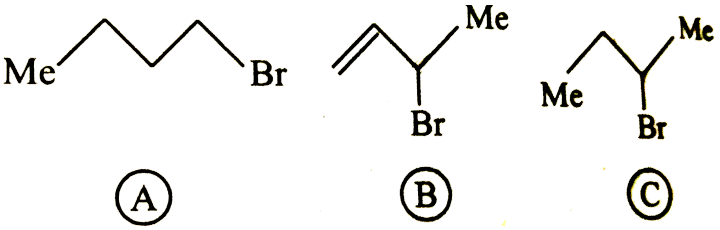
30. Consider the following bromides:



The correct order of S_N1 reactivity is

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31. The order of rate of hydrolysis of alkyl halides $1^\circ, 2^\circ, 3^\circ$ and CH_3X by the S_{N^2} pathway is :

A. $1^\circ > 2^\circ > 3^\circ > CH_3X$

B. $CH_3X > 3^\circ > 2^\circ > 1^\circ$

C. $CH_3X > 1^\circ > 2^\circ > 3^\circ$

D. $3^\circ > 2^\circ > 1^\circ > CH_3X$

Answer: C

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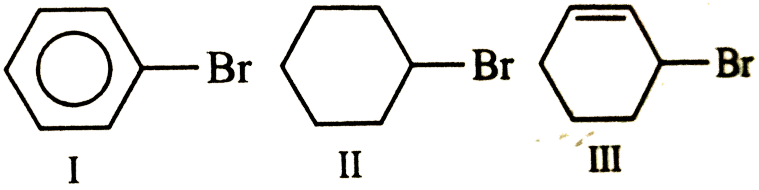
32. The increasing order of hydrolysis of the following compounds is



A. $I < IV < II < III$

B. $I < II < III < IV$

C. $I < II < IV < III$

D. $IV < III < II < I$

Answer: C

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33. The organic chloro compound, which shows complete stereochemical inversion during a S_N^2 reaction, is:

A. CH_3Cl

B. $(C_2H_5)_2CHCl$

C. $(CH_3)_3CCl$

D. $(CH_3)_2CHCl$

Answer: A

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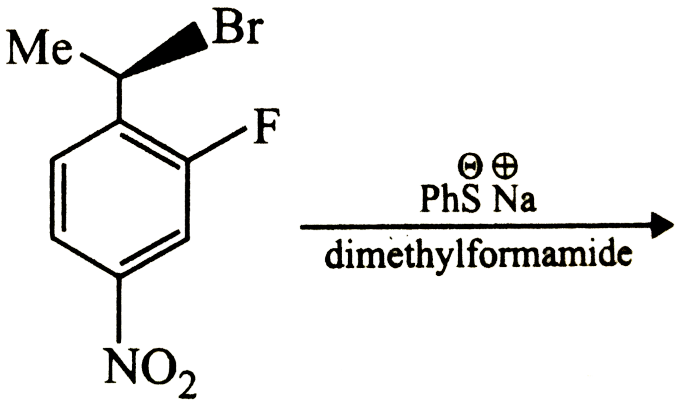
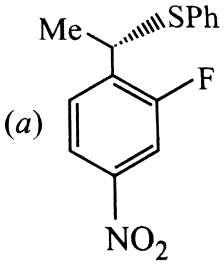
34. The major product of the following reaction is



A.



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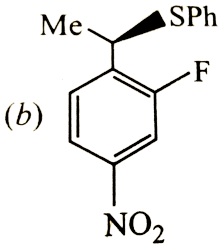
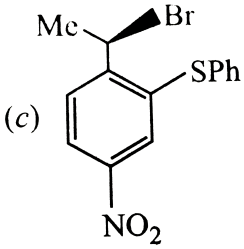
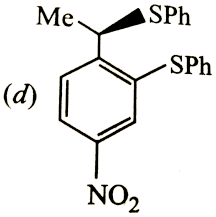


C.



D.



Answer: A

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35. In a S_N2 substitution reaction of the type

$$R - Br + Cl^- \xrightarrow{\text{DMF}} R - Cl + Br^+$$

which one of the following has the highest relative rate?

A. $CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_2Br$

B. CH_3CH_2Br

C. $CH_3 - CH_2 - CH_2Br$

D. $CH_3 - \underset{\underset{CH_3}{|}}{C}\ H - CH_2Br$

Answer: B

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36. Consider the reaction :

$$CH_3CH_2CH_2Br + NaCN \rightarrow CH_3CH_2CH_2CN + NaBr$$

This reaction will be the fastest in :

A. ethanol

B. methanol

C. N, N'-dimethylformamide (DMF)

D. water

Answer: C

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37. Arrange the following carbanions in order of their decreasing stability.

A) $H_3C - C \equiv C^-$

B) $H - C \equiv C^-$

C) $H_3C - C\overline{H}_2$

A. $I > III > II > IV$

B. $III > IV > II > I$

C. $II > I > III > IV$

D. $IV > III > II > I$

Answer: A

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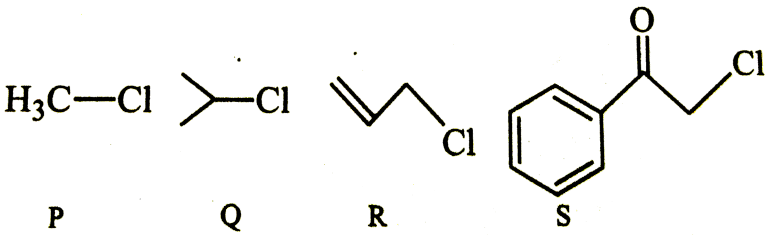
38. KI in acetone, undergoes S_N2 reaction with each of P,Q,R and S. The rate of the reaction vary as



A. PgtQgtRgtS

B. SgtPgtRgtQ

C. PgtRgtQgtS

D. RgtPgtSgtQ

Answer: B

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39. In S_N2 reaction, the correct order of reactivity for following compounds

$CH_3Cl, CH_3CH_2Cl, (CH_3)_2CHCl, (CH_3)_3C-Cl$ is

A. $(CH_3)_2CHCl > CH_3CH_2Cl > CH_3CL > (CH_3)_3CCl$

B. $CH_3Cl > (CH_3)_2CHCl > CH_3CH_2Cl > (CH_3)_3CCl$

C. $CH_3Cl > CH_3CH_2Cl > (CH_3)_2CHCl > (CH_3)_3CCl$

D. $CH_3CH_2Cl > CH_3Cl > (CH_3)_2CHCl > (CH_3)_3CCl$

Answer: C

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40. In an $S_N1$reaction on chiral centres, there is

A. inversion more than retention reading to partial racemization

B. 100% retention

C. 100% conversion

D. 100% racemization

Answer: A

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41. Identify the set of reagents/ reaction condition 'X' and 'Y' in the following set of transformations :

$$CH_3 - CH_2 - CH_2Br \xrightarrow{X} \text{Product} \xrightarrow{Y} CH_3 - \underset{\underset{Br}{|}}{CH} - CH_3$$

A. X=dil. Aquous NaOH, $20^\circ C$, $Y = Br_2/CHCl_3$, $0^\circ C$41

B. X=conc. Alcoholic NaoH, $80^\circ C$, Y=HBr/acetic acid, $20^\circ C$

C. X = dil. Aqueous acid, NaOH, $20^\circ C$, $Y = Br_2/CHCl_3$, $0^\circ C$

D. X = conc. Alcoholic NaOH, $80^\circ C$

$Y = Br_2/CHCl_3$, $0^\circ C$

Answer: B

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42. The ease of dehydrohalogenation of alkyl halide with alcoholic KOH is-

A. $3^\circ < 2^\circ < 1^\circ$

B. $3^\circ > 2^\circ > 1^\circ$

C. $3^\circ > 2^\circ > 1^\circ$

D. $3^\circ > 2^\circ < 1^\circ$

Answer: B

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43. Which of the following organohalogen compound when heated with alcoholic KOH does not undergo dehydrohalogenation reaction :

A. Secondary butyl chloride

B. Neopentyl chloride

C. Isobutyl chloride

D. Tertiary butyl chloride

Answer: B

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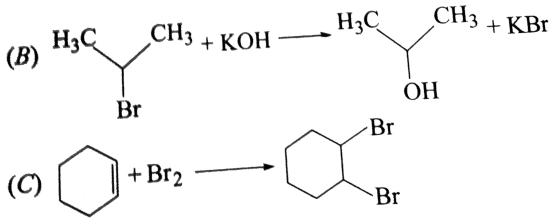
44. For the following reaction :

$(A)CH_3CH_2CH_2Br + KOH \rightarrow CH_3CH = CH_2$+KBr +H_(2)O`



which of the following statement is correct ?

A. (A) is elimination, (B) and (C) are substitution reactions.

B. (A) is substitution, (B) and (C) are addition reaction.

C. (A) and (B) are elimination reactions and (C) is addition reaction.

D. (A) is elimination, (B) is substitution and (C) is addition reaction.

Answer: D

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45. The major product formed in the reaction is:

$$CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{H}{|}}{C}} - CH_2Br \xrightarrow[CH_3OH]{CH_3O^{\ominus}}$$

A. $CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{H}{|}}{C}} - CH_2OCH_3$

B. $CH_3 - \underset{\underset{OCH_3}{|}}{C}\ H - CH_2CH_3$

C. $\begin{matrix} CH_3 \\ | \\ CH_3 - C = CH_2 \end{matrix}$

D. $CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{OCH_3}{|}}{C}} - CH_3$

Answer: C

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46. $\underset{(\text{major})}{B} \xleftarrow[CH_3CH_2OH]{CH_3CH_2O^-Na^+} CH_3-\overset{CH_3}{\underset{CH_3}{\overset{|}{\underset{|}{C}}}}-Br \xrightarrow{CH_3CH_2OH} A(maj \text{ or })$

A and B are

A. Both A and B are $(CH_3)_3C-OCH_2CH_3$

B. Both A and B are $(CH_3)_2C=CH_2$

C. A is $(CH_3)_3C-OCH_2CH_3$ and B is

D. A is $(CH_3)_2C=CH_2$ and B is $(CH_3)_3C-OCH_2CH_3$

Answer: C

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47. 2-chloro-2-methylpentane on reaction with sodium methoxide in methanol yields:

(a) $C_2H_5CH_2\overset{CH_3}{\underset{CH_3}{\overset{|}{\underset{|}{C}}}}-OCH_3$ (b) $C_2H_5CH_2\underset{CH_3}{\overset{|}{\underset{|}{C}}}=CH_2$ (c) $C_2H_5CH_2=\underset{CH_3}{\overset{|}{\underset{|}{C}}}-CH_3$

A. all of these

B. I and III

C. III only

D. I and II

Answer: A

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48. The major product obtained on treatment of $CH_3CH_2CH(F)CH_3$ with CH_3O^-/CH_3OH is :

A. $CH_3CH_2CH(OCH_3)CH_3$

B. $CH_3CH=CHCH_3$

C. $CH_3CH_2CH=CH_2$

D. $CH_3CH_2CH_2CH_2OCH_3$

Answer: C

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49. An alkyl chloride produces a single alkene when it reacts with sodium ethoxide and ethanol . This alkene on hydrogenation produces 2-Methylbutane. What is the identity of the alkyl halide ?

A. 1-Bromo-2,2-dimethylpropane

B. 1-Bromobutane

C. 1-Bromo-2-methylbutane

D. 2-Bromo-2-methylbutane

Answer: C

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50. In the following reaction,

$$C_6H_5CH_2Br \xrightarrow[(ii)\ H_3O^+]{(i)\ \text{Mg, ether}} X,$$

the product 'X' is

A. $C_6H_5CH_2OCH_2C_6H_5$

B. $C_6H_5CH_2OH$

C. $C_6H_5CH_3$

D. $C_6H_5CH_2CH_2C_6H_5$

Answer: C

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51. $(CH_3)_3CMgBr$ on reaction with D_2O produces :

A. $(CH_3)_3CD$

B. $(CH_3)_3COD$

C. $(CD_3)_3CD$

D. $(CD_3)_3OD$

Answer: A

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52. The products expected to be formed in the Wurtz reaction of a mixture of neopentyl bromide and isobutyl bromide are :

(i) 2,2,4-trimethylpentane

(ii) 2,2,5,5-tetramethylhexane

(iii) 2,2,4,4- tetramethlhexane

(iv) 2,5-dimethylhexane

(v) 2,2,5-trimethylhexane

A. (ii), (iii) and (v)

B. (ii), (iv) and (v)

C. (i), (iv) and (v)

D. (i), (iii) and (v)

Answer: B

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53. Cycloalkane formed when 1,4-dibromopentane is heated with sodium is:

A. methylcyclobutane

B. cyclopentane

C. cyclobutane

D. methylcyclopentane

Answer: A

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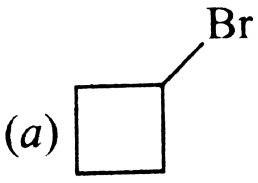
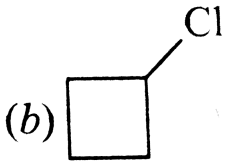
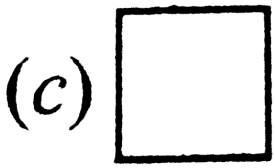
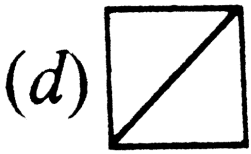
54. 1-bromo-3-chlorocyclobutane when treated with two equivalents of Na, in the presence of ether which of the following will be formed ?

A.



B. 

C. 

D. 

Answer: D

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55. Two possible stereo-structures of $CH_3CHOHCOOH$, which are optically active are called

A. atropisomers

B. enantiomers

C. mesomers

D. diastereomers

Answer: B

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56. Which of the following compounds is chiral? .

A. 3-Pentanol

B. 1-Pentanol

C. 3-Methyl-1-butanol

D. 3-Methyl-2-butanol

Answer: D

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57. How many chiral compounds are possible on mono chlorination of 2-methyl butane ?

A. 2

B. 4

C. 6

D. 8

Answer: A

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58. Out of the following the alkene that exhibits optical isomerism is

A. 3-methyl-1-pentene

B. 2-methyl-2-pentene

C. 3-methyl-2-pentene

D. 4-methyl-1-pentene

Answer: A

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59. The total number of optical isomers possible for 2,3-dibrom

https://d10lpgp6xz60nq.cloudfront.net/physics_images/NAR_CHM_V05_XI_C04

A. 2

B. 4

C. 0

D. 3

Answer: D

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60. How many stereoisomerse does this molecule has?

$CH_3CH = CHCH_2CHBrCH_3$

A. 8

B. 2

C. 4

D. 6

Answer: C

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61. In a mixture, two enantiomers are found to be present in 85% and 15% respectively. The enatiomeric excess (e,e) is

A. 0.85

B. 0.15

C. 0.7

D. 0.6

Answer: C

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62. A solution of (+)-1-chloro-1-phenylethane in t toluene racemises slowly in the presence of a small amount of $SbCl_5$ due to the formation of

A. free radical

B. carbanion

C. carbene

D. carbocation

Answer: D

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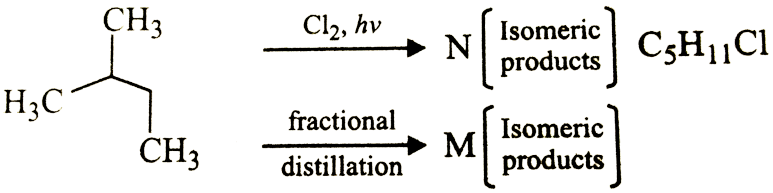

63. ltBrgt Give the number of N and M?

A. 6,6

B. 6,4

C. 4,4

D. 3,3

Answer: B

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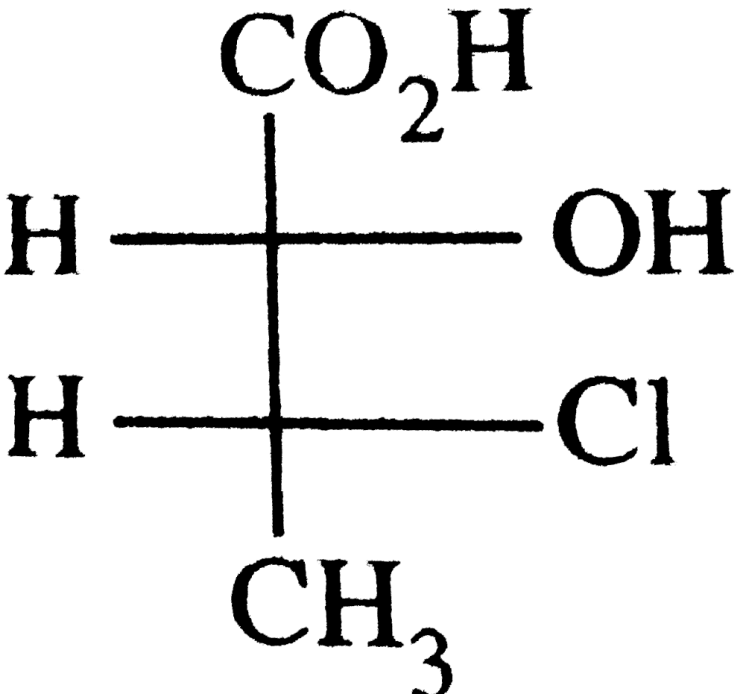
64. The absolute configuration of



A. (2R,3S)

B. (2S,3R)

C. (2S,3S)

D. (2R,3R)

Answer: B

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65. Which of the following biphynyl is optically active?

A.

B.

C.

D.

Answer: D

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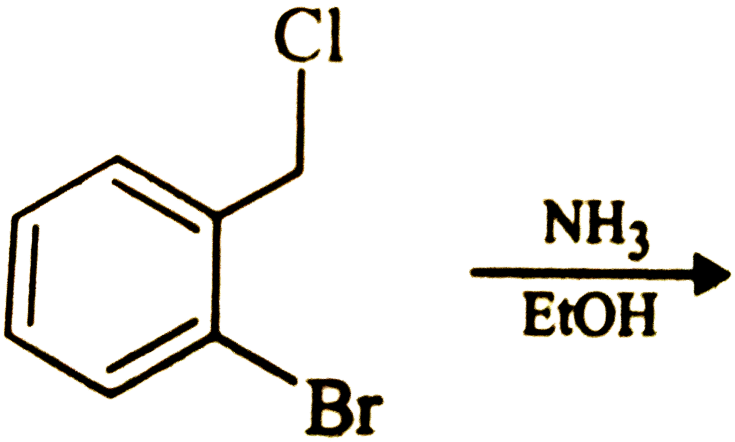
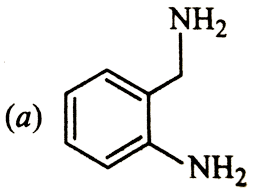
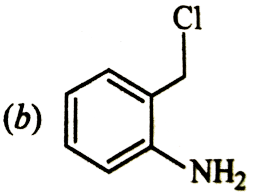
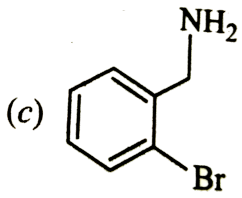


66.

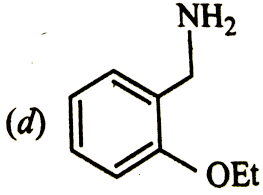
The product of the above reaction is

A. 

B. 

C. 

D.



Answer: C

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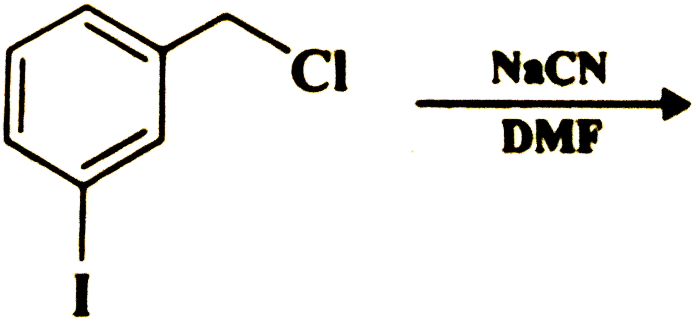
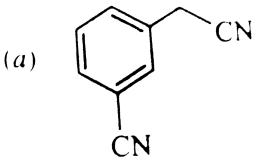
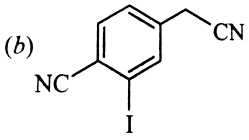
67. The structure of the major product formed in the following reaction is



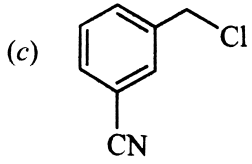
A.



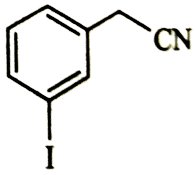
B.



C. (c)



D. (d)



Answer: D

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68. Bottles containing C_6H_5I and $C_6H_5 - CH_2I$ lost their original lables. They were labelled A and B for festing. A and B were separately taken in a test tube and boiled with $NaOH$ solution. The end solution in each tube was made acidic with dilute HNO_3 and then some $AgNO_3$ solution was added. Substance B gave a yellow precipitate. Which one of the following statements is true for this experiment.

A. Additionn of HNO_3 was unnecessary

B. A was $C_6H_5CH_2I$

C. A was $C_6H_5CH_2I$

D. B was C_6H_5I

Answer: d

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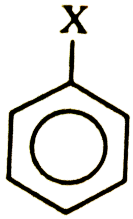
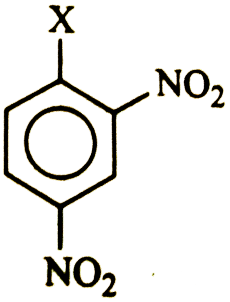
69. The correct order of increasing reactivity of C-X bond towards nucleophile in the following compound is



(I)



(II)

A. $III < II < I < IV$

B. $I < II < IV < III$

C. $II < III < I < IV$

D. $IV < III < I < II$

Answer: B

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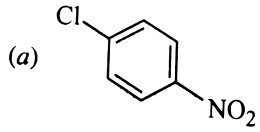
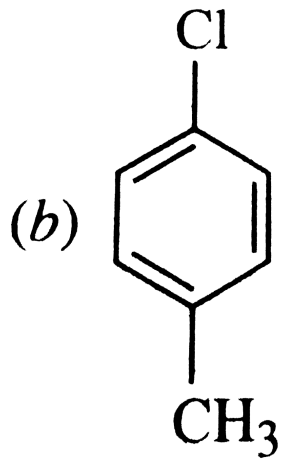
70. Which of the following compounds undergoes mucleophilic substitution reaction most easily?

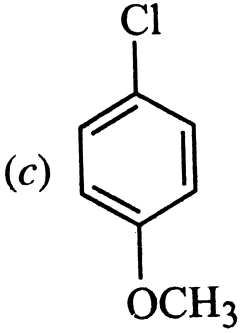
A.



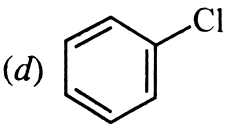
B.



C.



D.



Answer: A

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71. Which one of the following reactions is most suitable for the preparation of n-propyl benzene

A. Friedel-Crafts alkylation

B. Wurtz reaction

C. Wurtz-Fitting reaction

D. Grignard reaction

Answer: C

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72. Which of the following can be used as the halide component for Friedel Crafts reaction ?

A. Chlorobenzene

B. Bromobenzene

C. Chloroethene

D. Isopropyl chloride

Answer: D

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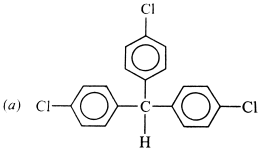
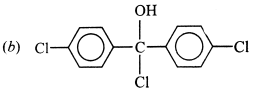
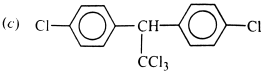
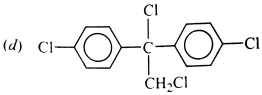
73. Trichloroacetaldehyde, CCl_3CHO reacts with chlorobenzene in presence of sulphuric acid and produces.

A. 

B. 

C. 

D. 

Answer: C

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74. What is DDT among the following

A. A fertilizer

B. Biodegradable polluntant

C. Non-biodegradable polluntant

D. Greenhouse gas

Answer: C

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Competition Focus (JEE (MAIN AND ADVANCED)/MEDICAL ENTRANCE SPECIAL (MULTIPLE CHOICE QUESTIONS-II))

1. Which of the following methods cannot be used to prepare allyl fluoride?

A. $ClCH_2CH = CH_2 \xrightarrow{\text{NaF, acetone}}$

B. $CH_3CH = CH_2 + F_2 \xrightarrow{hv}$

C. $HOCH_2CH = CH_2 \xrightarrow{HF}$

D. $ClCH_2CH = CH_2 + AgF \rightarrow$

Answer: A::B::C

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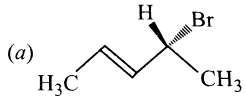
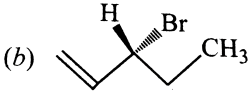
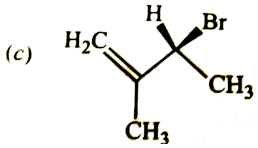
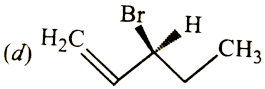
2. Compound (S) that on hydrogenation product (S) optically inactive compound (s) is/are

A. 

B. 

C. 

D. 

Answer: B::D

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3. Which of the following easily undergo nucleophilic substutition by S_{N^1} mechanism in butanol

A. $C_6H_5CH_2Br$

B. $BrCH_2CH = CH_2$

C. $(CH_3)_3CBr$

D. $(CH_3)_3CCH_2Br$

Answer: A::B::C::D

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4. Which of the following compound

on halogenation give a racemic mixture of products?

A. $(CH_3)_4C$

B. $CH_3CH_2CH_2CH_3$

C. $CH_3CH_2CH_3$

D. CH_3CH_3

Answer: B

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5. Which of the following compounds have approximately the same dipole moment?

A.

B.

C.

D.

Answer: A::B::D

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6. Which of the following aryl halides on reaction with Mg in ether followed by treatment with water give toluene?

A.

B.

C.

D.

Answer:

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7. The reagents which cannot be used to distinguish benzyl chloride from chlorobenzene are

A. Br_2 / CCl_4

B. Shaking with an aqueous solution of $AgNO_3$

C. Boiling with aqueous KOH solution followed by acidification with dil. HNO_3 annd addition of $AgNO_3$ solution.

D. Fusion with sodium metal followed by acidification with dil. HNO_3 and addition of $AgNO_3$ solution.

Answer: A::D

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8. The reagents used in the preparation of DDT from chlorobenzene are

A. Chloral (CCl_3CHO)

B. Conc. H_2SO_4

C. CH_3COCCl_3

D. $CH_2ClCOCH_2Cl$

Answer: A::B

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Competition Focus (JEE (MAIN AND ADVANCED)/MEDICAL ENTRANCE SPECIAL (MULTIPLE CHOICE QUESTIONS-III COMPREHENSION TYPE))

1. Explain the mechanism of S_{N1} and S_{N2} reactions with examples.

A.

B.

C.

D.

Answer: A

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2. Q. S_N1 reaction of optically active alkyl halides leads to

A. retention of configuration

B. racemisation

C. inversion of configuration

D. none of these

Answer: B

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3. As S_{N^2} reaction at an asymmetric carbon of a compound always gives:

A. an enantiomer of the substrate

B. a product with opposite optical rotation

C. a mixture of diastereomers

D. a single stereoisomer.

Answer: D

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4. In the solvolysis of 3-methyl-3-bromohexane, which of the following statements is not correct?

A. it involves carbocation intermediate

B. the intermediate invovles sp^2 carbon

C. polar solvents accelerate the reaction

D. it involves inversion of configuration

Answer: D

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5. Q. Isopropyl bromide on heating with a concentrated solution of alcoholic (ethanolic) KOH predominantly gives

A. Propene

B. Propan-2-ol

C. Propan-1-ol

D. Isopropyl ethyl ether

Answer: A

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6. Q. 2-Bromopropane is separately heated with aq. CH_3CO_2Na or with CH_3CH_2ONa/CH_3CH_2OH, the major product obtained in each case respectively are

A. propene, isopropyl ethyl ether

B. isopropyl acetate, propene

C. isopropyl acetate, isopropyl ethyl ether

D. propene in both the cases

Answer: B

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7. Q. 2-Bromopentane is heated with potassium in ethanol. the major product obtained is

A. 2-Ethoxypentane

B. Pentane-1-

C. cis-Pentene-2

D. trans-Pentene-2

Answer: D

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Competition Focus (JEE (MAIN AND ADVANCED)/MEDICAL ENTRANCE SPECIAL (INTEGER TYPE QUESTIONS - VI))

1. How many of the following alkenes on addition of HBr would give the sae product in the presence or absence of peroxide propene, 1-butene, 2-butene, 2-methylpropene, 3-methyl-1-butene, 2,3-dimethyl-1-butene, 2-pentene, 1-pentene, 4-methyl-2-pentene

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2. How many monochloro derivatives are possible when 3-methylheptane is subjected to free radical chlorination ?

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3. Excess chlorine is passed through boiling toluene how many chloroderivatives would you get?

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4. Total number of compound among the followinng having zero dipolemoment is/are $CCl_4, CH_3Cl, CH_2Cl_2, CHCl_3$, o-, m-and p-dichlorobenzene, benzyl chloride, benzal dichloride, benzotrichloride.

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5. The total number of isomers including stereoismers that could be obtained by replacing two hydrogen atoms of propane by two chlorine atoms are :

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6. How many chiral stereosimers are possible for 2-bromo-3-chlorobutane

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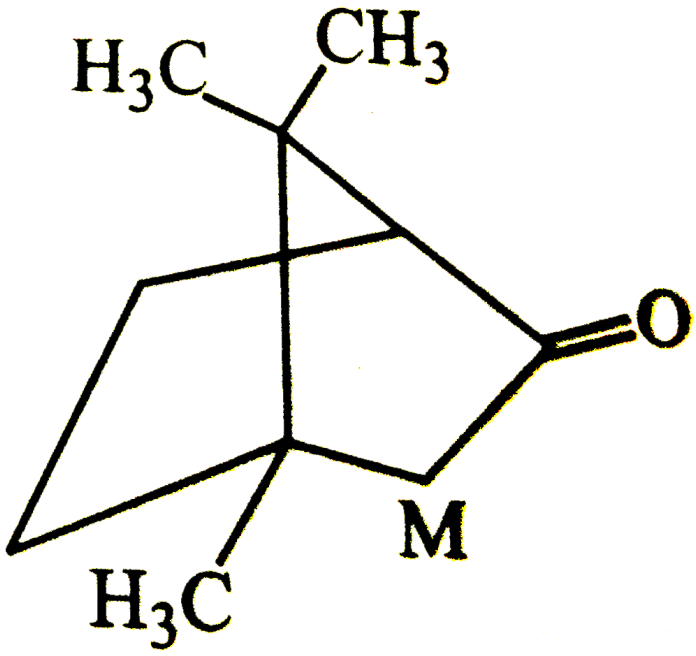
7. The total number of stereosiomers that can exist for M is



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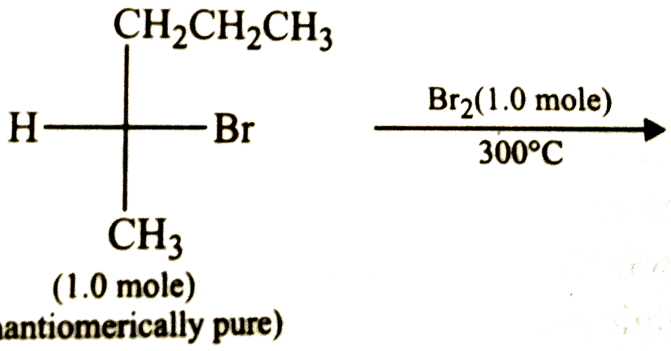
8. In the following monobromination reaction, the number of possible chiral products is



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9. The total number of alkenes possible by dehydrobromination of 3-bromo-3-cyclopentylhexane using alcoholic KOH is

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Competition Focus (JEE (MAIN AND ADVANCED)/MEDICAL ENTRANCE SPECIAL (VII - ASSERTION-REASON TYPE QUESTIONS))

1. Statement I: $1-$ Butene on reaction with HBr in the presence of a peroxide produces $1-$ bromobutane.

Statement II: It involves the formation of a primary radical.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation of statement-1.

B. Statement-1 is true, statement-2 is true, Statement-2 is not a correct explanation of statement-1.

C. Statement-1 is true, statement-2 is false.

D. Statement-1 is Fasle, Statement-2 is True.

Answer: C

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2. Statement 1: NBS is a specific reagent for allylic bromination.

Statement 2: Allylic bromination occurs through free radial intermediates.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation of statement-1.

B. Statement-1 is true, statement-2 is true, Statement-2 is not a correct explanation of statement-1.

C. Statement-1 is true, statement-2 is false.

D. Statement-1 is Fasle, Statement-2 is True.

Answer: B

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3. Assertion: n- Buty chloride has higher boiling point than n-butyl bromide

Reason $C-CI$ bond is more polar than $C-Br$ bond .

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation of statement-1.

B. Statement-1 is true, statement-2 is true, Statement-2 is not a correct explanation of statement-1.

C. Statement-1 is true, statement-2 is false.

D. Statement-1 is Fasle, Statement-2 is True.

Answer: D

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4. Assertion: $CH_3Br + AgCN \rightarrow CH_3NC + AgBr$

Reason: CN is an ambident ion .

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation of statement-1.

B. Statement-1 is true, statement-2 is true, Statement-2 is not a correct explanation of statement-1.

C. Statement-1 is true, statement-2 is false.

D. Statement-1 is Fasle, Statement-2 is True.

Answer: B

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5. Statement-1: Butan-2-ol is optically active.

Statement-2. Its mirror image is non-superimposable on it.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation of statement-1.

B. Statement-1 is true, statement-2 is true, Statement-2 is not a correct explanation of statement-1.

C. Statement-1 is true, statement-2 is false.

D. Statement-1 is Fasle, Statement-2 is True.

Answer: A

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6. Statement 1:Addition of Br_2 to 1-butene gives two optical isomers.

Statement 2:The product contains one asymmetric carbon

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation of statement-1.

B. Statement-1 is true, statement-2 is true, Statement-2 is not a correct explanation of statement-1.

C. Statement-1 is true, statement-2 is false.

D. Statement-1 is Fasle, Statement-2 is True.

Answer: A

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7. Statement-I: Nucleophilic substitution reaction on an optically active alkyl halide gives a mixture of enantiomers.

Because Statement-II: The reaction occurs by S_{N^1} mechanism.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation of statement-1.

B. Statement-1 is true, statement-2 is true, Statement-2 is not a correct explanation of statement-1.

C. Statement-1 is true, statement-2 is false.

D. Statement-1 is Fasle, Statement-2 is True.

Answer: C

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8. Statement-I: Optically active 2-idoibutane on treatment with NaI in acetone undergoes racemisation.

Because Statement-II: Repeated Walden inversions on the reactant and its product evantually gives a racemic mixure.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation of statement-1.

B. Statement-1 is true, statement-2 is true, Statement-2 is not a correct explanation of statement-1.

C. Statement-1 is true, statement-2 is false.

D. Statement-1 is Fasle, Statement-2 is True.

Answer: A

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Competition Focus (JEE (MAIN AND ADVANCED)/MEDICAL ENTRANCE SPECIAL (VII - ASSERTION-REASON TYPE QUESTIONS)) TYPE - II

1. Assertion: Reaction of alcohol with $SOCl_2$ is catalysed by the presence of a tertiary amine (R_3N).

Reason: Tertiary amine promotes the reaction by reacting with the by product HCl.

A. If both assertionn and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and Reason are false.

Answer: A

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2. Assertion : Alkyl iodide can be prepared by treating alkyl chloride/bromide with Nal in acetone .

Reason : NaCI/NaBr are soluble in acetone while Nal is not .

A. If both assertionn and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and Reason are false.

Answer: C

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3. Assertion: p-Dichlorobenzene is less soluble in organic solvents than the corresponding o-isomer

Reason o-Dichlorobenzene is polar while p-dichlorobenzene is non-polar .

A. If both assertionn and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and Reason are false.

Answer: B

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4. Assertion : Treatment of chloroethane with a saturated solution of AgCN gives ethyl isocyanide as the major product.

Reason : Cyanide $\left(CN^{-}\right)$ is an ambident nucelophile

A. If both assertionn and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and Reason are false.

Answer: B

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5. Assertion: S_N2 reactions proceed with inversion of configuration

Reason: S_N2 reactions occur in one step .

A. If both assertionn and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and Reason are false.

Answer: B

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6. Assertion: S_N1 reaction is basically a solvolysis reaction.

Reason: Polar protic solvents help the substrate to ionize and by the way get involved in S_N1 reaction.

A. If both assertionn and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and Reason are false.

Answer: A

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7. Assertion: Benzyl bromide when kept in acetone water produces benzyl alcohol.

Reason: The reaction follows S_N2 mechanism.

A. If both assertionn and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and Reason are false.

Answer: C

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8. Assertion:2-Bromobutane on reaction with sodium ethoxide in ethanol gives 1-butene as a major product

Reason:1-butene is more stable than 2-butene.

A. If both assertionn and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and Reason are false.

Answer: D

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9. Assertion: In the E2 elimination, $\beta - H$ and leaving group should be antiperiplanar.

Reason: In the E2 elimination, base always abstracts unhindered $\beta - H$.

A. If both assertionn and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and Reason are false.

Answer: C

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10. Assertion:of tert butylchloride with Na gives $2, 2, 3, 3$-tetramethy butane

Reason Tert butyl chloride on Wurtz reaction gives alkene.

A. If both assertionn and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and Reason are false.

Answer: D

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11. Assertion: in comparison to ethyl chloride it is difficult to carry out nucleophilic on vinyl chloride

Reason: Vinyl group is electron-donating .

A. If both assertionn and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and Reason are false.

Answer: C

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12. Assertion : The presence of nitro group facilitates nucleophilic substituation reactions in aryl halides.

Reason : The intermediate carbanion is stabilised due to the presence of nitro group.

A. If both assertionn and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and Reason are false.

Answer: A

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13. Assertion : Chloral reacts with phenyl chloride to form DDT.

Reason : It is an electrophilic substitution reaction.

A. If both assertionn and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and Reason are false.

Answer: A

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IMPORTANT QUESTIONS FOR BOARD EXAMINATION

1. Write the structure of 1-Bromo-4-chlorobut-2-ene

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2. Name of the alkene which will yield 1-chloro-1-methylcyclohexane by its reaction with HCl. Write the reaction involved.

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3. How will you bring about the convertion: methyl bromide to methyl iodide.

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4. Write down the product formed when HBr adds to 3-methyl-1-butene.

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5. A hydrocarbon of molecular mass 72 g mol^{-1} gives a single monochloro derivative and two dichloro derivatives on photo chlorination. Give the structure of the hydrocarbon.

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6. How will you prepare bromobenzene from aniline?

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7. Which one of the following has the highest dipole moment?

(i) CH_2Cl_2, $(ii)CHCl_3$, $(iii)CCl_4$

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8. What happens when chlorine is passed through boiling toluene in the presence of sunlight?

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9. Arrange each of the following compounds in order of increasing boiling point: Bromomethane, bromoform, chloromethane, dibromomethane.

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10. Which is a better nucleophile, a bromide ion or an iodide ion?

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11. Haloalkanes react with KCN to form alkyl cyanides as main product while AgCN forms isocyanides as the chief product. Explain.

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12. Predict the order of reactivity of the four isomeric bromobutanes in S_N1 and S_N2 reactions.

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13. Optically active 2-iodo butane on treatment with NaI in acetone gives a product which does not show optical activity. Explain briefly.

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14. Give two reasons for the low reactivity of aryl halides towards nucleophilic substitution reactions.

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15. Wrutz reaction fails in case of tert-alkyl halides. Explain.

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16. Primary alkyl halide C_4H_9Br (a) reacted with alcoholic KOH to give compound (b). Compound (b) is reacted with HBr to give (c) which is an

isomer of (a). When (a) is reacted with sodium metal it gives compound (d), C_8H_{18} which is different from the compound formed when n-butyl bromide is reacted with sodium. Give the structural formula of (a) and write the equations for all the reactions.

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17. Explain the following: (i) In nucleophilic aromatic substitution reactions, fluorides are more reactive than chlorides while in aliphatic nucleophilic substitution reactions reverse is true.

(ii) Chlorobenzene forms grignard reagent in THF but not in ether.

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18. Write the following reactions:

(i) Swarts reaction

(ii) Sandmeyer reaction

(iii) Wurtz-Fitting reaction

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19. Although chlorine is an electron-withdrawing group, yet it is ortho-, para-directing in electrophilic aromatic substitution reactions. Why?

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20. What is the IUPAC name of the insecticide DDT? Write the chemical equation for its preparation from chlorobenzene. Why is its use banned in USA?

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21. How is Freon-12 prepared ? Discuss its uses and also comment upon its environmental effect.

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22. Give at least one test which can distinguish between C_2H_5Br and C_2H_5Cl.

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