

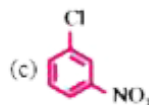
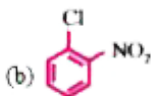
CHEMISTRY

BOOKS - CBSE COMPLEMENTARY MATERIAL CHEMISTRY (HINGLISH)

HALOALKANES AND HALOARENES

Multiple Choice Questions

1. Arrange the following compounds in increasing order of rate of reaction towards nucleophilic substitution :



A. a lt b lt c

B. a lt b lt a

C. a lt c lt b

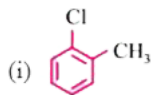
D. c lt a lt b

Answer: C

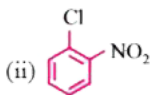


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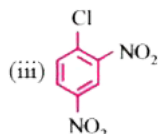
2. Arrange the following compounds in increasing order of rate of reaction towards nucleophilic substitution :



(a) $i < ii < iii$



(b) $i < iii < ii$



A. i lt ii lt iii

B. i lt iii lt ii

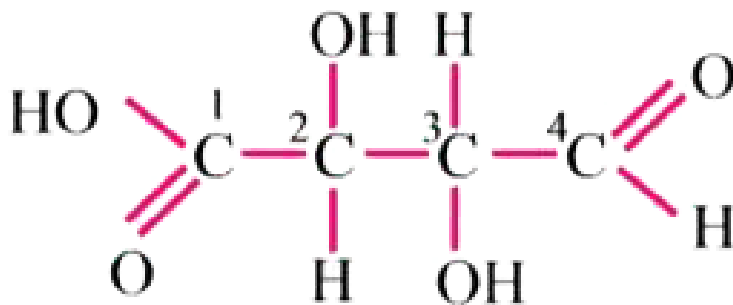
C. ii lt i lt iii

D. iii It ii It i

Answer: A

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3. Which of the carbon atom present in the molecule given below are asymmetric.



A. 1,2,3,4

B. 2,3

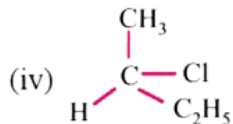
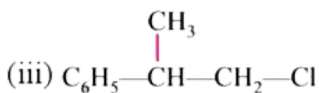
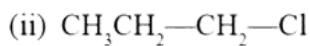
C. 1,4

D. 1,2,3

Answer: B

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4. Which of the following compound will undergo reversion when solution of KOH hydrolyses?



(i)

A. I and iv

B. ii and iv

C. iii and iv

D. iv

Answer: C

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5. On chiral centre there is always in S_N^1 reaction

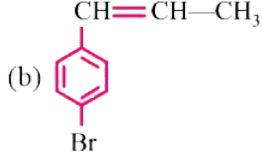
- A. 100% retention
- B. 100% inversion
- C. 100% racemisation
- D. inversion is more than retention leading to racemisation

Answer: D

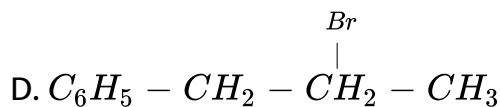
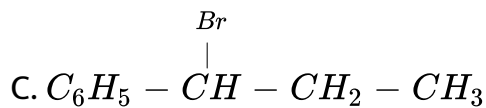
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6. The reaction of $C_6H_5 - CH = CH - CH_3$ with HBr produces

- A. $C_6H_5 - CH_2CH_2 - CH_2 - Br$



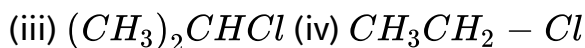
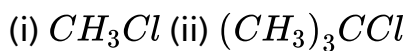
B.



Answer: C

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7. In $S(N)^2$ reaction the correct order of reactivity of the following compounds:



A. $i > ii > iii > iv$

B. $iv > iii > ii > i$

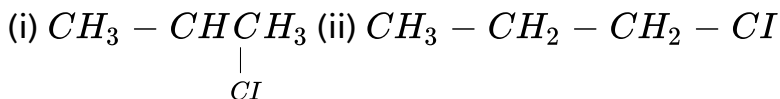
C. $i > iv > iii > ii$

D. $iv > i > ii > iii$

Answer: C

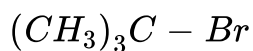
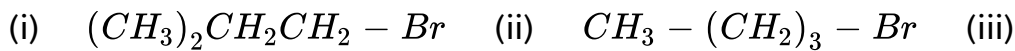
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8. The increasing order of reactivity of the following halides for the S_N^1 reaction is



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9. Arrange the following compounds in increasing order of their boiling point



A. ii lt i lt iii

B. i lt ii lt iii

C. iii lt i lt ii

D. iii lt ii lt i

Answer: C



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

A. electrophilic elimination reaction

B. electrophilic substitution

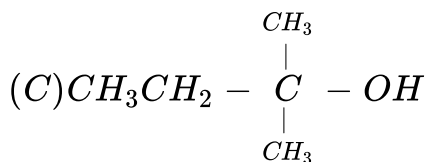
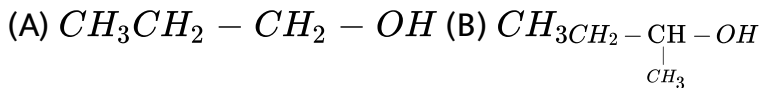
C. free radical addition reaction

D. nucleophilic substitution

Answer: B

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



A. I gt ii gt iii

B. iii gt ii gt i

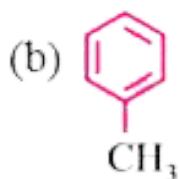
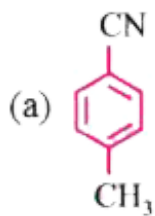
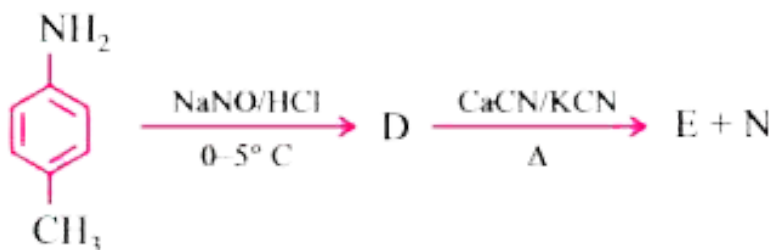
C. ii gt I gt iii

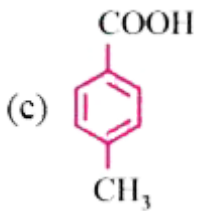
D. I gt iii gt ii

Answer: B

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12. In the reaction





C.

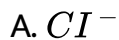


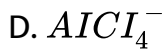
D.

Answer: A

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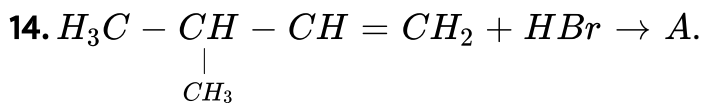
13. Chlorobenzene is formed by reaction of chlorine with benzene in the presence of $AlCl_3$. Which of the following species attacks the benzene ring in this reaction?



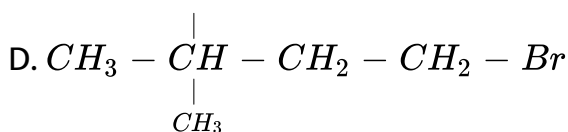
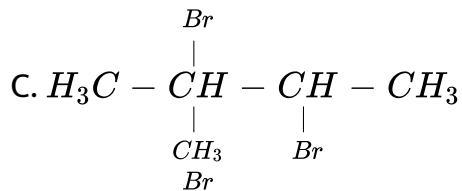
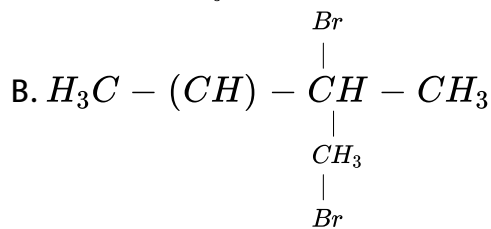
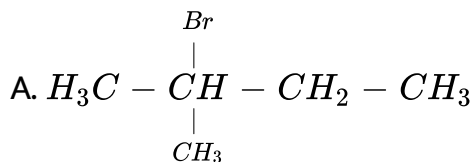


Answer: B

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A is predominantly



Answer: A

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15. The reaction of toluene with Cl_2 in presence of $FeCl_3$ gives X and reaction in presence of light gives Y Thus X and Y are .

- A. X' = benzyl chloride and 'Y' = m - chlorotoluene
- B. X' = benzyl chloride and 'Y' = o - chlorotoluene
- C. X' = m- chlorotoluene and 'Y' = p - chlorotoluene
- D. X' = p - chlorrotoluene and 'Y' = benzyl chloride

Answer: D

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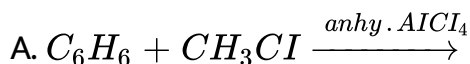
16. Aryl halides are less reactive towards nucleophilic substitution reaction as compared to alkyl halides due to

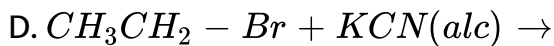
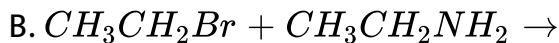
- A. the formation of stable carbonium ion
- B. resonance stabilization
- C. longer carbon halogen bond
- D. sp^2 hybridised carbon attached to halogen

Answer: B::D

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17. A new carbon bond is possible in the following reaction reactions:





Answer: A::D

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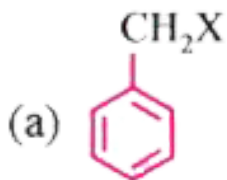
18. Which of the following state are correct

- A. Benzyl halides are more reactive than viny and anyl halides
- B. vinyl/halides are more reactive than alkylhalides
- C. Aryl halides are less reactive than alkylhalide
- D. Aryl halides are more reactive than benzyl halides

Answer: A::C

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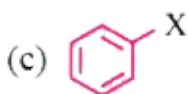
19. Which of the following contain sp^2 hybridised carbon bonded to X?



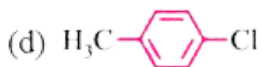
A.



B.



C.

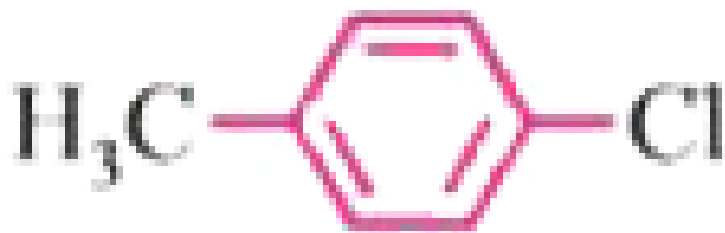


D.

Answer: B::D

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20. The IUPAC name of the following compound are



- A. 1-chloro-4-methyl benzene
- B. 4 - chlorotoluene
- C. 1 - methy1-4 chlorobenzene
- D. 4-methylchlorobenzene

Answer: A::B

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Assertion And Reasoning

1. Assertion: S_N2 reactions proceed with inversion of configuration

Reason: S_N2 reactions occur in one step .

- A. Both assertion and reason are correct, and reason is the correct explanation of the assertion.
- B. Both assertion and reason are True, but reason is not the correct explanation of the assertion.
- C. Assertion is Incorrect, but reason is correct
- D. Both assertion and reason are incorrect

Answer: B



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2. Assertion : Treatment of chloroethane with saturated solution of AgCN give ethyl isocyanide as major product.

Reason : Cyanide ion (CN^-) is an ambident nucleophile.

- A. Both assertion and reason are correct, and reason is the correct explanation of the assertion.
- B. Both assertion and reason are True, but reason is not the correct explanation of the assertion.
- C. Assertion is Incorrect, but reason is correct
- D. Both assertion and reason are incorrect

Answer: B

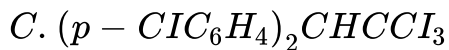


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Matching Column Type

1. Match the items of column I and column II

Column I



Column II

P. Antiseptic

Q. Insecticide

R. Pyrene

S. Refrigerend

A. A-R, B-Q, C-S, D-p

B. A-S, B-R, C-Q, D-P

C. A-Q, B-P, C-S, D-R

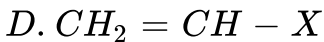
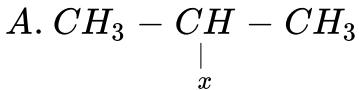
D. A-P, B-S, C-R, D-Q

Answer: B



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2. Match the items of Column I and Column II



P. Aryl halide

Q. Alkyl halide

R. Vinyl halide

S. Allyl halide

A. A-P, B-Q, C-S, D-P

B. A-S, B-R, C-Q, D-P

C. A-Q, B-P, C-S, D-R

D. A-P, B-S, C-R, D-Q

Answer: B



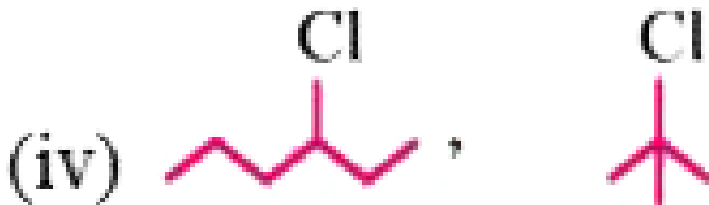
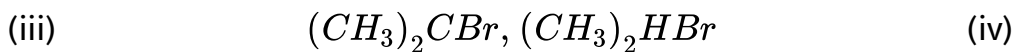
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Integer Type Question

1. In how many pairs the second compound reacts faster than the first in S_N ! Reaction with OH^- ?



CH_3I, CH_3Br

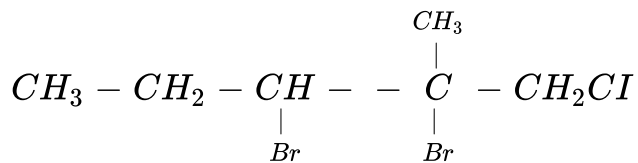


(v) $CH_3Cl, (CH_3)_2CHCl$

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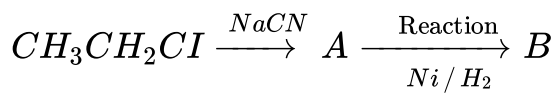
Very Short Answer Type Questions 1 Mark

1. Give IUPAC name of :



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2. Identify A and B in each of the following processes :



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3. Draw the structure of 4-bromo-3-methylpent-2-ene.

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4. Why Grignard reagent should be prepared under anhydrous conditions ?

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

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6. An alkyl halide having molecular formula C_4H_9Cl is optically active. What is its structure ?

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7. An organic compound 'A' on treatment with KCN gave B which on hydrolysis with dil. HCl gave acetic acid. Identify A.

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8. Write IUPAC name of iodoform.

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9. Which one of the following two substances undergo SN^1 reaction faster and why?

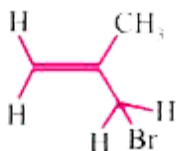


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10. Haloalkanes react with KCN to form alkyl cyanides as main product while AgCN forms isocyanides as the chief product. Explain.

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11. Write the IUPAC name of the following compound :

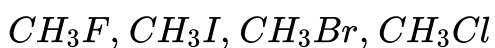


[Hint : 3-bromo-2-methylprop-1-ene]

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12. Arrange the following in order of their

Increasing reactivity in nucleophilic substitution reactions :

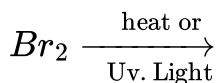


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13. Allyl chloride is more reactive than n-propyl chloride towards nucleophilic substitution reaction. Explain why?

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14. Complete the reaction :



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15. How will you convert 2-bromo propane into 1-bromo propane ?

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16. Give one chemical test to distinguish between chlorobenzene and benzyl chloride ?

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17. Why iodoform show antiseptic properties ?

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18. The presence of nitro group ($-NO_2$) at ortho or para positions increases the reactivity of haloarenes towards nucleophilic substitution reactions. Explain.



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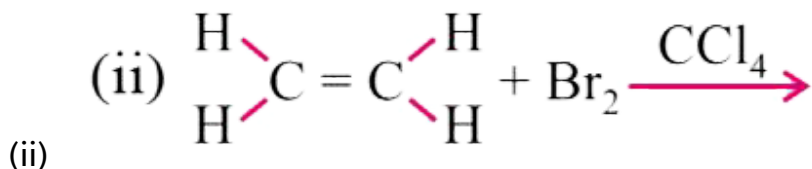
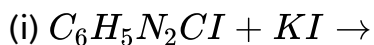
19. For the preparation of alkyl chlorides from alcohols, thionyl chloride ($SOCl_2$) is preferred. Give reason.



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Short Answer I Type Questions 2 Marks

1. Complete the following reactions :



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2. Carry out the following conversions in not more than two steps

:

(i) Toluene to benzyl alcohol

(ii) Benzyl alcohol to phenylethanenitrile



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3. Give reasons :

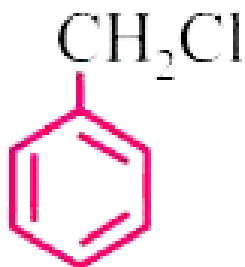
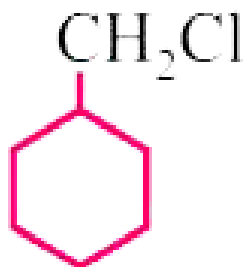
(i) Boiling point of alkyl bromide is higher than alkyl chloride.

(ii) Alkyl halides are better solvents than aryl halides.



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4. Which of the following compounds would undergo SN_1 reaction faster and why ?



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5. Identify and indicate the presence of centre of chirality, if any, in the following molecules. How many stereoisomers are possible for those containing chiral centre :

(i) 1, 2-dichloropropane

(ii) 3-bromopent-1-ene

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6. Convert :

(i) Benzene to m-nitrochlorobenzene

(ii) Benzene to diphenyl

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7. What happens when :

(i) Propene is treated with HBr in presence of peroxide.

(ii) Benzene is treated with methyl chloride in presence of $AlCl_3$

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8. (i) Alkyl iodides develop colouration on long standing particularly in light.

Explain.

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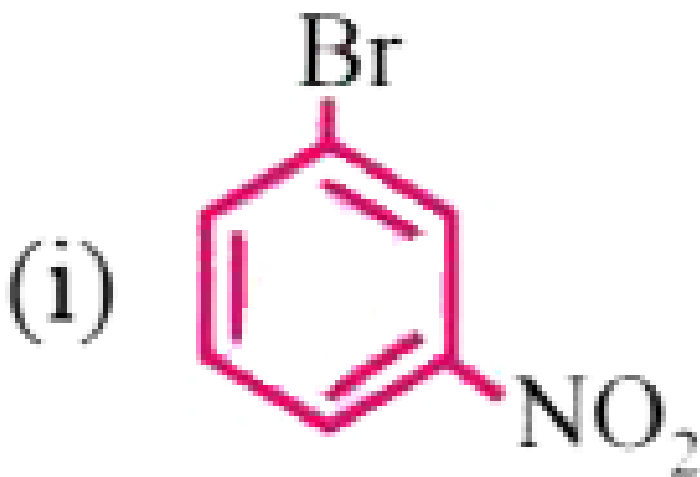
9. tert-Butylbromide reacts with aq. NaOH by S_N1 mechanism while n butylbromide reacts by S_N2 mechanism. Why?

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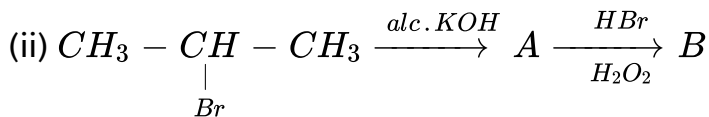
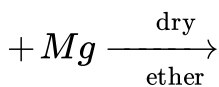
10. Although chlorine is an electron withdrawing group, yet it is ortho-para-directing in electrophilic aromatic substitution reactions. Explain why it is so ?

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11. Identify the products :

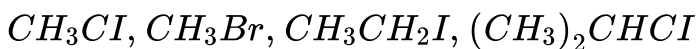


(i)



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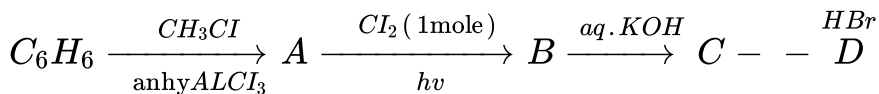
12. (i) Arrange the following halides in order of increasing S_N^1 reactivity :



(ii) Which out of 1-bromobutane & 2-bromobutane would react faster by S_N^2 pathway and why ?

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13. Identify the products :



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14. Carry out the following conversions :

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

(ii) Isopropyl alcohol to iodoform

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15. An organic compound A reacts with PCl_5 to give compound B. Compound B reacts with Na/ether to give n-butane. What are compounds A and B ?

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16. Write short note on :

(i) Sandmeyer reaction

(ii) Finkelstein reaction

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17. Name the reagents used to convert :

(i) 2-chloropropane to 2-nitropropane

(ii) Chloroethane to n-butane

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18. Draw structure of monohalo product in each of the following :



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Short Answer II Type Questions 3 Marks

1. Rearrange the compounds of each of the following sets in order of reactivity towards S_N^1 displacement :

(i) 2-bromo-2-methyl butane, 1-bromopentane, 2-bromopentane

(ii) 1-bromo-3-methylbutane, 2-bromo-2-methyl butane, 2-bromo-3-methyl butane

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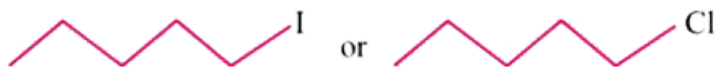
2. Answer the following :

- (i) Haloalkanes easily dissolve in organic solvents, why ?
- (ii) What is known as racemic mixture ? Give example.

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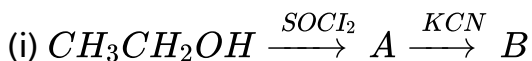
3. Answer the following :

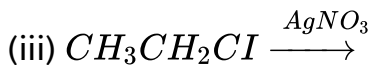
- (i) What is meant by chirality of a compound ? Give an example.
- (ii) Which one undergo S_N^2 substitution reaction faster and why ?



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4. Complete the following reactions :





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5. How the following conversions can be carried out ?

(i) But-1-ene to n-butyl iodide

(ii) Tert-butyl bromide to isobutyl bromide

(iii) Ethanol to but-1-yne



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6. Write short notes on :

(i) Wurtz-Fittig reaction

(ii) Fittig reaction

(iii) Dehydrohalogenation reaction



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7. An organic compound 'A' having molecular formula C_4H_8 on treatment with dil. H_2SO_4 give another compound 'B'. B on treatment with conc. HCl and anhy. $ZnCl_2$ gives 'C'. C on treatment with sodium ethoxide gives back 'A'.

Identify the compound. Write the equations involved.

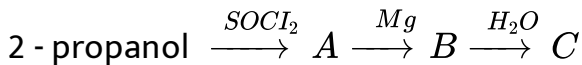
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8. What happens when :

- (i) 1-bromopropane reacts with metallic sodium.
- (ii) Bromoethane is treated with caustic potash.
- (iii) Iodomethane is treated with ammonia.

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9. Identify A, B and C :



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10. Account for the following :

(i) A small amount of ethyl alcohol is added to CHCl_3 stored for use as an anaesthetic.

(ii) After using CCl_4 as a fire extinguisher inside a closed space, the space is thoroughly ventilated.

(iii) When 2-chloro-3-methylbutane is treated with alcoholic potash, 2-methyl-2-butene is the main product.

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11. How will you distinguish between

(i) Vinyl chloride and ethyl chloride

(ii) Chlorobenzene and cyclohexyl chloride

(iii) Ethyl chloride and ethyl bromide ?

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12. Explain the following :

(i) The dipole moment of chloroethane is higher than that of chlorobenzene.

(ii) Although haloalkane are polar in character yet they are insoluble in water.

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13. p-chloronitrobenzene undergoes nucleophilic substitution faster than chlorobenzene. Give reason.

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14. (i) What are ambident nucleophiles ? Explain with an example.
(ii) Convert ethyl bromide to diethyl ether.

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15. (a) A hydrocarbon 'A' (C_4H_8) is added with HBr in accordance with Markovnikov's rule to give compound 'B' which on hydrolysis with aqueous alkali forms tertiary alcohol 'C' ($C_4H_{10}O$). Identify A, B and C.

(b) Convert chlorobenzene into phenol.

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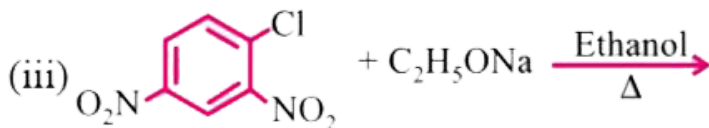
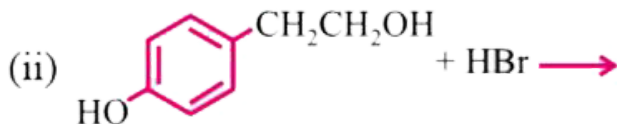
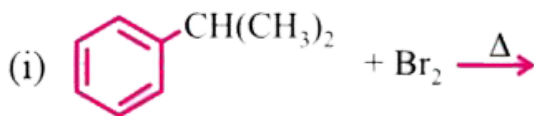
16. Predict the alkenes that would be formed by dehydrohalogenation with sodium ethoxide and ethanol. Predict major alkenes :

(a) 2-chloro-2-methylbutane

(b) 3-bromo-2, 2, 3-trimethylpentane

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17. Write the structure of major product in each of the following :



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18. Write the main products when :

- (i) n-butyl chloride is treated with alcoholic KOH
- (ii) 2, 4, 6-trinitrochlorobenzene is subjected to hydrolysis.
- (iii) Methyl chloride is treated with AgCN.



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Long Answer Type Questions 5 Marks

1. How would you bring about the following conversions :

- (i) Propene to 2-bromopropane
- (ii) Bromoethane to propanoic acid
- (iii) 1-chloropropane to 1-propanol
- (iv) Ethanol to chloroethane
- (v) 1-iodopropane to propene



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2. What happens when : (Give chemical reactions)

(i) Cyclohexanol is treated with thionyl chloride

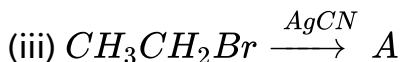
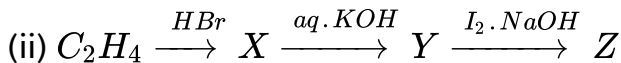
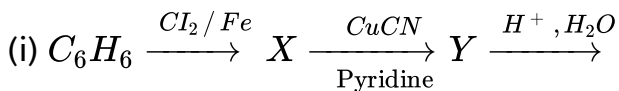
(ii) p-hydroxybenzyl alcohol is heated with HCl.

(iii) Ethyl bromide is refluxed with NaI in acetone.



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3. Complete the following reactions :



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4. Alkyl halides are insoluble in water though they contain a polar C - X bond.why?

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5. Iodoform gives a precipitate with $AgNO_3$ on heating while $CHCl_3$ does not. ?

Why ?

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Conceptual Questions

1. Why haloalkanes are more reactive than haloarenes?

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2. Why do haloalkenes under go nucleophilic substitution whereas haloarenes under go electrophilic substitution

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3. When an alkyl halide is treated with ethanolic solution of KCN, the major product is alkyl cyanide where as if alkyl halide is treated with AgCN, the major product is alkyl isocyanide?

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4. 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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5. Explain why vinyl chloride is unreactive in nucleophilic substitution reaction?

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

4-nitrochlorobenzene > 2,4 dinitrochlorobenzene > 2,4,6, trinitrochlorobenzene with CH_3O^-Na

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7. Why Grignard reagent should be prepared under anhydrous conditions?

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8. Why is Sulphuric acid not used during the reaction of alcohols with KI?



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9. p-dichlorobenzene has highest m.p. than those of ortho and m-isomers?



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10. Give reasons:

(i) C-Cl bond length in chlorobenzene is shorter than C-Cl bond in CH_3Cl .

(ii) The dipole moment of chlorobenzene is lower than that of cyclohexyl chloride

(iii) SN_1 reactions are accompanied by racemization in optically active alkyl halides



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