Revision Chemistry

A complete Revision material for class XII as per new syllabus of NCERT

Revision Booket-4 (Organic Chemistry) [18 Marks]

- **Reasoning Based Questions (6 marks)**
- **Mechanism Based Questions (2-3marks)**
- **Chemical Test to distinguish between pair of Organic Compounds (2-3marks)**
- **Name Reactions Based (2-3marks)**
- **IUPAC Nomenclature (2 Marks)**
- **Word Problem (Reaction Based) (3 Marks)**
- **Conversions (2-3marks)**
- **Complete The Reactions (2-3marks)**

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Reasoning Based Questions (6 marks)

UNIT: 10 Haloalkanes and Haloarenes.

1. Sulphuric acid is not used during the reaction of alcohols with KI.
2. Alkyl halides are generally not prepared in laboratory by free radical halogenations of alkanes.
3. The boiling points of alkyl halides decrease in the order: RI > RBr > RCl > RF.
4. **Haloalkanes have higher boiling points as compared to those of corresponding alkanes.**
5. **The dipole moment of chlorobenzene is lower than that of cyclohexyl chloride.**
6. **Alkyl halides, though polar, are immiscible with water.**
7. **Grignard reagents should be prepared under anhydrous conditions.**
8. **Aryl halides are extremely less reactive towards Nucleophilic Substitution reactions**.
9. p - nitro chlorobenzene undergoes nucleophilic substitution faster than chlorobenzene
10. **The treatment of alkyl chlorides with aq.KOH leads to the formation of alcohols but in the presence of alc.KOH alkenes are major products.**
11. **Haloalkanes react with KCN to form alkyl cyanides as main product while AgCN forms isocyanides as main product.**
12. Allyl chloride is more reactive than n - propyl chloride towards nucleophilic substitution reaction.
13. **P-Dichlorobenzene has higher m.p and solubility than those of o- and m- isomers.**
14. Chloroform is stored in closed dark coloured bottles.
15. **Although chlorine is an electron withdrawing group, yet it is *ortho*-, *para*- directing in electrophilic aromatic substitution reactions.**

UNIT: 11 ALCOHOLS,PHENOLS & ETHERS

1. **Phenols not undergo Nucleophilic substitution reaction easily but undergo elecrophilic substitution reaction easily at ortho and para positions.**
2. **In Phenol, the –OH group activates the benzene ring towards elecrophilic substitution and directs the substituents to Ortho and para positions in benzene ring.**
3. The –OH group in phenols is more strongly held as compared to –OH group in alcohols.
4. **Phenol does not undergo protonation easily.**
5. **Nitration is an example of aromatic electrophonic substitution and its rate depends upon the group already present in the benzene ring.Out of benzene and phenol which one is more easily nitrated and why?**
6. The carbon –oxygen bond in phenol is slightly stronger than in methanol
7. In Kolbe's reaction instead of phenol phenoxide ion is treated with carbon dioxide.why
8. **Phenol is more acidic than alcohols(Ethanol)**
9. The presence of electron withdrawing groups such as nitro group enhances the acidic strength of phenol.
10. The presence of electron releasing groups such as alkyl group decreases the acidic strength of phenol.
11. **Ortho – nitrophenol is more acidic than Ortho – methoxyphenol.**
12. **Out of 2-Chloroethanol & ethanol which is more acidic & why?**
13. The acid strength of alcohols decreases in the following order:$1^o>2^o>3^o$.
14. Arrange the following compounds in increasing order of acidity and give a suitable explanation. Phenol, o-nitrophenol,o-cresol
15. Arrange the following compounds in increasing order of acidity and give a suitable explanation.Phenol,water & Alcohol.
16. **Out of o-nitrophenol & o-cresol which is more acidic & why**
17. Arrange the following compounds in increasing order of acidity H_2O,ROH.$CH\equiv CH$.
18. **Phenol has small dipole moment than methanol.**
19. **O-nitrophenol has lower boiling point than p-nitrophenol**
20. Out of o-nitrophenol & p-nitrophenol which is more volatile & why
21. **O-nitrophenol is steam volatile whereas p-nitrophenol is not.**

22. **Alcohols are comparatively more soluble in water than the corresponding hydrocarbons**
23. **Propanol has higher boiling point than that of the hydrocarbon, butane.**
24. Lower alcohols are soluble in water, higher alcohols are not.
25. The boiling point of alcohols and phenols increase with increase in number of carbon atoms.
26. In alcohols the boiling point decreases with increase in branching.
27. The boiling point of alcohols & phenols are higher in comparison to hydrocarbons, ethers, haloalkanes.
28. Thionyl chloride preferred over PCl_5 in nucleophilic substitution Rx^n to convert alcohol to alkyl halide.
29. Among HI, HBr, HCl, HI is most reactive towards alcohol.
30. Out of ethanol and propanol, ethanol gives iodoform test whereas propanol does not do so.
31. The reactivity of all the three classes of alcohols with Lucas reagent is different.
32. **In aryl alkyl ethers (i) the alkoxy group activates thebenzene ring towards electrophilic substitution and (ii) it directs the incoming substituents to ortho and para positions in benzene ring..**
33. **Preparation of ethers by acid dehydration of secondary or tertiary alcohols is not a suitable method.**
34. O=C=O is nonpolar while R-O-R is polar.
35. **Ethers can be prepared by Williamson synthesis in which alkyl halide is reacted with sodium alkoxide.Di-tert butyl ether can't be prepared by this method.why**

UNIT: 12 Aldehydes,Ketones & Carboxylic acids

1. **Aldehydes are more reactive than Ketones towards Nucleophilic addition reaction**
2. **Cyclohexanone forms cyanohydrin in good yield but 2,2,6 – tri methylcyclohexanone does not.**
3. **Arrange the following compounds in increasing order of their reactivity in nucleophilic addition reactions.with reasons**
   - **(i) Ethanal, Propanal, Propanone, Butanone.**
   - **(ii) Benzaldehyde, *p*-Tolualdehyde, *p*-Nitrobenzaldehyde, Acetophenone.**
   - **(iii) Acetaldehyde, Acetone, Di-*tert*-butyl ketone, Methyl *tert*-butyl ketone**
4. **Would you expect benzaldehyde to be more reactive or less reactive in nucleophilic addition reactions than propanal.**
5. **Aldehydes and Ketones have lower boiling point than alcohols.**
6. **The boiling points of aldehydes and ketones are higher than hydrocarbons and ethers of comparable molecular masses.**
7. Why is there a large difference in the boiling points of butanal and butan-1-ol?
8. The lower members of aldehydes and ketones such as methanal,ethanal and propanone are miscible with water in all proportions.
9. **There are two – NH_2 group in semi carbazide however only one is involved in the formation of semi carbazones.**
10. **It is necessary to control the pH during the reaction of aldehydes and ketones with ammonia derivatives.**
11. **o-hydroxybenzaldehyde is a liquid at room temperature while p-hydroxybenzaldehyde is a high melting solid.**
12. Formaldehyde does not take part in Aldol condensation.
13. Benzaldehyde gives a positive test with Tollens reagent but not with Fehling and Benedict's solution.
14. **Carboxylic acids are more acidic than phenols.**
15. **Carboxylic acids are more acidic than alcohols or phenols although all of them have hydrogen atom attached to a oxygen atom (—O—H)**
16. Electron withdrawing groups increase the acidity of carboxylic acids.
17. Electron donating groups decrease the acidity of carboxylic acids.
18. **Formic acid is stronger acid than acetic acid**
19. **Chloroacetic acid is stronger than acetic acid.**
20. **Arrange the following compounds in increasing order of acid strength**
   - **(i) CH_3CH_2OH, CH_3COOH, $ClCH_2COOH$, FCH_2COOH, $C_6H_5CH_2COOH$**
   - **(ii) C_6H_5COOH, FCH_2COOH, NO_2CH_2COOH**

(iii) $CH_3CH_2CH(Br)COOH$, $CH_3CH(Br)CH_2COOH$, $(CH_3)_2CHCOOH$,$CH_3CH_2CH_2COOH$
(iv) Benzoic acid, 4-Nitrobenzoic acid, 3,4-Dinitrobenzoic acid, 4-Methoxybenzoic acid

21. **Which acid of each pair shown here would you expect to be stronger?(i) CH_3CO_2H or CH_2FCO_2H (ii) CH_2FCO_2H or CH_2ClCO_2H(iii) $CH_2FCH_2CH_2CO_2H$ or $CH_3CHFCH_2CO_2H$. .**
22. **Carboxylic acids are higher boiling liquids than aldehydes, ketones and even alcohols of comparable molecular masses.**
23. Aliphatic carboxylic acids having upto four carbon atoms are miscible in water
24. **During the preparation of esters from a carboxylic acid and an alcohol in the presence of an acid catalyst, the water or the ester should be removed as fast as it is formed.**
25. **HCOOH does not give HVZ (Hell Volhard Zelinsky) reaction but CH_3COOH does.**
26. **Carboxyl group in benzoic acid is meta directing**
27. Melting Point of an acid with even number of carbon atoms higher than those of its neighbours with odd number of carbon atoms
28. Carboxylic acids do not give the characteristic reactions of carbonyl group.
29. **Carboxylic acids contain carbonyl group but do not show the nucleophilic addition reaction like aldehydes or ketones.**

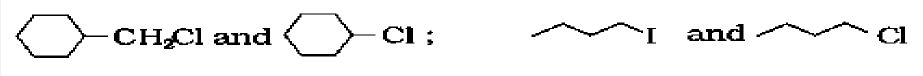
UNIT: 13 AMINES

1. **Amines are less acidic than alcohols of comparable molecular masses.**
2. **Primary amines have higher boiling point than tertiary amines?**
3. **Aromatic primary amines cannot be prepared by Gabriel phthalimide synthesis?**
4. **Gabriel phthalimide synthesis is preferred for synthesising primary amines.**
5. **Ethylamine is soluble in water whereas aniline is not.**
6. Aniline is soluble in aqueous HCl?
7. **Methylamine in water reacts with ferric chloride to precipitate hydrated ferric oxide**.
8. Although amino group is *o*– and *p*– directing in aromatic electrophilic substitution reactions, aniline on nitration gives a substantial amount of *m*-nitroaniline.
9. Direct nitration of aniline is not carried out. Explain why?
10. NH_2 group of aniline acetylated is before carrying out nitration?
11. Aniline does not undergo Friedel-Crafts reaction.
12. Benzene diazonium chloride is not stored and is used immediately after its preparation?
13. Diazonium salts of aromatic amines are more stable than those of aliphatic amines.
14. The presence of a base is needed in the ammonolysis of alkyl halides.
15. The observed K_b order $Et_2NH \rangle Et_3N \rangle EtNH_2$in aqueous solution .where Et is ethyl
16. Aliphatic amines are stronger bases than aromatic amines?
17. $MeNH_2$ is stronger base than MeOH?
18. **p*Kb* of aniline is more than that of methylamine.**
19. **Arrange the following in increasing order of basic strength**
    a. $C_2H_5NH_2$, $C_6H_5NHCH_3$, $(C_2H_5)_2NH$ and $C_6H_5NH_2$
    b. Aniline, *p*-nitroaniline and *p*-toluidine
    c. $C_6H_5NH_2$, $C_2H_5NH_2$, $(C_2H_5)_2NH$, NH_3
    d. $C_2H_5NH_2$, $(C_2H_5)_2NH$, $(C_2H_5)_3N$,NH_3
    e. $C_2H_5NH_2$, $C_6H_5NHCH_3$, $(C_2H_5)_2NH$, $C_6H_5NH_2$
    f. $C_6H_5NH_2$, $C_6H_5NH(CH_3)_2$, $(C_2H_5)_2NH$,CH_3NH_2
    g. $C_6H_5NH_2$, $C_6H_5N(CH_3)_2$, $(C_2H_5)_2NH$ and CH_3NH_2
    h. $C_6H_5NH_2$, $C_6H_5NHCH_3$, $C_6H_5CH_2NH_2$.
    i. $(C_2H_5)_2NH$, $(C_2H_5)_3N$, $C_2H_5NH_2$ NH_3
    j. $(CH_3)_2NH$, CH_3NH_2 ,$(CH_3)_3N$,NH_3

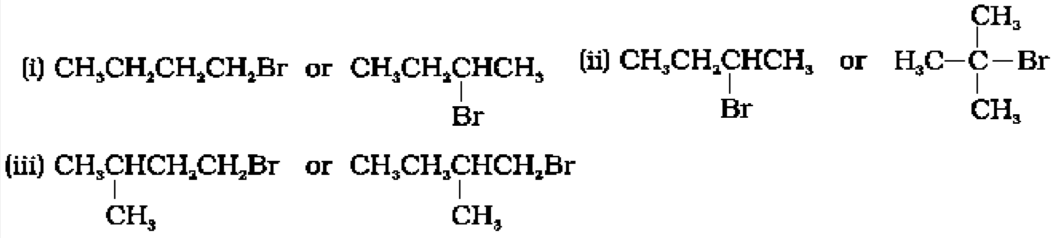
Mechanism Based Questions (2-3marks)

UNIT: 10 Haloalkanes and Haloarenes.

1. Explain the S_N1 & S_N2 mechanism with suitable examples.
2. In the following pairs of halogen compounds, which would undergo S_N2 reaction faster?



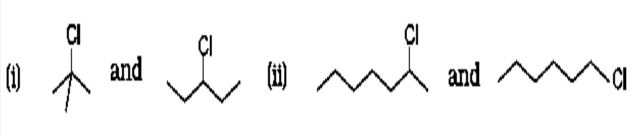
3. Predict the order of reactivity of the following compounds in S_N1 and S_N2 reactions:
   (i)The four isomeric bromobutanes
   (ii) $C_6H_5CH_2Br$, $C_6H_5CH(C_6H_5)Br$, $C_6H_5CH(CH_3)Br$, $C_6H_5C(CH_3)(C_6H_5)Br$
4. Which alkyl halide from the following pairs would you expect to react more rapidly by an S_N2 mechanism? Explain your answer.

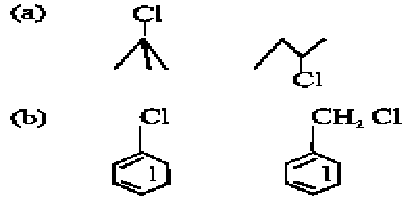


(i) $CH_3CH_2CH_2CH_2Br$ or $CH_3CH_2\underset{Br}{\underset{|}{C}}HCH_3$ (ii) $CH_3CH_2\underset{Br}{\underset{|}{C}}HCH_3$ or $H_3C-\overset{CH_3}{\overset{|}{\underset{CH_3}{\underset{|}{C}}}}-Br$

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

5. In the following pairs of halogen compounds, which compound undergoes faster S_N1 reaction?





6. 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
7. Write the mechanism of the following reaction:

$$nBuBr + KCN \xrightarrow{EtOH-H_2O} nBuCN$$

8. 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, 3-Bromo-2-methylbutane
   (iii) 1-Bromobutane, 1-Bromo-2,2-dimethylpropane, 1-Bromo-2-methylbutane, 1-Bromo-3-methylbutane

UNIT: 11 ALCOHOLS,PHENOLS & ETHERS

1. Give mechanism for the Hydration of alkenes
2. Give mechanism for the acidic Dehydration of alcohols to give alkenes..Or Write the mechanism of acid dehydration of ethanol to yield ethene.
3. Give mechanism for the acidic Dehydration of alcohols to give ethers or Give mechanism of preparation of ethoxyethane from ethanol.
4. Give mechanism for the addition Grignard reagent on carbonyl compounds.
5. Give mechanism for the reaction of HI on methoxymethane.

UNIT: 12 Aldehydes,Ketones & Carboxylic acids

1. Give mechanism for Nucleophilic addition reaction in carbonyl compounds.
2. Write the mechanism of reaction between actetaldehyde and HCN.
3. Arrange the following compounds in increasing order of their reactivity in nucleophilic addition reactions.with reasons

- (i) Ethanal, Propanal, Propanone, Butanone.
- (ii) Benzaldehyde, *p*-Tolualdehyde, *p*-Nitrobenzaldehyde, Acetophenone.
- (iii) Acetaldehyde, Acetone, Di-*tert*-butyl ketone, Methyl *tert*-butyl ketone

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Chemical Test to distinguish between pair of Organic Compounds (2-3marks)

UNIT: 10 Haloalkanes and Haloarenes.

1. Ethyl bromide & Bromobenzene
2. Ethyl bromide & Vinyl chloride
3. **Chlorobenzene & n-hexyl chloride**
4. Chlorobenzene & chlorocyclohexane
5. Chlorobenzene and Benzylchloride
6. Bromobenzene and Benzylbromide

UNIT: 11 ALCOHOLS,PHENOLS & ETHERS

7. Methanol and Ethanol
8. Propanol and Propan-2-ol
9. 2-Methyl Propan-2-ol and Propanol
10. Phenol and Cyclohexanol
11. 1^0,2^0,&3^0 Alchols
12. **Phenol and Benzoic acid**

UNIT: 12 Aldehydes,Ketones & Carboxylic acids

13. **Propanal and Propanone**
14. **Acetophenone and Benzophenone**
15. **Phenol and Benzoic acid**
16. **Benzoic acid and Ethyl benzoate**
17. **Pentan-2-one and Pentan-3-one**
18. **Benzaldehyde and Acetophenone**
19. **Ethanal and Propanal**
20. **Acetone and Acetaldehyde**
21. **Acetaldehyde and Benzaldehyde**
22. **Ethanoic acid and Ethnoyl chloride**
23. **Formic acid and Acetic acid**

UNIT: 13 AMINES

24. **Methylamine and dimethylamine**
25. **Ethylamine and aniline**
26. **Aniline and benzylamine**
27. **Aniline and N-methylaniline**
28. N-methyl Propane -2-amine and N-ethyl N-methyl ethanamine
29. Secondary and tertiary amines
30. 1^0,2^0,& 3^0 Amines
31. **Describe a method for the identification of primary, secondary and tertiary amines. Also write chemical equations of the reactions involved**

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Name Reactions Based (2-3marks)

UNIT: 10 Haloalkanes and Haloarenes.

1. Wurtz reaction
2. Wurtz-Fittig reaction
3. Fittig reaction
4. Finkelstein reaction
5. Swarts reaction

UNIT: 11 ALCOHOLS,PHENOLS & ETHERS

1. Hydroboration –oxidation reaction
2. **Reimer-Tiemann reaction**
3. **Kolbe's reaction**
4. **Williamson's synthesis**
5. Friedel crafts alkylation in anisole
6. Friedel crafts acetlyation in anisole
7. Esterification

UNIT: 12 Aldehydes,Ketones & Carboxylic acids

1. **Aldol Condensation**
2. Cross Aldol Condensation
3. **Cannizzaro Reaction**
4. **Clemmensen Reaction**
5. **Wolf Kishner Reaction**
6. **Rosenmund Reaction**
7. Etard Reaction
8. Stephen Reaction
9. Ozonolysis
10. Esterification
11. Saponification
12. **Decarboxylation**
13. **Hell Volhard Zelinsky**
14. **Acetylation**

UNIT: 13 AMINES

1. **Hoffmann bromamide degradation reaction**
2. **Gabriel phthalimide synthesis**
3. Ammonolysis
4. **Carbylamine reaction**
5. Acylation
6. Diazotisation
7. Sandmeyers reaction
8. **Gatterman reaction**
9. **Coupling reaction**

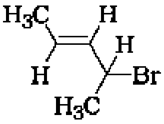
IUPAC Nomenclature Based 1 marks)

Write the structures of the following organic compounds

1. 1-Chloropropane
2. 1-Bromobutane
3. 2-Chloropropane
4. 1-Chloro2-methyl propane
5. 1-Chloro2, 2-dimethyl propane
6. 1, 1, dichloroethane
7. 1, 2, dichloroethane
8. 1-Bromo-2,2-dimethylpropane
9. 2-Bromo-2-methylpropane
10. 1-Chloro-2-methylbenzene or 2-Chlorotoluene
11. Chlorophenylmethane
12. 2-Chloro-3-methylpentane
13. 1-Chloro-4-ethylcyclohexane
14. 4-tert. Butyl-3-iodoheptane
15. 1,4-Dibromobut-2-ene
16. **1-Bromo-4-sec. butyl-2-methylbenzene.**
17. 4-Bromopent-2-ene
18. 3-Bromo-2-methylbut-1-ene
19. 4-Bromo-3-methylpent-2-ene
20. 1-Bromo-2-methylbut-2-ene
21. 1-Bromobut-2-ene
22. 3-Bromo-2-methylpropene
23. 2-Chloro-3-methylpentane
24. 1-Chloro-4-ethylcyclohexane
25. 4-tert-Butyl-3-iodoheptane
26. 1,4-Dibromobut-2-ene
27. Methanol
28. Propan-1-ol
29. Propan-2-ol
30. Butan-1-ol
31. Butan-2-ol
32. 2-Methylpropan-1-ol
33. **2-Methylpropan-2-ol**
34. Propane -1, 2, 3-triol
35. Methoxymethane
36. Ethoxyethane
37. 1-Methoxypropane
38. Methoxybenzene(Anisole)
39. Ethoxybenzene(Phenetole)
40. 1-Phenoxyheptane
41. 2-Methoxypropane
42. 3- Methylbutoxybenzene
43. 1,2-Dimethoxyethane
44. 2-Ethoxy--1,1-dimethylcyclohexane
45. **4-Chloro-2,3-dimethylpentan-1-ol**
46. 2-Ethoxypropane
47. **2,6-Dimethylphenol**
48. 1-Ethoxy-2-nitrocyclohexane
49. 2-Methylbutan-2-ol
50. **1-Phenylpropan-2-ol**
51. **3,5-Dimethylhexane –1, 3, 5-triol**
52. **2,3 – Diethylphenol**
53. 1 – Ethoxypropane
54. 2-Ethoxy-3-methylpentane
55. Cyclohexylmethanol
56. **3-Cyclohexylpentan-3-ol**
57. Cyclopent-3-en-1-ol
58. 3-Chloromethylpentan-1-ol.
59. 3-Chloromethyl-2-isopropylpentan-1-ol
60. **2, 5-Dimethylhexane-1,3-diol**
61. 3-Bromocyclohexanol
62. Hex-1-en-3-ol
63. 2-Bromo-3-methylbut-2-en-1-ol
64. Methanal
65. Ethanal
66. 2-Methylpropanal
67. 3-Methylcyclohexanecarbaldehyde
68. 2-Methoxypropanal
69. Pentanal
70. 3-Bromobenzaldehyde
71. Pentan-2-one
72. 2,4-Dimethylpentan-3-one
73. 2-Methylcyclohexanone
74. **4-Methylpent-3-en-2-one**
75. 3-Hydroxybutanal
76. 2-Hydroxycyclopentane carbaldehyde
77. **4-Oxopentanal**
78. Di-sec. butyl ketone
79. 4-Fluoroacetophenone
80. 3-Phenylpropanoic acid
81. 3-Methylbut-2-enoic acid
82. 3-Methylbutanal
83. *p*-Nitropropiophenone
84. *p*-Methylbenzaldehyde
85. **4-Methylpent-3-en-2-one**
86. **4-Chloropentan-2-one**
87. 3-Bromo-4-phenylpentanoic acid
88. **Hex-2-en-4-ynoic acid**
89. Ethanamine
90. Propan-1-amine
91. Propan-2-amine
92. N-Methylethanamine
93. N,N-Dimethylmethanamine
94. N,N-Diethylbutan-1-amine
95. Prop-2-en-1-amine
96. Hexane-1,6-diamine
97. Aniline or Benzenamine
98. 2-Aminotoluene
99. 4-Bromobenzenamine or 4-Bromoaniline

IUPAC Nomenclature Based (1 marks)

1. Write IUPAC names of the following:

(i)


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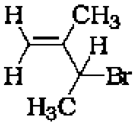

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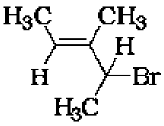

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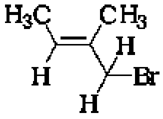

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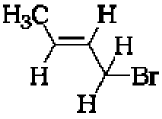
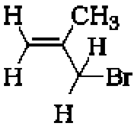
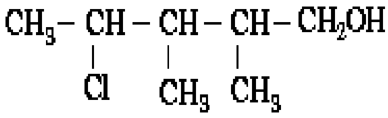
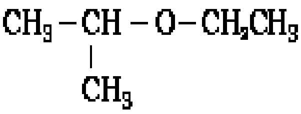


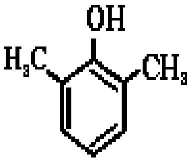
(vi)


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) $(CCl_3)_3CCl$

3. Write IUPAC names of the following:

(i)

$CH_3-\underset{Cl}{CH}-\underset{CH_3}{CH}-\underset{CH_3}{CH}-CH_2OH$

(ii)

$CH_3-\underset{CH_3}{CH}-O-CH_2CH_3$

(iii)


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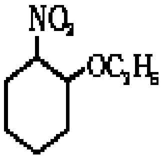
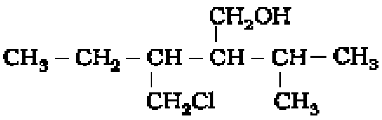
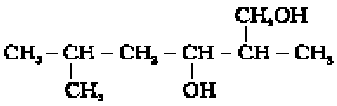
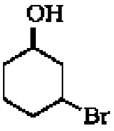
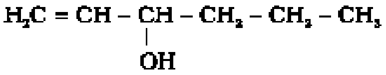


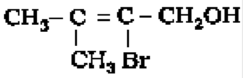
4. Name the following compounds according to IUPAC system.

(i)

$CH_3-CH_2-\underset{CH_2Cl}{CH}-\overset{CH_2OH}{CH}-\underset{CH_3}{CH}-CH_3$

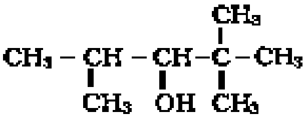
(ii)

$CH_3-\underset{CH_3}{CH}-CH_2-\underset{OH}{CH}-\overset{CH_2OH}{CH}-CH_3$

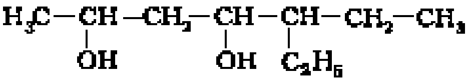
(iii)


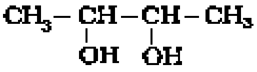
(iv)

$H_2C=CH-\underset{OH}{CH}-CH_2-CH_2-CH_3$

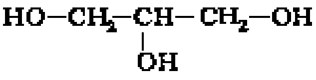
(v)

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

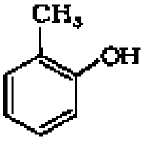
5. Write IUPAC names of the following compounds:

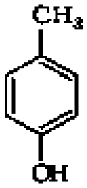
(i)

$CH_3-\underset{CH_3}{CH}-\underset{OH}{CH}-\overset{CH_3}{\underset{CH_3}{C}}-CH_3$

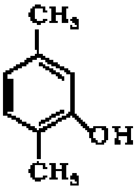
(ii)

$H_3C-\underset{OH}{CH}-CH_2-\underset{OH}{CH}-\underset{C_2H_5}{CH}-CH_2-CH_3$

(iii)

$CH_3-\underset{OH}{CH}-\underset{OH}{CH}-CH_3$

(iv)

$HO-CH_2-\underset{OH}{CH}-CH_2-OH$

(v)


(vi)


(vii)


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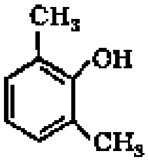
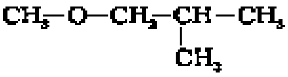
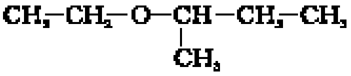


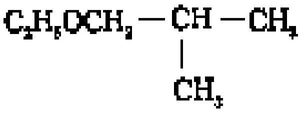
(ix)

$CH_3-O-CH_2-\underset{CH_3}{CH}-CH_3$

(x) $C_6H_5-O-C_2H_5$

(xi) $C_6H_5-O-C_7H_{15}$(n–)

(xii)

$CH_3-CH_2-O-\underset{CH_3}{CH}-CH_2-CH_3$

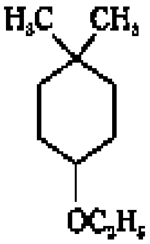
6. Give IUPAC names of the following ethers:

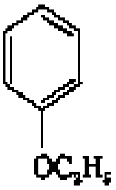
(i) 
$C_2H_5OCH_2-\underset{CH_3}{\underset{|}{CH}}-CH_3$

(ii) $CH_3OCH_2CH_2Cl$

(iii) $O_2N-C_6H_4-OCH_3(p)$

(iv) $CH_3CH_2CH_2OCH_3$

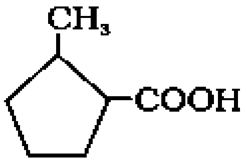
(v) 

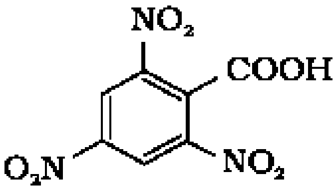
(vi) 

7. Give the IUPAC names of the following compounds:

(i) Ph CH_2CH_2COOH

(ii) $(CH_3)_2C=CHCOOH$

(iii) 

(iv) 

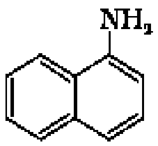
8. Name the following compounds according to IUPAC system of nomenclature:

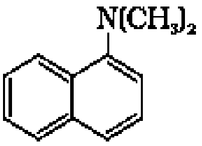
(i) $CH_3CH(CH_3)CH_2CH_2CHO$
(ii) $CH_3CH_2COCH(C_2H_5)CH_2CH_2Cl$
(iii) $CH_3CH=CHCHO$
(iv) $CH_3COCH_2COCH_3$
(v) $CH_3CH(CH_3)CH_2C(CH_3)_2COCH_3$
(vi) $(CH_3)_3CCH_2COOH$
(vii) $OHCC_6H_4CHO$-*p*
(viii) $CH_3CO(CH_2)_4CH_3$
(ix) $CH_3CH_2CHBrCH_2CH(CH_3)CHO$
(x) $CH_3(CH_2)_5CHO$
(xi) Ph-CH=CH-CHO
(xii) PhCOPh

9. Write IUPAC names of the following compounds and classify them into primary,secondary and tertiary amines.

a. $(CH_3)_2CHNH_2$
b. $CH_3(CH_2)_2NH_2$
c. $CH_3NHCH(CH_3)_2$
d. $(CH_3)_3CNH_2$
e. $C_6H_5NHCH_3$
f. $CH_3CH_2)_2NCH_3$
g. *m*–$BrC_6H_4NH_2$

10. Classify the following amines as primary, secondary or tertiary:

(i) 

(ii) 

(iii) $(C_2H_5)_2CHNH_2$

(iv) $(C_2H_5)_2NH$

Conversion Based Questions (2 marks)

Write the reactions and the conditions involved in the conversion of:

(i) Propene to Propan-1-ol (ii) Phenol to Salicylic acid (iii)Acetophenone to 2-Phenyl -butan-2-ol

(iv) Nitrobenzene to Aniline (v)Aniline to benzonitrile (vi)Primary alcohol to an aldehyde

(vii) Butan-2-one to butan-2-ol (viii) Phenol to 2,4,6 –tribromophenol

(ix)Ethyl magnesium chloride to propan-1-ol (x)Benzyl chloride to benzyl alcohol

(xi) Ethanol to 3-hydroxy butanal (xii)Benzaldehyde to Benzophenone

(xii)Toluene to Benzaldehyde (xiii) Ethylbenzene to benzoic acid

(xiv)Propanone to Propene (xv)Ethanal to but-2-ene

(xvi)Butanol to butanoic acid (xvii)Phenol to benzoquinone

(xviii)Methymagnesium bromide to 2-Methylpropan-2-ol

(xix)Aniline to nitrobenzene (xx)Ethanamine to N-Ethylethnamide

(xxi)Chloroethane to Propan-1-amine (xxii)Benzene to benzaldehyde

(xxiii) Benzene to Acetophenone (xxiv) Benzaldehyde to m-nitrobenzylalcohol

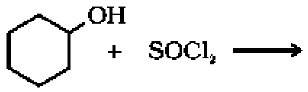
Word problems of Organic Chemistry (2 marks)

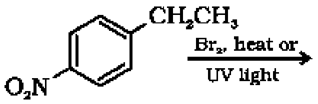
1. An aromatic compound **A** on treatment with aqueous ammonia and heating forms compound **B** which on heating with Br_2 and KOH forms compound **C** of molecular formula C_6H_7N .Write the structures and IUPAC names of compounds **A,B,C**.
2. An organic compound **A** with molecular formula $C_8H_{16}O_2$ was hydrolysed with sulphuric acid to give a carboxylic acid **B** and alcohol **C**. Oxidation of **C** with chromic acid produced **B. C** on dehydration gives but-1-ene.Write reactions involved.
3. An organic compound **A** which has a characteristic odour on treatment with NaOH forms two compounds **B** and **C**. Compound B has a molecular formula C_7H_8O which on oxidation gives back compound A. Compound **C** is sodium salt of acid. **C** when heated with sodalime yields an aromatic hydrocarbon **D**. Deduce structures **A-D** .
4. A compound '**X**' (C_2H_4O) on oxidation gives '**Y**' ($C_2H_4O_2$). '**X**' undergoes haloform reaction. On treatment with HCN '**X**' forms a product '**Z**' which on hydrolysis gives 2- hydroxy propanoic acid. (i) Write down structures of 'X' and '**Y**'. (ii) Name the product when '**X**' reacts with dil NaOH. (iii) Write down the equations for the reactions involved.
5. 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 reactions for all.
6. .An organic compound (**A**) with molecular formula C_8H_8O forms an orange-red precipitate with 2,4-DNP reagent and gives yellow precipitate on heating with iodine in the presence of sodium hydroxide. It neither reduces Tollens' or Fehlings' reagent, nor does it decolourise bromine water or Baeyer's reagent. On drastic oxidation with chromic acid, it gives a carboxylic acid (**B**) having molecular formula $C_7H_6O_2$. Identify the compounds A and **B** and explain the reactions involved.
7. . An organic compound with the molecular formula $C_9H_{10}O$ forms 2,4-DNP derivative, reduces Tollens' reagent and undergoes Cannizzaro reaction. On vigorous oxidation, it gives 1,2-benzenedicarboxylic acid. Identify the compound.

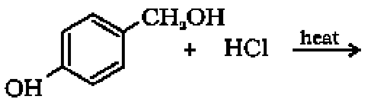
Complete the Organic Reactions (2-3 marks)

1.

Draw the structures of major monohalo products in each of the following reactions:

(i)


(ii)


(iii)


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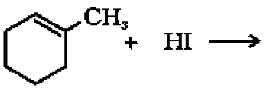
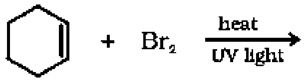


(v) $CH_3CH_2Br + NaI \longrightarrow$

(vi)


2.

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

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

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

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

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

(v) $C_6H_5ONa + C_2H_5Cl \longrightarrow$

(vi) $CH_3CH_2CH_2OH + SOCl_2 \longrightarrow$

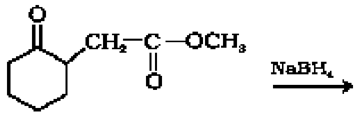
(vii) $CH_3CH_2CH = CH_2 + HBr \xrightarrow{peroxide}$

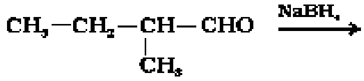
viii) $CH_3CH = C(CH_3)_2 + HBr \longrightarrow$

3.

Write structures of the products of the following reaction:

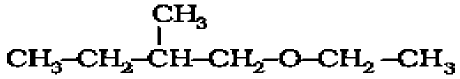
(i) $CH_3 - CH = CH_2 \xrightarrow{H_2O/H^+}$

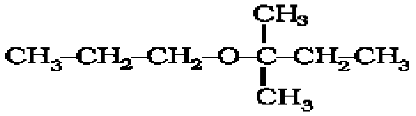
(ii)


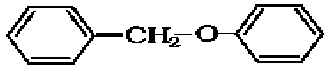
(iii)

$CH_3-CH_2-\underset{\displaystyle CH_3}{CH}-CHO \xrightarrow{NaBH_4}$

4.

Give the major products that are formed by heating each of the following ethers with HI.

(i)

$CH_3-CH_2-\overset{\displaystyle CH_3}{CH}-CH_2-O-CH_2-CH_3$

(ii)

$CH_3-CH_2-CH_2-O-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{C}}-CH_2CH_3$

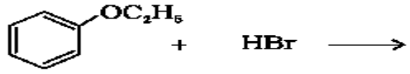
(iii)


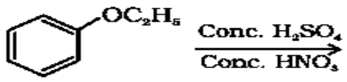
5.

Predict the products of the following reactions:

(i) $CH_3-CH_2-CH_2-O-CH_3 + HBr \rightarrow$ (ii) $(CH_3)_3C\text{-}OC_2H_5 \xrightarrow{HI}$

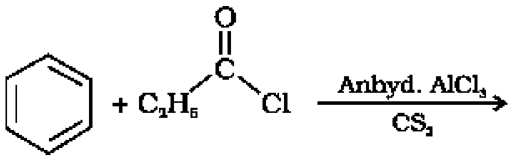
(iii)





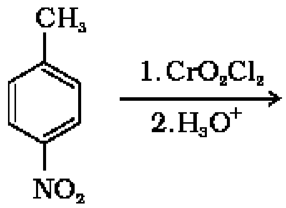
6.

Write the structures of products of the following reactions

(i) 

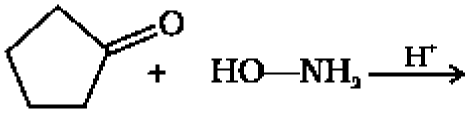
(ii) $(C_6H_5CH_2)_2Cd + 2\ CH_3COCl \rightarrow$

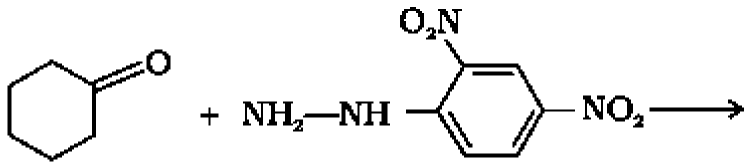
(iii) $H_3C-C\equiv C-H \xrightarrow{Hg^{2+},\ H_2SO_4}$

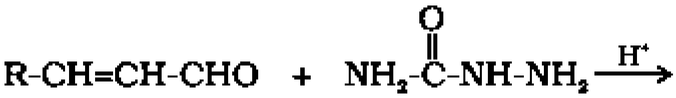
(iv) 

7.

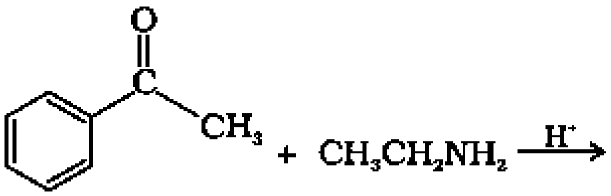
Predict the products of the following reactions:

(i) 

(ii) 

(iii) 

$$R\text{-}CH{=}CH\text{-}CHO + NH_2\text{-}\overset{\overset{O}{\|}}{C}\text{-}NH\text{-}NH_2 \xrightarrow{H^+}$$

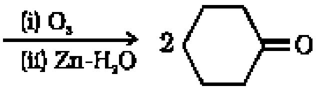
(iv) 

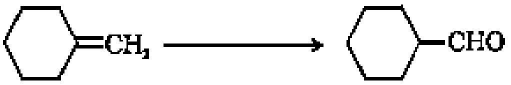
8.

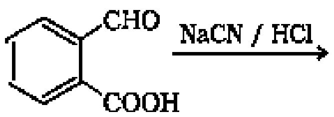
Complete each synthesis by giving missing starting material, reagent or products

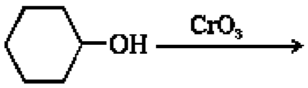
1 $C_6H_5CHO \xrightarrow{H_2NCONHNH_2}$

2 $C_6H_5CHO + CH_3CH_2CHO \xrightarrow{dil.NaOH}$

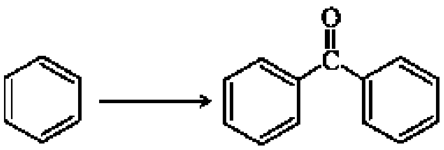
3 

4 

5 

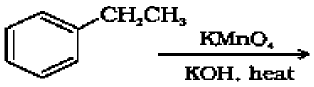
6 

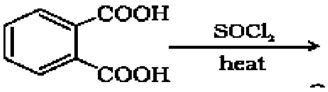
7 $CH_3COCH_2COOC_2H_5 \xrightarrow[(ii)\ H^+]{(i)\ NaBH_4}$

8 

9.

Complete each synthesis :

1 

2 

10.

Give the structures of A, B and C in the following reactions:

(i) $CH_3CH_2I \xrightarrow{NaCN} A \xrightarrow[\text{Partial hydrolysis}]{OH^-} B \xrightarrow{NaOH+Br_2} C$

(ii) $C_6H_5N_2Cl \xrightarrow{CuCN} A \xrightarrow{H_2O/H^+} B \xrightarrow[\Delta]{NH_3} C$

(iii) $CH_3CH_2Br \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B \xrightarrow[0^\circ C]{HNO_2} C$

(iv) $C_6H_5NO_2 \xrightarrow{Fe/HCl} A \xrightarrow[273K]{NaNO_2+HCl} B \xrightarrow[\Delta]{H_2O/H^+} C$

(v) $CH_3COOH \xrightarrow[\Delta]{NH_3} A \xrightarrow{NaOBr} B \xrightarrow{NaNO_2/HCl} C$

(vi) $C_6H_5NO_2 \xrightarrow{Fe/HCl} A \xrightarrow[273K]{HNO_2} B \xrightarrow{C_6H_5OH} C$

11.

Complete the following reactions:

(i) $C_6H_5NH_2 + CHCl_3 + alc.KOH \rightarrow$

(ii) $C_6H_5N_2Cl + H_3PO_2 + H_2O \rightarrow$

(iii) $C_6H_5NH_2 + H_2SO_4\ (conc.) \rightarrow$

(iv) $C_6H_5N_2Cl + C_2H_5OH \rightarrow$

(v) $C_6H_5NH_2 + Br_2\ (aq) \rightarrow$

(vi) $C_6H_5NH_2 + (CH_3CO)_2O \rightarrow$

(vii) $C_6H_5N_2Cl \xrightarrow[(ii) NaNO_2/Cu,\Delta]{(i) HBF_4}$