

UNIT TEST - 4

Class XII

CHEMISTRY

Time : 1½ hrs

SET - A

Marks : 40

SECTION - A

7 × 1 = 7

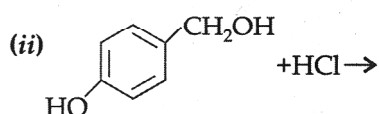
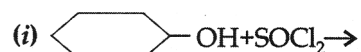
- The most suitable reagent for the conversion of $\text{RCH}_2\text{OH} \rightarrow \text{RCHO}$ is
 - $\text{K}_2\text{Cr}_2\text{O}_7$
 - CrO_3
 - KMnO_4
 - PCC
- Conversion of phenol to salicylic acid and to salicylaldehyde are known as (respectively)
 - Reimer-Tiemann reaction and Kolbe's reaction
 - Williamson's synthesis and Hydroboration-oxidation
 - Kolbe's reaction and Williamson's synthesis
 - Kolbe's reaction and Reimer-Tiemann reaction
- An alcohol X when treated with hot conc. H_2SO_4 gave an alkene Y with formula C_4H_8 . This alkene on ozonolysis gives single product with molecular formula $\text{C}_2\text{H}_4\text{O}$. The alcohol is
 - butan-1-ol
 - butan-2-ol
 - 2-methylpropan-1-ol
 - 2, 2-dimethylbutanal-1-ol
- Addition of water to alkynes occurs in acidic medium and in the presence of Hg^{2+} ions as a catalyst. Which of the following products will be formed on addition of water to but-1-yne under these conditions.
 - $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CHO}$
 - $\text{CH}_3 - \text{CH}_2 - \text{CO} - \text{CH}_3$
 - $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{COOH} + \text{CO}_2$
 - $\text{CH}_3 - \text{COOH} + \text{H} - \text{COOH}$
- Which is the most suitable reagent for the following conversion?
$$\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CO} - \text{CH}_3 \rightarrow \text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_2 - \text{COOH}$$
 - Tollen's reagent
 - Benzoyl peroxide
 - I_2 and NaOH solution
 - Sn and NaOH solution
- CH_3CHO & $\text{C}_6\text{H}_5\text{CH}_2\text{CHO}$ can be distinguished chemically by
 - Benedict's test
 - Iodoform test
 - Tollen's reagent test
 - Fehling's solution test
- Which of the following on treatment with 50% aq. Solution of NaOH yields the corresponding alcohol and the acid by disproportionation and the reaction is called.
 - CH_3COCH_3 , aldol condensation
 - $\text{C}_6\text{H}_5\text{CH}_2\text{CHO}$, Claisen's reaction
 - $\text{C}_6\text{H}_5\text{CHO}$, Cannizzaro's reaction
 - $\text{CH}_3\text{CH}_2\text{CHO}$ Clemmensen reduction

In the following questions (No. 8-9) a statement of Assertion followed by a statement of Reason is given. Choose the correct answer out of the following choices. $2 \times 1 = 2$

- a) If both the assertion and the reason are true and the reason is a correct explanation of the assertion.
- b) If both the assertion and reason are true but the reason is not a correct explanation of the assertion.
- c) Assertion is true but reason is false
- d) Assertion is false but reason is true.
8. Assertion (A) : p-Nitrophenol is more acidic than phenol.
Reason (R) : Nitro group helps in the stabilisation of the phenoxide ion by dispersal of negative charge due to resonance.
9. Assertion (A) : Compounds containing $-CHO$ group are easily oxidised to corresponding carboxylic acids.
Reason (R) : Carboxylic acids can be reduced to alcohol by treatment with $LiAlH_4$.

SECTION - B

10. Complete the following reaction equations : 2



11. How are the following conversions carried out?

- i) Propene to propan-2-ol
- ii) Ethylmagnesium chloride to propan-1-ol. 2

OR

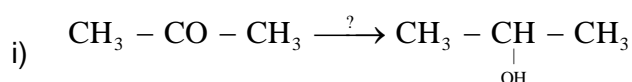
How will you convert the following?

- i) Propan-2-ol to propanone
- ii) Phenol to 2, 4, 6-tribromophenol

12. Write the equations involved in the following reactions :

- i) Wolff-Kishner reduction ii) Etard reaction 2

13. Name the reagents used in the following reactions :



SECTION - C

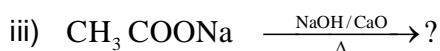
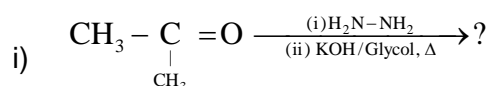
14. Explain the mechanism of the following reactions :

- i) Addition of Grignard's reagent to the carbonyl group of a compound forming an adduct followed by hydrolysis.
- ii) Acid catalysed dehydration of an alcohol forming an alkene.
- iii) Acid catalysed hydration of an alkene forming an alcohol. 3

15. Give reasons for the following :

- i) Phenol is more acidic than methanol.
- ii) The C–O–H bond angle in alcohols is slightly less than the tetrahedral angle ($109^{\circ}28'$).
- iii) $(\text{CH}_3)_3\text{C}-\text{O}-\text{CH}_3$ on reaction with HI gives $(\text{CH}_3)_3\text{C}-\text{I}$ and CH_3-OH as the main products and not $(\text{CH}_3)_3\text{C}-\text{OH}$ and CH_3-I . 3

16. Predict the products of the following reactions :



OR

Do the following conversions in not more than two steps :

- i) Benzoic acid to benzaldehyde
- ii) Ethyl benzene to Benzoic acid
- iii) Propanone to Propene

SECTION - D

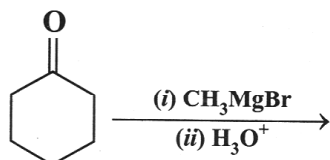
17. Read the passage and answer the questions given below.

Alcohols and phenols are most important compounds used in our daily life. Alcohols are prepared by hydration of alkenes, fermentation of glucose, reduction of aldehydes, ketones, carboxylic acids and esters.

Alcohols are soluble in water. Boiling points increase with increase in molar mass and decrease with branching. Alcohols on dehydration gives alkene at 443 K, follow carbocation mechanism. Excess of alcohol at 413 K on dehydration with conc. H_2SO_4 also follow carbocation mechanism but gives diethyl ether. Alcohols undergo nucleophilic substitution reactions, esterification with carboxylic acids and derivatives like amides, acid halides, acid anhydride. Phenol is prepared from cumene, diazonium salts, anisole, chlorobenzene. Phenol is used to prepare salicylaldehyde, salicylic acid, aspirin, methyl salicylate, *p*-benzoquinone. Phenol undergoes electrophilic substitution reaction at *o* & *p*-position. Ethers are functional isomers of alcohols, have low boiling points. Ethers are used as solvents. Unsymmetrical ethers are prepared by Williamson synthesis. Ethers react with

HI and undergo S_N1 or S_N2 mechanism depending upon stability of carbocation formed. Aromatic ethers like anisole undergoes electrophilic substitution at *o* & *p*-position.

- a) Out of tert, butyl alcohol and *n*-butanol, which will undergo dehydration faster and why? 1
- b) Complete the chemical reaction. 1



- c) Why is C – OH bond length in CH_3OH longer than C – OH bond length in phenol? 1
- d) Why is $\text{R}-\text{O}-\text{H}$ bond angle in alcohol less than tetrahedral bond angles? 1

SECTION - E

18. a) Explain the mechanism of a nucleophilic attack on the carbonyl group of an aldehyde or a ketone.
- b) An organic compound (A) (molecular formula $\text{C}_8\text{H}_{16}\text{O}_2$) was hydrolysed with dilute sulphuric acid to give a carboxylic acid (B) and an alcohol (C). Oxidation of (C) with chromic acid also produced (B). On dehydration (C) gives but-1-ene. Write the equations for the reactions involved. 5

OR

- a) Give chemical tests to distinguish between the following pairs of compounds :
- Benzene amide and 4-aminobenzoic acid
 - Methyl acetate and Ethyl acetate
- b) An organic compound with molecular formula $\text{C}_9\text{H}_{10}\text{O}$ forms 2, 4-DNP derivative and reduces Tollen's reagent and undergoes Cannizzaro's reaction. On vigorous oxidation, it gives 1, 2-benzenedicarboxylic acid. Identify the compound and write chemical equations for the reactions.

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SECTION - A

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- Dehydration of alcohol to ethers is catalysed by
 - conc. H_2SO_4 at 413 K
 - Hot NaOH
 - Hot HBr
 - Hot HNO_3
- An ether is more volatile than alcohol having the same molecular formula. This is due to
 - intermolecular hydrogen bonding in alcohols
 - dipolar character of ethers
 - alcohols, having resonance structures
 - intermolecular hydrogen bonding in ethers
- In the reaction of phenol with CHCl_3 and aqueous NaOH at 343 K, the electrophile attacking the ring is
 - CHCl_3
 - CHCl_2
 - CCl_2
 - COCl_2
- Which of the following compounds is most reactive towards nucleophilic addition reaction?
 - $\text{CH}_3 - \text{COOH}$
 - $\text{CH}_3 - \text{CO} - \text{CH}_3$
 - $\text{C}_6\text{H}_5 - \text{CHO}$
 - $\text{C}_6\text{H}_5 - \text{CO} - \text{CH}_3$
- In Clemmensen Reduction carbonyl compound is treated with
 - Zinc amalgam + HCl
 - Sodium amalgam + HCl
 - Zinc amalgam + nitric acid
 - Sodium amalgam + HNO_3
- The final product (Y) in the following sequence of chemical reaction is
$$\text{CH}_3\text{OH} \xrightarrow[300^\circ\text{C}]{\text{Cu}} \text{X} \xrightarrow{\text{NaOH}} \text{Y} + \text{CH}_3\text{OH}$$
 - An alkene
 - a carboxylic acid
 - an aldehyde
 - sodium salt of carboxylic acid
- The correct order of increasing acid strength of the compounds.
 - CH_3COOH
 - $\text{CH}_3\text{OCH}_2\text{COOH}$
 - CF_3COOH
 - $(\text{CH}_3)_2\text{CHCOOH}$
 - $\text{B} < \text{D} < \text{A} < \text{C}$
 - $\text{D} < \text{A} < \text{C} < \text{B}$
 - $\text{D} < \text{A} < \text{B} < \text{C}$
 - $\text{A} < \text{D} < \text{C} < \text{B}$

In the following questions (No. 8-9) a statement of Assertion followed by a statement of Reason is given. Choose the correct answer out of the following choices. $2 \times 1 = 2$

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- b) If both the assertion and reason are true but the reason is not a correct explanation of the assertion.
- c) Assertion is true but reason is false
- d) Assertion is false but reason is true.
8. Assertion (A) : o-nitrophenol is less soluble in water than the m and p-isomers.
Reason (R) : m- and p-nitrophenols exist as associated molecules.
9. Assertion (A) : Aromatic aldehydes and formaldehyde undergo Cannizzaro reaction.
Reason (R) : Aromatic aldehydes are almost as reactive as formaldehyde.

SECTION - B

10. Write the structures of the products when Butan-2-ol reacts with the following
a) CrO_3 b) SOCl_2 **2**
11. How are the following conversions carried out?
i) Benzyl chloride to benzyl alcohol
ii) Methyl magnesium bromide to 2-methylpropan-2-ol **2**

OR

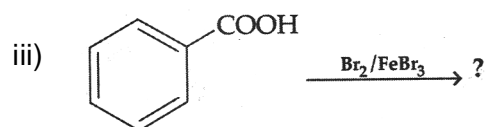
How would you obtain.

- i) Picric acid (2, 4, 6-trinitrophenol) from phenol,
ii) 2-Methylpropene from 2-methylpropanol?
12. Write the reactions involved in the following :
i) Hell-Volhard Zelinsky reaction
ii) Decarboxylation reaction **2**
13. Write the reagents required in the following reactions :
i) $\text{CH}_2 = \text{CH} - \text{CH}_2\text{OH} \xrightarrow{?} \text{CH}_2 = \text{CH} - \text{CHO}$
ii) $\text{CH}_3 - \text{COOH} \xrightarrow{?} \text{CH}_3 - \text{CONH}_2$ **2**

SECTION - C

14. a) Give mechanism of preparation of ethoxy ethane from ethanol.
b) How is toluene obtained from phenol? **3**
15. Explain the following observations :
i) The boiling point of ethanol is higher than that of methoxymethane.
ii) Phenol is more acidic than ethanol.
iii) o- and p-nitrophenols are more acidic than phenol. **3**

16. Predict the products of the following reactions :



3

OR

How would you bring about the following conversions :

- i) Propanone to Propene ii) Benzoic acid to Benzaldehyde
ii) Bromobenzene to 1-phenylethanol

SECTION - D

17. Read the passage and answer the questions given below.

Alcohols play very important role in our daily life. Ordinary spirit used as an antiseptic contains methanol. Ethanol is present in cough syrups, tonics, wine, beer and whisky, Sugar, starch, cellulose are carbohydrates which also contain large number –OH groups. Phenol is also an antiseptic in low concentration (0.2%) where as 2% solution of phenol is used as disinfectant. The fragrance of rose is due to citronellol (unsaturated alcohol). Phenol is used for preparation of many useful compounds like aspirin, methyl salicylate (Iodex) and phenyl salicylate (salol) used as intestinal antiseptic.

- a) How is phenol prepared from cumene? What is advantage of this method? 1
b) How is phenol converted into salicylic acid? 1
c) Distinguish between phenol and benzyl alcohol? 1
d) Why does phenol turn pink after long standing? 1

SECTION - E

18. a) How will you obtain the following :

- i) Benzaldehyde from Phenol ii) Benzoic acid from Aniline

b) Give reasons :

- i) Aldehydes are more reactive than ketones towards nucleophilic reagents.
ii) Electrophilic substitution in benzoic acid takes place at meta position.
iii) Carboxylic acids do not give the characteristic reactions of carbonyl group. 5

OR

a) Give chemical tests to distinguish between the following pairs of compounds :

- i) Benzoic acid and Phenol ii) Benzaldehyde and Acetophenone

b) An organic compound with molecular formula $\text{C}_5\text{H}_{10}\text{O}$ does not reduce Tollen's reagent but forms an addition compound with sodium hydrogen sulphite and gives a positive iodoform test. On vigorous oxidation, it gives ethanoic acid and propanoic acid. Identify the compound and write all chemical equations for the reactions.