	INDIAN SCHOOL AL WADI AL KABIR	
Class: XII	**DEPARTMENT OF SCIENCE 2025– 2026** **SUBJECT: CHEMISTRY**	**Date: 09/05/2025**
Worksheet: 02	**CHAPTER 2: ALCOHOLS, PHENOLS AND ETHERS**	**Note:** **A4 FILE FORMAT**
CLASS & SEC:	**NAME OF THE STUDENT:**	**ROLL NO.**

MULTIPLE CHOICE QUESTIONS (1 MARK EACH)

1. The IUPAC name for anisole is:
a. Methyl phenyl ether
b. Ethoxybenzene
c. Methoxybenzene
d. Phenol

2.Which reaction involves the conversion of phenol to salicylic acid?
a. Friedel-Crafts acylation
b. Kolbe's reaction
c.Williamson synthesis
d.Reimer-Tiemann reaction

3. What type of reaction is involved in the formation of ethers?
a. Nucleophilic unimolecular reaction
b. Nucleophilic bimolecular reaction (SN2)
c. Electrophilic substitution
d. Free radical substitution

4. In the reaction of phenol with NaOH followed by CO_2 and H^+, what is the final product formed?
a. 2-Hydroxybenzoic acid (Salicylic acid)
b. 4-Hydroxybenzoic acid
c. Benzoic acid
d. Phenyl benzoate

5. Which statement best describes the reaction R-X + R'–O–Na+ → R–O–R' + NaX?
a. It's an elimination reaction
b. It's Williamson ether synthesis
c. It's an addition reaction
d. It's a condensation reaction

6. What is the major product formed when anisole reacts with CH_3Cl in presence of anhydrous $AlCl_3$?
a. 2-Methoxytoluene
b. 3-Methoxytoluene
c. 4-Methoxytoluene
d. Pentamethyl benzene

7. What type of hydrogen bonding is present in o-Nitrophenol?
a. Intermolecular hydrogen bonding
b. No hydrogen bonding
c. Intramolecular hydrogen bonding
d. Both inter and intramolecular hydrogen bonding

8.When phenol reacts with $Na_2Cr_2O_7$ and H_2SO_4, what product is formed?
a. Benzaldehyde
b. Benzoic acid
c. Benzoquinone
d. Benzyl alcohol

9. In the mechanism of ether formation, what is the first step?
a. Formation of alkoxide ion
b. Protonation of alcohol
c. Dehydration
d. Nucleophilic attack

10. Assertion (A): $(CH_3)_3C-O-CH_3$ gives $(CH_3)_3C-I$ and CH_3OH on treatment with HI.
Reason (R): The reaction occurs by SN1 mechanism.
(a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
(b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
(c) Assertion is correct statement but reason is wrong statement.
(d) Assertion is wrong statement but reason is correct statement.

11. Assertion (A): Ortho and para-nitrophenol can be separated by steam distillation.
Reason (R): Ortho isomer associates through intermolecular hydrogen bonding while para isomer associates through intermolecular hydrogen bonding.
(a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
(b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
(c) Assertion is correct statement but reason is wrong statement.
(d) Assertion is wrong statement but reason is correct statement.

Read the given passage and answer the questions that follow: (1 MARK EACH)

Oxidation of alcohols involves the formation of a carbon-oxygen double bond with cleavage of an O-H and C-H bonds.
H–C–O–H C=O
Bond breaking

Such a cleavage and formation of bonds occur in oxidation reactions. These are also known as dehydrogenation reactions as these involve loss of dihydrogen from an alcohol molecule. Depending on the oxidising agent used, a primary alcohol is oxidised to an aldehyde which in turn is oxidised to a carboxylic acid. Strong oxidising agents such as acidified potassium permanganate is used for getting carboxylic acids from alcohols directly. CrO_3 in anhydrous medium is used as the oxidising agent for the isolation of aldehydes.

1.Based on the text, describe the process by which a primary alcohol is transformed into an aldehyde and subsequently into a carboxylic acid.

2. What is the IUPAC name of the compound that forms when methanol is treated with thionyl chloride? Discuss the importance of this reaction in organic synthesis.

3. Compare the oxidation products of primary alcohols versus secondary alcohols.

4. Classify the following substances as either an oxidizing agent or not: CrO_3, NaCl, acidified potassium permanganate.

5. How does the text describe the relationship between primary alcohols, aldehydes, and carboxylic acids during oxidation?

Question – Answer Type: (Previous Years' Board Questions)

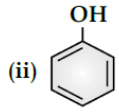
Short Answer type Question- 2 marks

1. Draw the structures of any two isomeric alcohols (other than 1° alcohols) having molecular formula $C_5H_{12}O$ and give their IUPAC names. [CBSE SQP 2015]
2. How do you convert:
   (i) Phenol to toluene
   (ii) Formaldehyde to Ethanol [CBSE Set-2 2016]
3. Write the structures of the products when Butan-2-ol reacts with the following:
   (i) CrO_3 (ii) $SOCl_2$ [CBSE OD Set-1, 2, 3 2017]
4. Write the mechanism of acid dehydration of
   Ethanol to yield Ethene. [CBSE SQP 2018-2019]

Short Answer Type Questions-II (3 marks each)

5. How are the following conversions carried out ?
   (i) Propene to propane-2-ol
   (ii) Benzyl chloride to Benzyl alcohol
   (iii) Anisole to p-Bromoanisole
   [CBSE Comptt. Delhi 2015]
6. How are the following conversions carried out ?
   (i) Benzyl chloride to Benzyl alcohol
   (ii) Ethyl magnesium chloride to Propan-1-ol
   (iii) Propene to Propan-2-ol [CBSE Comptt. OD 2015]
7. Write the major products in the following equations:

(i) $CH_3–CH_2OH \xrightarrow{PCl_5} ?$

(ii)  $+ CH_3Cl \xrightarrow{\text{anhyd. } AlCl_3} ?$

(iii) $CH_3–Cl + CH_3CH_2 – ONa \longrightarrow ?$

[CBSE Comptt. OD 2015]

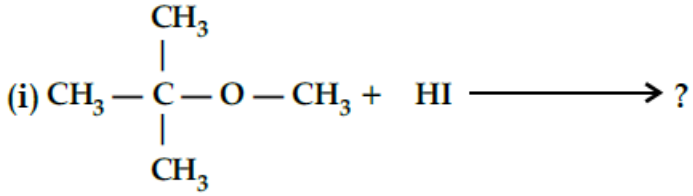
8. (i) Write the mechanism of the following reaction:

$$2CH_3CH_2OH \xrightarrow{H^+} CH_3CH_2 – O – CH_2CH_3$$

(ii) Write the equations involved in the acetylation of Salicylic acid.

[CBSE Delhi 2015]

9. Write the main product(s) in each of the following reactions:

(i) 

(ii) $CH_3–CH = CH_2 \xrightarrow[(ii)\ 3H_2O_2/OH^-]{(i)\ B_2H_6} ?$

(iii) $C_6H_5–OH \xrightarrow[(ii)\ CO_2, H^+]{(i)\ aq.NaOH} ?$

[CBSE Delhi 2016]

Long Answer Type Questions (5 marks each)

10. (i) Write the formula of reagents used in the following reactions:
(a) Bromination of phenol to 2,4,6-tribromophenol
(b) Hydroboration of propene and then oxidation to propanol.
(ii) Arrange the following compound groups in the increasing order of their property indicated:
(a) p-nitrophenol, ethanol, phenol (acidic character)
(iii) Write the mechanism (using curved arrow notation) of the following reaction

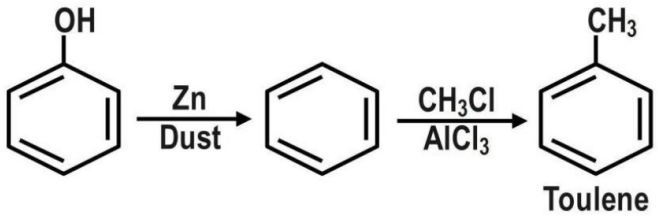
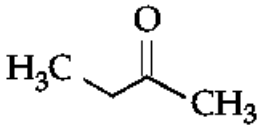
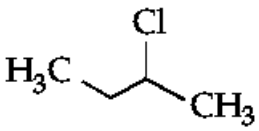
$$CH_3 – CH_2 – \overset{+}{O}H_2 \xrightarrow{CH_3CH_2OH} CH_3 – CH_2 – \underset{\displaystyle H}{\overset{\displaystyle +}{O}} – CH_2 – CH_3 + H_2O$$

[CBSE Delhi Set-1,2,3 2017]

11. (a) How do you convert the following?
(i) Phenol to Anisole.
(ii) Ethanol to Propan-2-ol.
(b) Write mechanism for the following reaction:

$$C_2H_5OH \xrightarrow[443\ K]{H_2SO_4} CH_2 = CH_2 + H_2O$$

Answers

1.	c. Methoxybenzene
2	b. Kolbe's reaction
3	b. Nucleophilic bimolecular reaction (SN2)
4	a. 2-Hydroxybenzoic acid (Salicylic acid)
5	b. It's Williamson ether synthesis
6	c. 4-Methoxytoluene
7	c. Intramolecular hydrogen bonding
8	c. Benzoquinone
9	b. Protonation of alcohol
10	a. Assertion and reason both are correct statements and reason is correct explanation for assertion.
11.	c Assertion is correct statement but reason is wrong statement
1	The alcohol is first oxidized to an aldehyde, which is then oxidized further to the acid
2	$CH_3OH+SOCl_2 \rightarrow CH_3Cl+HCl+SO_2\uparrow$ Chloromethane As both the by-products are gases they will escape out giving the pure alkyl halide
3	primary alcohols, depending on the reagent used, produce aldehydes or carboxylic acids during oxidations. Secondary alcohols are oxidized to produce ketones.
4	CrO_3 and acidified potassium permanganate – Oxidising agent
5	The alcohol is first oxidized to an aldehyde, which is then oxidized further to the acid
1	Any two isomers out of the following **(i)** $CH_3—CH_2—CH_2—CH(OH)—CH_3$ Pentan-2-ol **(ii)** $CH_3—CH_2—CH(OH)—CH_2—CH_3$ Pentan-3-ol **(iii)** $CH_3—CH(CH_3)CH(OH)—CH_3$ 3-Methybutan-2-ol **(iv)** $CH_3—CH_2—C(CH_3)(OH)—CH_3$ 2-Methylbutan-2-ol
2	 $HCHO + CH_3MgBr \rightarrow CH_3CH_2OMgBr \xrightarrow{H_2O} CH_3CH_2OH$
3	**(i)**  **(ii)** 
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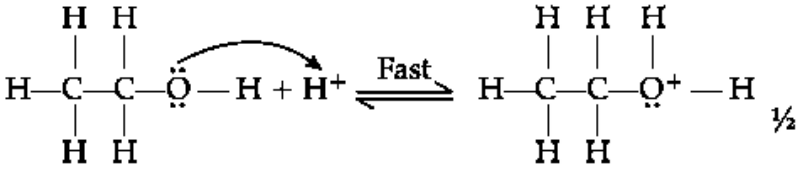
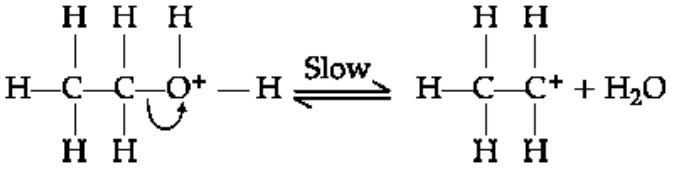
Step 1 : Formation of protonated alcohol.



½

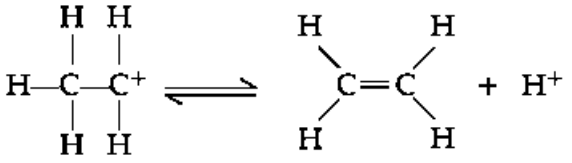
Ethanol — Protonated ethanol (Ethyl oxonium ion)

Step 2 : Formation of carbocation.



1

Step 3 : Formation of ethene by elimination of a proton.



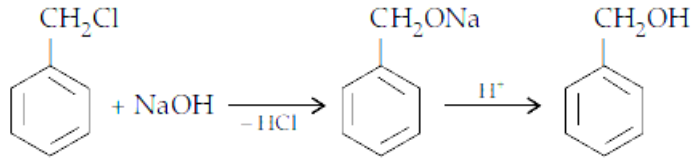
½

Ethene

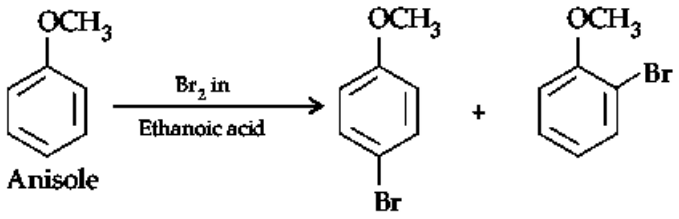
5

(i) $CH_3CH = CH_2 + H_2O \xrightleftharpoons{H^+} CH_3 - \underset{\displaystyle OH}{\underset{|}{CH}} - CH_3$

(ii)



(iii)



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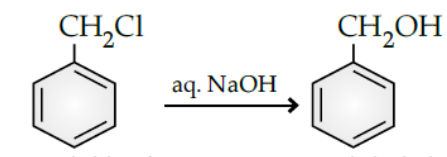
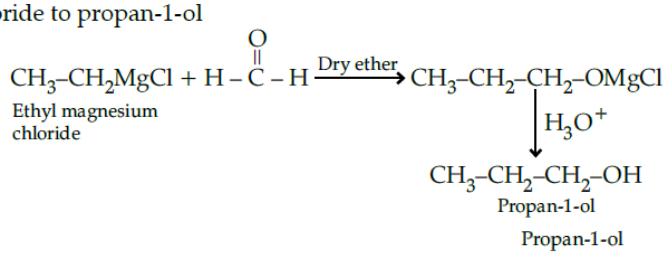
(i) Benzyl chloride to Benzyl alcohol

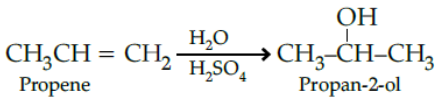


Benzyl chloride — Benzyl alcohol

(ii) Ethyl magnesium chloride to propan-1-ol



(iii) Propene to propan-2-ol



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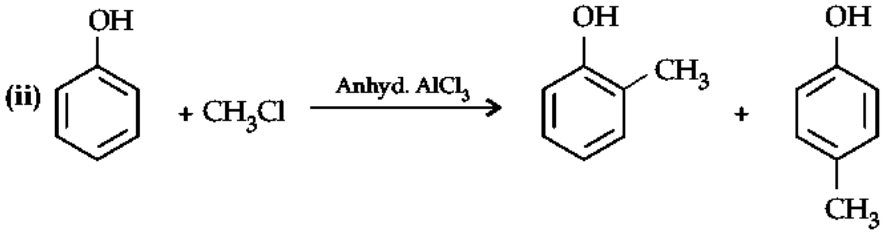
(i) $CH_3—CH_2OH \xrightarrow{PCl_5} CH_3CH_2Cl$

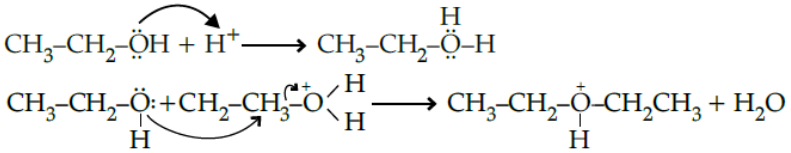
(ii)

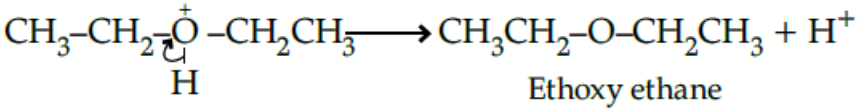


(iii) $CH_3Cl + CH_3CH_2–ONa \longrightarrow CH_3CH_2–O–CH_3$

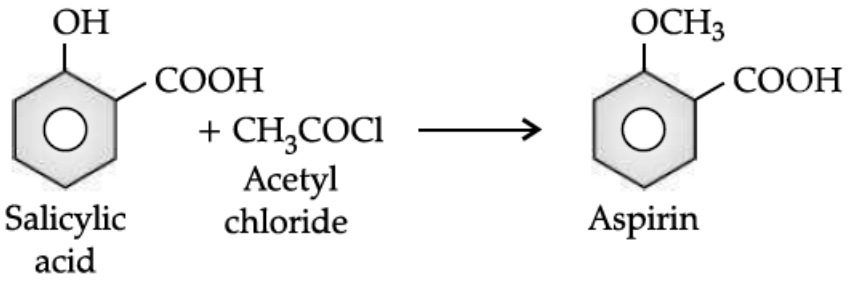
8

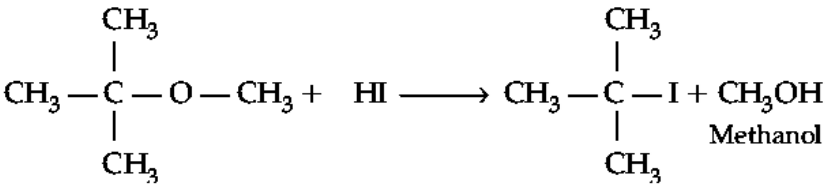
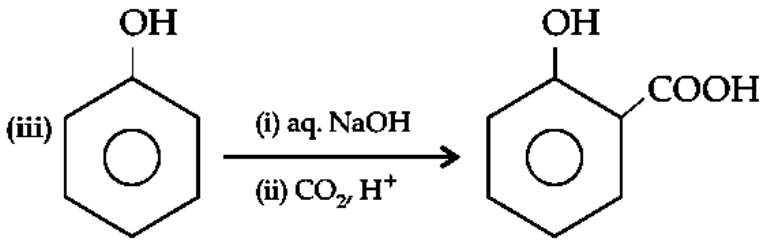
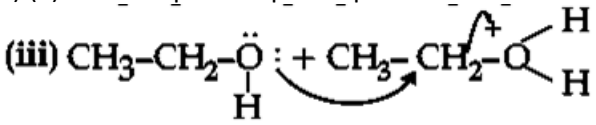
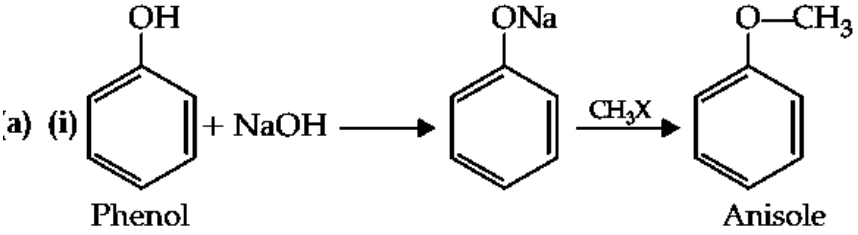
(i) $2CH_3CH_2OH \xrightarrow{H^+} CH_3CH_2 – O – CH_2CH_3$



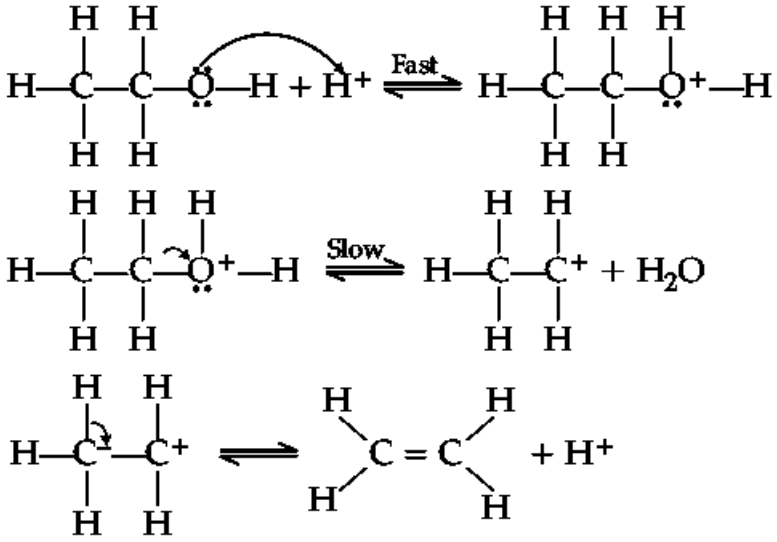


(ii)



9	ıs.(i)  Methanol (ii) $CH_3-CH=CH_2 \xrightarrow[(ii)\,3H_2O_2/OH^-]{(i)\,B_2H_6} CH_3CH_2CH_2OH$ Propanol (iii)  2-Hydroxybenzoic acid (Salicylic acid)
10	(i) (a) Aq. Br_2 (b) B_2H_6, H_2O_2 and OH^- (ii) (a) ethanol<phenol<p-nitrophenol (iii) 
11.	(a) (i)  Phenol Anisole (ii) $CH_3CH_2OH \xrightarrow{PCC,\ Heat} CH_3-CHO \xrightarrow{(i)\,CH_3MgBr\ \ (ii)\,H^+} CH_3CH(OH)-CH_3$ Ethanol Propan-2-ol

(b)



Prepared by: *Ms Jenesha Joseph*	*Checked by:* *HoD Science*