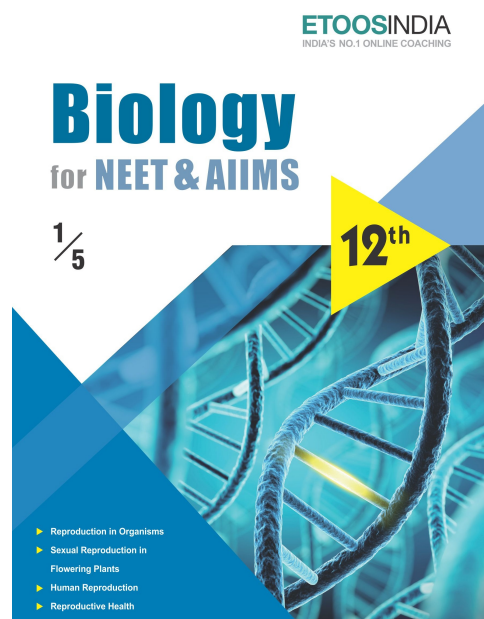
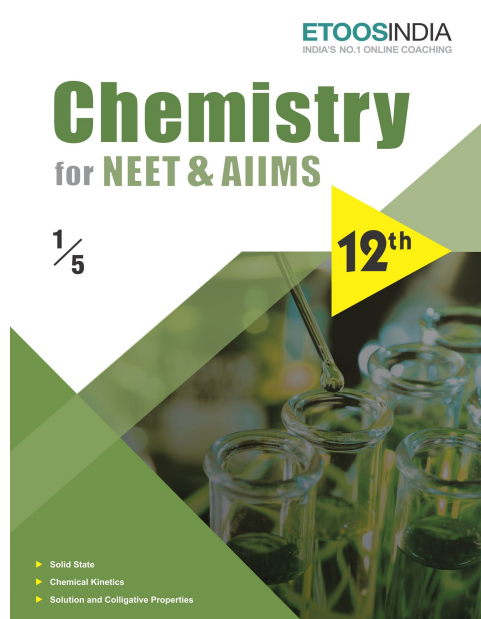
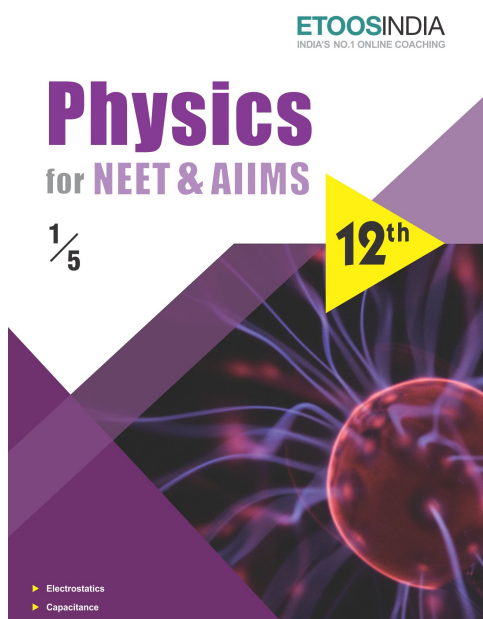
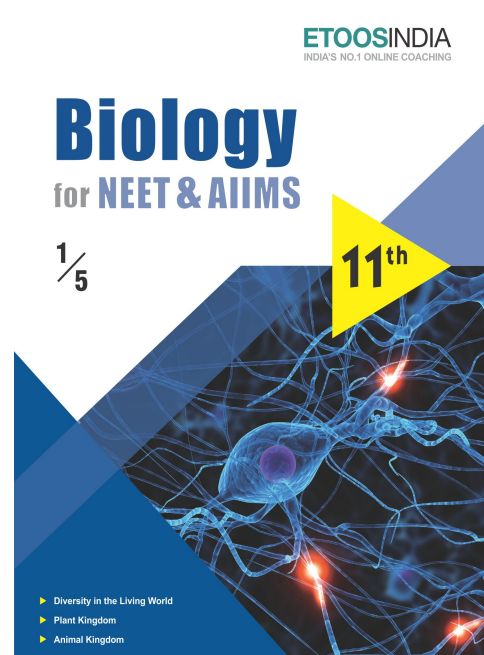
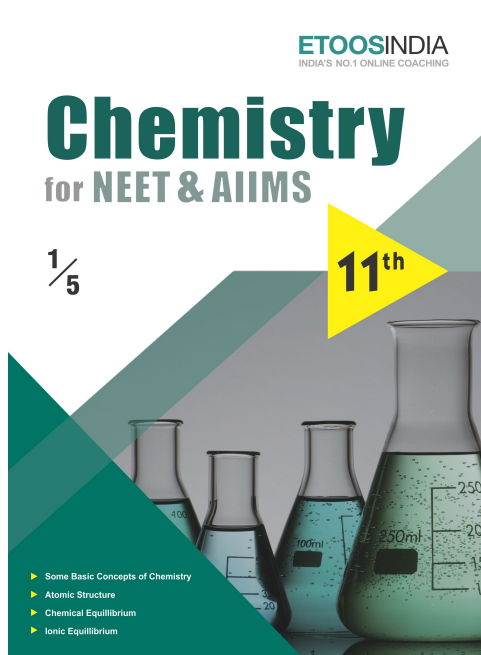
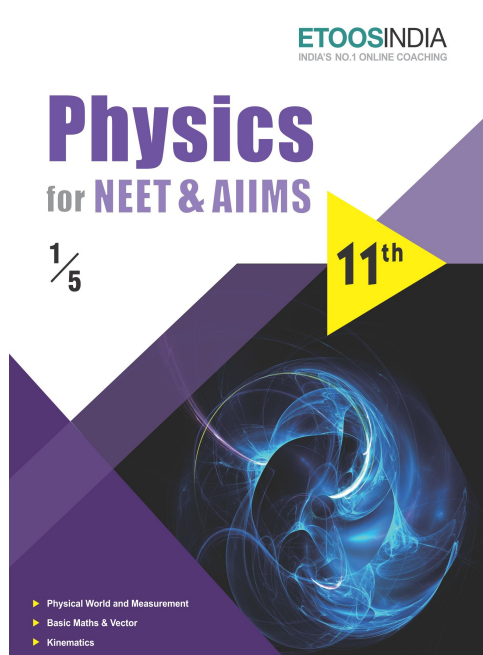


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ALCOHOL, PHENOL AND ETHER

Organic compounds exist in which a hydrogen atom, joined to the carbon, acquires acid properties as a result of the proximity of certain functional groupings.

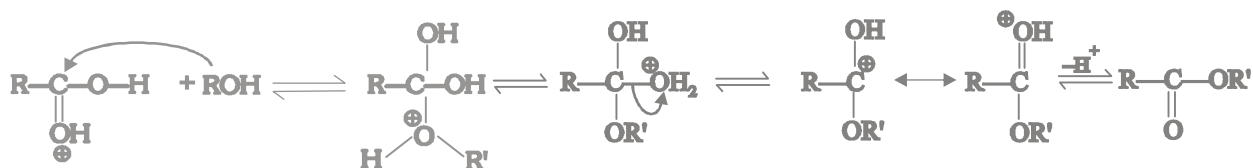
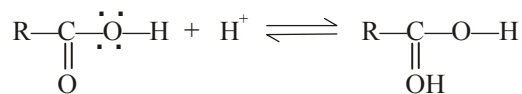
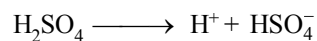
"VICTOR GRIGNARD"

INTRODUCTION

Alcohols and phenols are formed when a hydrogen atom in a hydrocarbon, aliphatic and aromatic respectively, is replaced by $-OH$ group. These classes of compounds find wide applications in industry as well as in day-to-day life. For instance, ordinary spirit used for polishing wooden furniture is chiefly a compound containing hydroxyl group, ethanol. The sugar we eat, the cotton used for fabrics, the paper we use for writing, are all made up of compounds containing $-OH$ groups.

The substitution of a hydrogen atom in a hydrocarbon by an alkoxy or aryloxy group ($R-O/Ar-O$) yields another class of compounds known as 'ethers', for example, CH_3OCH_3 (dimethyl ether). Ethers as compounds formed by substituting the hydrogen atom of hydroxyl group of an alcohol or phenol by an alkyl or aryl group.

Mechanism :



Note : This is a laboratory method to prepare ester.

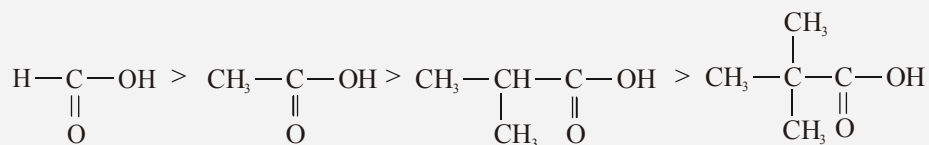


Dry HCl can be used as dehydrating agent.

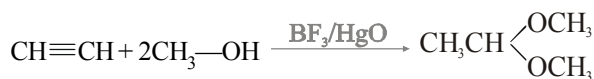


ETOOS KEY POINTS

- (a) Reactivity for esterification $\propto \frac{1}{\text{Steric hindrance}}$.
- (b) Reactivity of R-OH [If acid is same] : $\text{CH}_3-\text{OH} > 1^\circ > 2^\circ > 3^\circ$ alcohol
- (c) Reactivity of RCOOH [If alcohol is same] :



(vii) Reaction with $\text{CH}\equiv\text{CH}$:



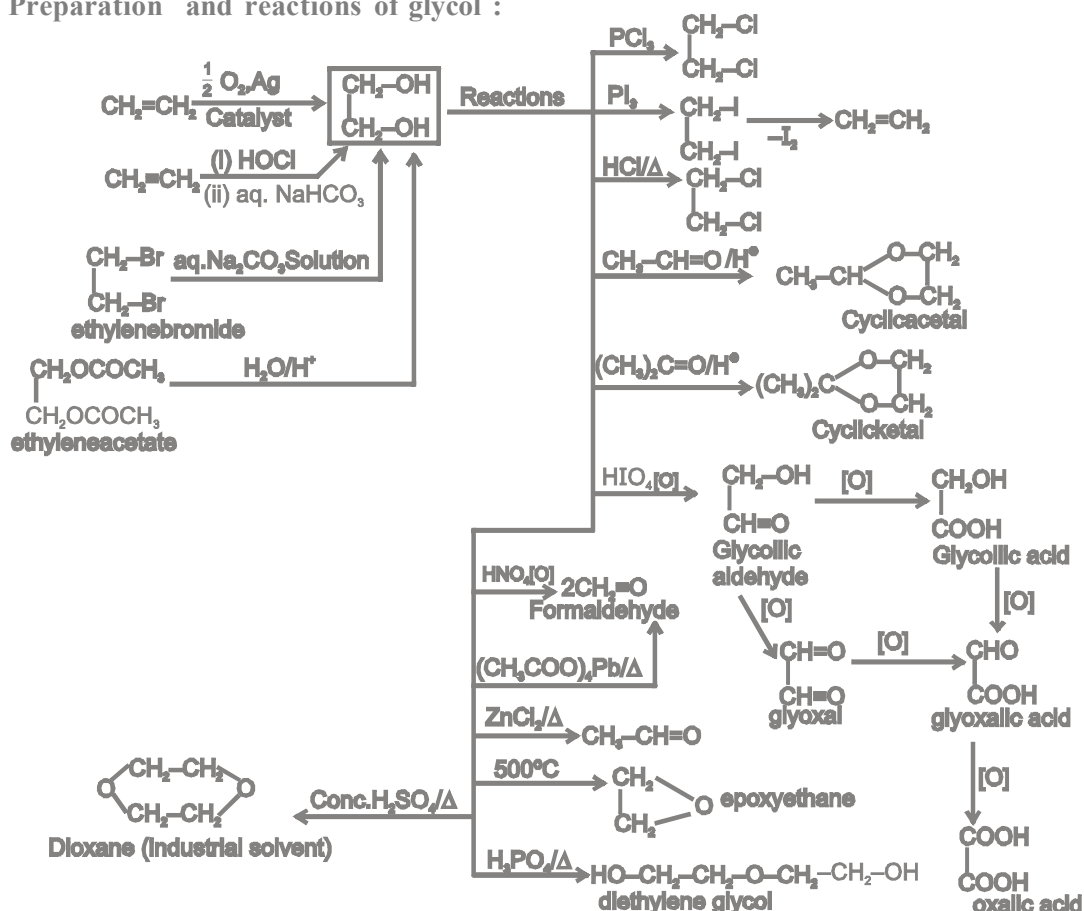
Methylal



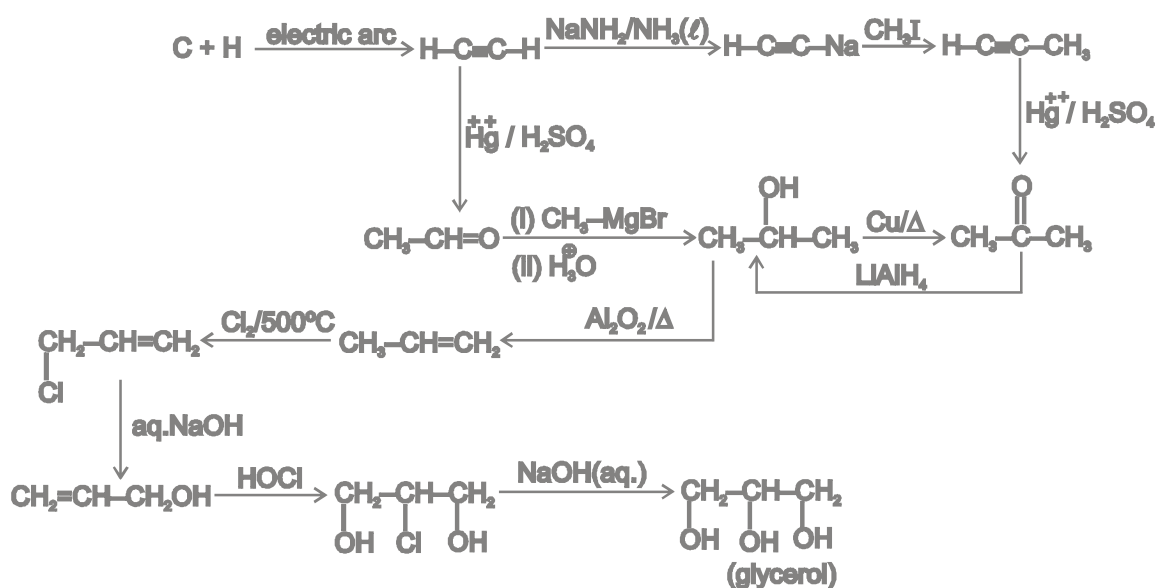
Ethylal

Etoos Tips & Formulas

1. Preparation and reactions of glycol :

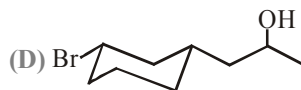
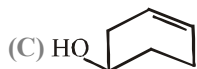
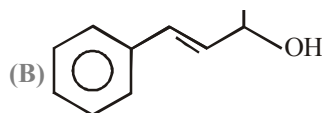
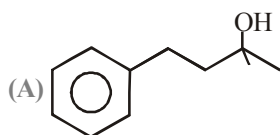


2. General Reactions of Glycerol :



SOLVED EXAMPLE

Ex. 1 Give the IUPAC names for the following compounds. Chiral descriptions are not required.



Sol. (A) 2-Methyl-4-phenylbutan-2-ol ;
(C) Cyclohex - 3-enol ;

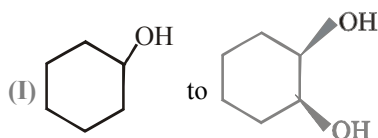
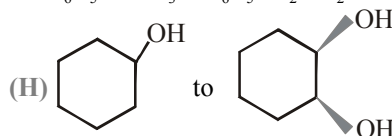
(B) **trans**-4-phenylbut-3-en-2-ol ;
(D) 1-(**cis**-3-Bromocyclohexyl)propan-2-ol

Ex. 2 How will you carry out the following conversions ? You may use other organic compounds if necessary.

(A) CH_3OH to $\text{CH}_3\text{CH}_2\text{OH}$
(C) $\text{CH}_3\text{CH}_2\text{OH}$ to $\text{HOCH}_2\text{CH}_2\text{OH}$
(E) $\text{CH}_3\text{CH}_2\text{OH}$ to $\text{CH}_3\text{CH}_2\text{CHOHCH}_3$

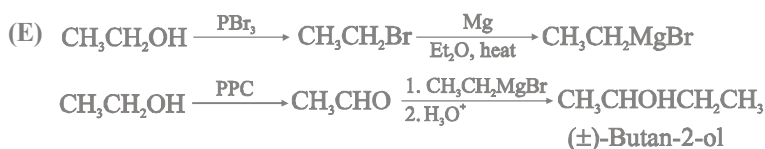
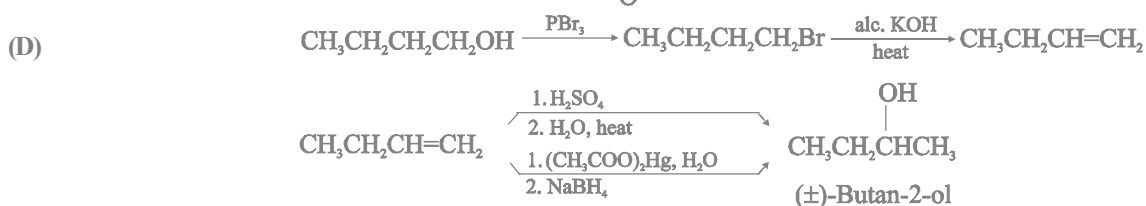
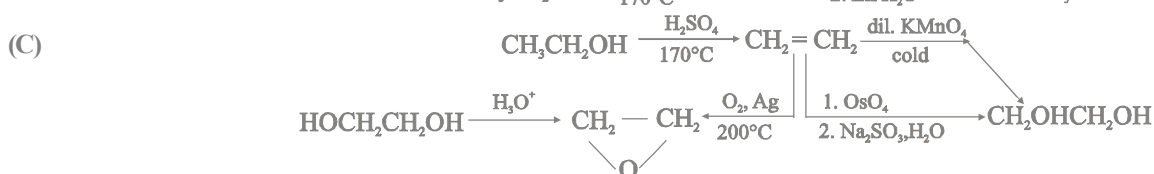
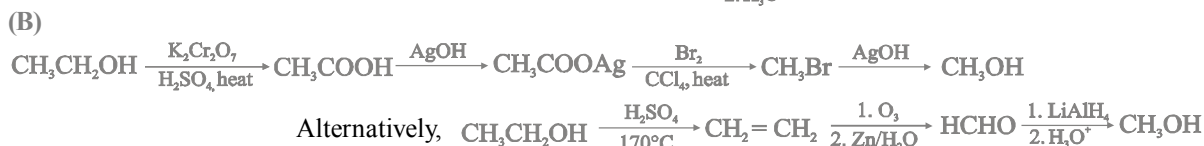
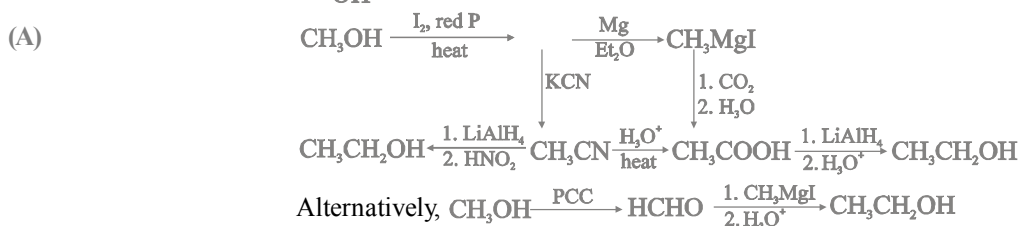
(B) $\text{CH}_3\text{CH}_2\text{OH}$ to CH_3OH
(D) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ to $\text{CH}_3\text{CH}_2\text{CHOHCH}_3$
(F) $\text{C}_6\text{H}_5\text{COCH}_3$ to $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{OH}$

(G) $\text{CH}_3\text{CH}_2\text{OH}$ to $(\text{C}_2\text{H}_5)_2\text{CHOHCH}_3$



(J) $\text{CH}_2 = \text{CHCH}_2\text{OH}$ to $\text{CH}_2\text{OHCHOHCHO}$

Sol.



Exercise # 1

SINGLE OBJECTIVE

NEET LEVEL

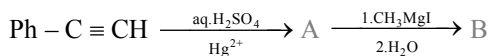
1. Butane-2-ol is
(A) Primary alcohol (B) Secondary alcohol
(C) Tertiary alcohol (D) Aldehyde
2. Picric acid is
(A) Trinitroaniline (B) Trinitrotoluene
(C) A volatile liquid (D) 2, 4, 6 trinitrophenol
3. 3-pentanol is a
(A) Primary alcohol (B) Secondary alcohol
(C) Tertiary alcohol (D) None of these
4. Glycerol is a
(A) Primary alcohol
(B) Monohydric alcohol
(C) Secondary alcohol
(D) Trihydric alcohol
5. Cresols are
(A) Hydroxy toluenes (B) Dihydric phenols
(C) Trihydric phenols (D) Trihydric alcohols
6. Ethanol is prepared industrially by
(A) Hydration of ethylene
(B) Fermentation of sugars
(C) Both the above
(D) None of these
7. Ethyl alcohol is industrially prepared from ethylene by
(A) Permanganate oxidation
(B) Catalytic reduction
(C) Absorbing in H_2SO_4 followed by hydrolysis
(D) Fermentation
8. Propene, $CH_3 - CH = CH_2$ can be converted to 1-propanol by oxidation. Which set of reagents among the following is ideal to effect the conversion
(A) Alkaline $KMnO_4$
(B) B_2H_6 and alkalien H_2O_2
(C) O_3 / Zn dust
(D) $OsO_4 / CH_4, Cl_2$
9. Which one of the following will produce a primary alcohol by reacting with CH_3MgI
(A) Acetone (B) Methyl cyanide
(C) Ethylene oxide (D) Ethyl acetate
10. The fermentation of starch to give alcohol occurs mainly with the help of
(A) O_2 (B) Air
(C) CO_2 (D) Enzymes
11. Coconut oil upon alkaline hydrolysis gives
(A) Glycol (B) Alcohol
(C) Glycerol (D) Ethylene oxide
12. Which enzyme converts glucose and fructose both into ethanol
(A) Diatase (B) Invertase
(C) Zymase (D) Maltase
13. Chlorination of toluene in the presence of light and heat followed by treatment iwth aqueous NaOH gives
(A) o-cresol
(B) p-cresol
(C) 2, 4-dihydroxy toluene
(D) Benzyle alcohol
14. In the commercial manufacture of ethyl alcohol from starchy substances by fermentatio method, which enzymes stepwise complete the fermentation reaction
(A) Diastase, maltase and zymase
(B) Maltase, zymase and invertase
(C) Diastase, zymase and lactase
15. Primary alcohols can be obtained from the reaction of the $RMgX$ with
(A) CO_2 (B) $HCHO$
(C) CH_3CHO (D) H_2O
16. On heating aqueous solution of benzene diazonium chloride, which is formed
(A) Benzene (B) Chlorobenzene
(C) Phenol (D) Aniline
17. $LiAlH_4$ converts acetic acid into
(A) Acetaldehyde (B) Methane
(C) Ethyl alcohol (D) Methyl alcohol
18. Formaldehyde gives an additive product with methyl magnesium iodide which on aqueous hydrolysis gives
(A) Isopropyl alcohol (B) Ethyl alcohol
(C) Methyl alcohol (D) Propyl alcohol
19. Benzyl alcohol is obtained from benzaldehyde by
(A) Fittig's reaction (B) Cannizaro's reaction
(C) Kolbe's reaction (D) Wurtz's reaction
20. Benzene diazonium chloride on boiling with dilute sulphuric acid gives
(A) Toluene (B) Benzoic acid
(C) Benzene (D) Phenol
21. The reaction given below is known as
 $C_2H_5ONa + IC_2H_5 \rightarrow C_2H_5OC_2H_5 + NaI$
(A) Kolbe's synthesis
(B) Wurtz's synthesis
(C) Williamson's synthesis
(D) Grignard's synthesis
22. Salicylaldehyde can be prepared from
(A) Phenol and chloroform
(B) Phenol, chloroform and sodium hydroxide
(C) Phenol, carbon tetrachloride and $NaOH$
(D) None of these

Exercise # 2

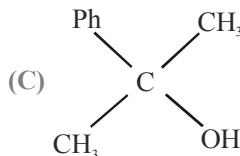
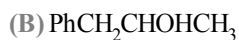
SINGLE OBJECTIVE

AIIMS LEVEL

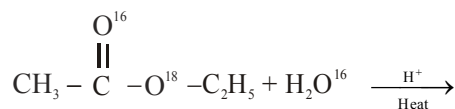
1. In the following reaction sequence



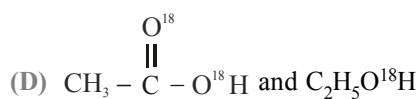
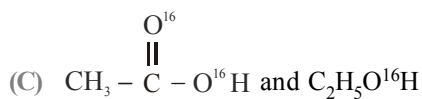
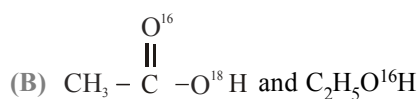
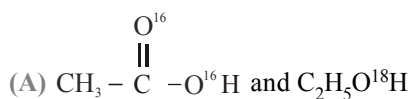
the product (B) is :



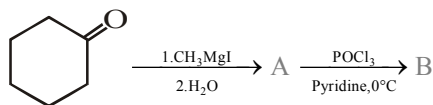
2. Consider the following reaction.



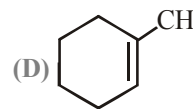
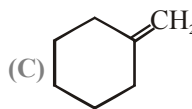
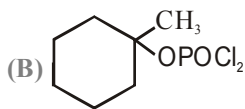
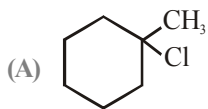
The products formed in the reaction are



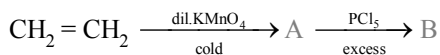
3. Consider the following reaction sequence,



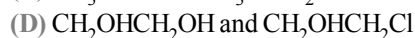
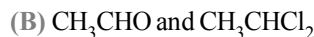
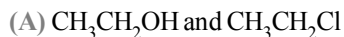
The product (B) is-



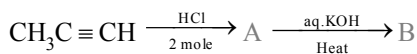
4. Consider the following reaction sequence



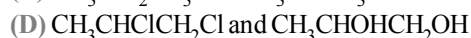
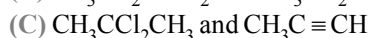
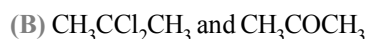
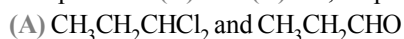
The products (A) and (B) are, respectively :



5. Consider the following reaction sequence,



The products (A) and (B) are, respectively,



Exercise # 3

PART - 1

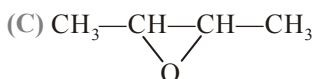
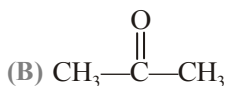
MATRIX MATCH COLUMN

1. Match the column I with column II.

Column-I

(substrate + RMgX)

(A) HCHO



(D) Ester

Column-II

(Product)

(p) Tertiary alcohol

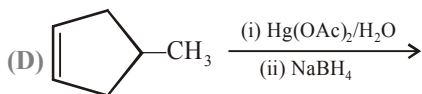
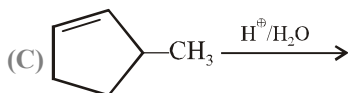
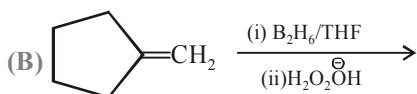
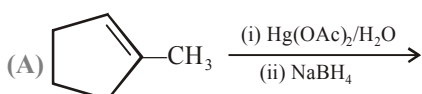
(q) First ketone then 3° alcohol

(r) Secondary alcohol

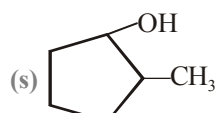
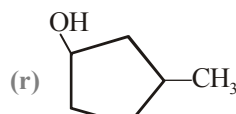
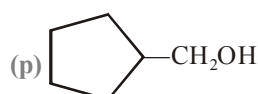
(s) Primary alcohol

2. Match the column I with column II.

Column-I (Reaction)

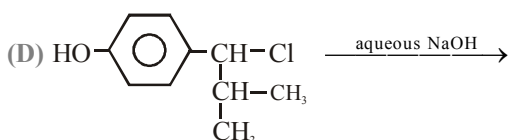
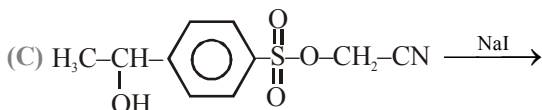
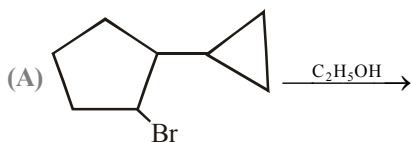


Column-II (Possible products)



3. Match the characteristics mentioned in Column -II with the reactions given in Column -I

Column-I



Column-II

(p) S_N2

(q) Rearrangement

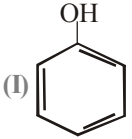
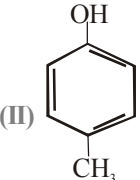
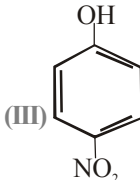
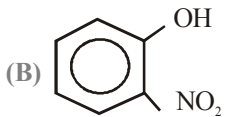
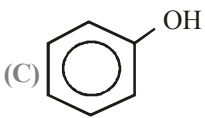
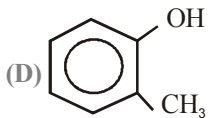
(r) S_N1

(s) Walden Inversion

Exercise # 4

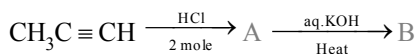
PART - 1

PREVIOUS YEAR (NEET/AIPMT)

1. Propan-1-ol may be prepared by reaction of propene with
[CBSE AIPMT 2000]
- (A) $\text{CH}_3 - \overset{\text{O}}{\parallel} \text{C} - \text{O} - \text{O} - \text{H}$
 (B) H_3BO_3
 (C) $\text{B}_2\text{H}_6/\text{NaOH}-\text{H}_2\text{O}_2$
 (D) $\text{H}_2\text{SO}_4/\text{H}_2\text{O}$
2. The ionisation constant of phenol is higher than that of ethanol because
[CBSE AIPMT 2000]
- (A) Phenoxide ion is bulkier than ethoxide
 (B) phenoxide ion is stronger base than ethoxide
 (C) phenoxide ion is stabilised through delocalisation
 (D) phenoxide ion is less than ethoxide
3. The correct acidic order of following is
[CBSE AIPMT 2001]
- (I)  (II)  (III) 
- (A) I>II>III
 (B) III>I>II
 (C) II>III>I
 (D) I>III>II
4. Which one of the following is correct?
[CBSE AIPMT 2001]
- (A) Reduction of any aldehyde gives secondary alcohol
 (B) Reaction of vegetable oil with H_2SO_4 gives glycerine
 (C) Alcoholic iodine with NaOH gives iodoform
 (D) Sucrose on reaction with NaCl gives invert sugar
5. Which of the following is correct?
[CBSE AIPMT 2001]
- (A) Cycloheptane is an aromatic compound
 (B) Diastase is an enzyme
 (C) Acetophenone is an ether
 (D) All of the above
6. In preparation of alkene from alcohol using Al_2O_3 , which is effective factor
[CBSE AIPMT 2001]
- (A) Porosity of Al_2O_3
 (B) Temperature
 (C) Concentration
 (D) Surface area of Al_2O_3
7. n-propyl alcohol and iso-propyl alcohol can be chemically distinguished by which reagent?
[CBSE AIPMT 2000]
- (A) PCl_5
 (B) reduction
 (C) Oxidation with potassium dichromate
 (D) ozonolysis
8. The —OH group of an alcohol or the —COOH group of a carboxylic acid can be replaced by —Cl using
[CBSE AIPMT 2004]
- (A) phosphorus pentachloride
 (B) hypochlorous acid
 (C) chlorine
 (D) hydrochloric acid
9. Which of the following will not form a yellow precipitate on heating with an alkaline solution of iodine
[CBSE AIPMT 2004]
- (A) $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$
 (B) $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_3$
 (C) CH_3OH
 (D) $\text{CH}_3\text{CH}_2\text{OH}$
10. The enzyme which hydrolyses triglycerides into fatty acids and glycerol is called
[CBSE AIPMT 2004]
- (A) maltase
 (B) lipase
 (C) zymase
 (D) pepsin
11. Which one of the following compounds is most acidic?
[CBSE AIPMT 2005]
- (A) $\text{ClCH}_2 - \text{CH}_2\text{OH}$ (B) 
- (C)  (D) 

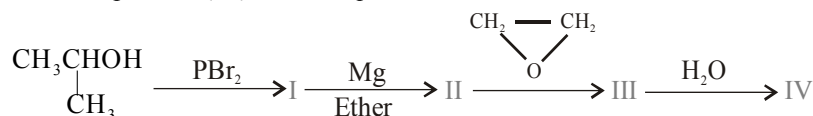
STRAIGHT OBJECTIVE TYPE

1. Consider the following reaction sequence,

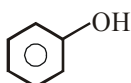


The products (A) and (B) are, respectively,

- (A) $\text{CH}_3\text{CH}_2\text{CHCl}_2$ and $\text{CH}_3\text{CH}_2\text{CHO}$ (B) $\text{CH}_3\text{CCl}_2\text{CH}_3$ and CH_3COCH_3
 (C) $\text{CH}_3\text{CCl}_2\text{CH}_3$ and $\text{CH}_3\text{C}\equiv\text{CH}$ (D) $\text{CH}_3\text{CHClCH}_2\text{Cl}$ and $\text{CH}_3\text{CHOHCH}_2\text{OH}$
2. The final product (IV) in the sequence of reactions is :

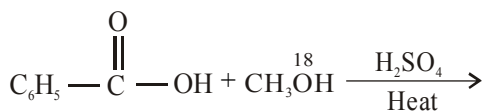


- (A) $\begin{array}{c} \text{CH}_3\text{---CHOCH}_2\text{CH}_2\text{OH} \\ | \\ \text{CH}_3 \end{array}$ (B) $\begin{array}{c} \text{CH}_3\text{---CHCH}_2\text{CH}_2\text{Br} \\ | \\ \text{CH}_3 \end{array}$
 (C) $\begin{array}{c} \text{CH}_3\text{---CH---CH}_2\text{CH}_2\text{OH} \\ | \\ \text{CH}_3 \end{array}$ (D) $\begin{array}{c} \text{CH}_3\text{---CHOCH}_2\text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$

3.  $\xrightarrow{\text{CHCl}_3 + \text{KOH}}$ Product :

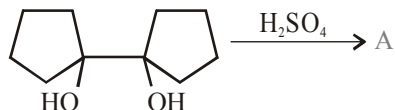
about above reaction the incorrect statement is

- (A) The name of reaction is Reimer tiemann's reaction
 (B) The intermediate in the reaction is dichloro carbene
 (C) The final product is o-hydroxy benzaldehyde
 (D) the final product is benzyl chloride
4. The products formed in the reaction are :

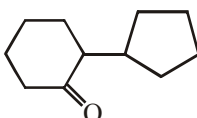
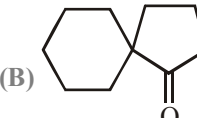
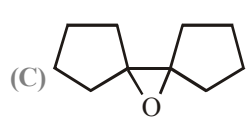
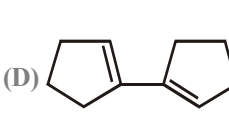


- (A) $\text{C}_6\text{H}_5\text{---}\overset{\text{O}}{\parallel}\text{C---O}^{18}\text{CH}_3$ and H_2O (B) $\text{C}_6\text{H}_5\text{---}\overset{\text{O}}{\parallel}\text{C---OCH}_3$ and H_2^{18}O
 (C) $\text{C}_6\text{H}_5\text{---}\overset{\text{O}}{\parallel}\text{C---CH}_2^{18}\text{OH}$ and H_2O (D) $\text{C}_6\text{H}_5\text{OCH}_3$, CO and H_2O

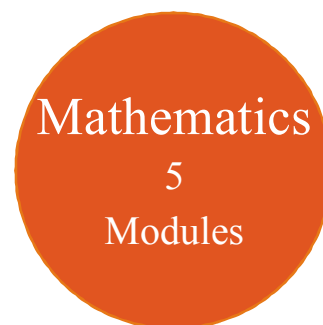
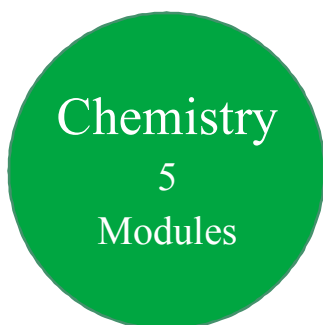
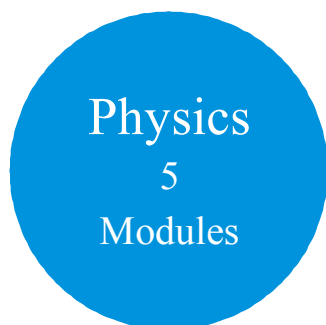
5. The major product (A) formed in the reaction



is :

- (A)  (B)  (C)  (D) 

11th Class Modules Chapter Details



PHYSICS	CHEMISTRY	BIOLOGY
<p>Module-1</p> <ol style="list-style-type: none"> 1. Physical World & Measurements 2. Basic Maths & Vector 3. Kinematics <p>Module-2</p> <ol style="list-style-type: none"> 1. Law of Motion & Friction 2. Work, Energy & Power <p>Module-3</p> <ol style="list-style-type: none"> 1. Motion of system of particles & Rigid Body 2. Gravitation <p>Module-4</p> <ol style="list-style-type: none"> 1. Mechanical Properties of Matter 2. Thermal Properties of Matter <p>Module-5</p> <ol style="list-style-type: none"> 1. Oscillations 2. Waves 	<p>Module-1(PC)</p> <ol style="list-style-type: none"> 1. Some Basic Concepts of Chemistry 2. Atomic Structure 3. Chemical Equilibrium 4. Ionic Equilibrium <p>Module-2(PC)</p> <ol style="list-style-type: none"> 1. Thermodynamics & Thermochemistry 2. Redox Reaction 3. States Of Matter (Gaseous & Liquid) <p>Module-3(IC)</p> <ol style="list-style-type: none"> 1. Periodic Table 2. Chemical Bonding 3. Hydrogen & Its Compounds 4. S-Block <p>Module-4(OC)</p> <ol style="list-style-type: none"> 1. Nomenclature of Organic Compounds 2. Isomerism 3. General Organic Chemistry <p>Module-5(OC)</p> <ol style="list-style-type: none"> 1. Reaction Mechanism 2. Hydrocarbon 3. Aromatic Hydrocarbon 4. Environmental Chemistry & Analysis Of Organic Compounds 	<p>Module-1</p> <ol style="list-style-type: none"> 1. Diversity in the Living World 2. Plant Kingdom 3. Animal Kingdom <p>Module-2</p> <ol style="list-style-type: none"> 1. Morphology in Flowering Plants 2. Anatomy of Flowering Plants 3. Structural Organization in Animals <p>Module-3</p> <ol style="list-style-type: none"> 1. Cell: The Unit of Life 2. Biomolecules 3. Cell Cycle & Cell Division 4. Transport in Plants 5. Mineral Nutrition <p>Module-4</p> <ol style="list-style-type: none"> 1. Photosynthesis in Higher Plants 2. Respiration in Plants 3. Plant Growth and Development 4. Digestion & Absorption 5. Breathing & Exchange of Gases <p>Module-5</p> <ol style="list-style-type: none"> 1. Body Fluids & Its Circulation 2. Excretory Products & Their Elimination 3. Locomotion & Its Movement 4. Neural Control & Coordination 5. Chemical Coordination and Integration

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12th Class Modules Chapter Details

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5
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Chemistry
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Mathematics
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Modules

PHYSICS	CHEMISTRY	BIOLOGY
<p>Module-1</p> <ol style="list-style-type: none"> 1. Electrostatics 2. Capacitance <p>Module-2</p> <ol style="list-style-type: none"> 1. Current Electricity 2. Magnetic Effect of Current and Magnetism <p>Module-3</p> <ol style="list-style-type: none"> 1. Electromagnetic Induction 2. Alternating Current <p>Module-4</p> <ol style="list-style-type: none"> 1. Geometrical Optics 2. Wave Optics <p>Module-5</p> <ol style="list-style-type: none"> 1. Modern Physics 2. Nuclear Physics 3. Solids & Semiconductor Devices 4. Electromagnetic Waves 	<p>Module-1(PC)</p> <ol style="list-style-type: none"> 1. Solid State 2. Chemical Kinetics 3. Solutions and Colligative Properties <p>Module-2(PC)</p> <ol style="list-style-type: none"> 1. Electrochemistry 2. Surface Chemistry <p>Module-3(IC)</p> <ol style="list-style-type: none"> 1. P-Block Elements 2. Transition Elements (d & f block) 3. Co-ordination Compound 4. Metallurgy <p>Module-4(OC)</p> <ol style="list-style-type: none"> 1. HaloAlkanes & HaloArenes 2. Alcohol, Phenol & Ether 3. Aldehyde, Ketone & Carboxylic Acid <p>Module-5(OC)</p> <ol style="list-style-type: none"> 1. Nitrogen & Its Derivatives 2. Biomolecules & Polymers 3. Chemistry in Everyday Life 	<p>Module-1</p> <ol style="list-style-type: none"> 1. Reproduction in Organisms 2. Sexual Reproduction in Flowering Plants 3. Human Reproduction 4. Reproductive Health <p>Module-2</p> <ol style="list-style-type: none"> 1. Principles of Inheritance and Variation 2. Molecular Basis of Inheritance 3. Evolution <p>Module-3</p> <ol style="list-style-type: none"> 1. Human Health and Disease 2. Strategies for Enhancement in Food Production 3. Microbes in Human Welfare <p>Module-4</p> <ol style="list-style-type: none"> 1. Biotechnology: Principles and Processes 2. Biotechnology and Its Applications 3. Organisms and Populations <p>Module-5</p> <ol style="list-style-type: none"> 1. Ecosystem 2. Biodiversity and Conservation 3. Environmental Issues

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