



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

ALCOHOLS, PHENOLS AND ETHERS — DPP 53 TO 58

Student Workbook + Teacher Answer Key

Arihantam Academy • Faith Strength Education

Bihar Board Class 12 Chemistry: board-oriented daily practice for Alcohols, Phenols and Ethers.

Coverage: alcohol preparation/reactions; phenol acidity and named reactions; ethers/Williamson synthesis; mixed full revision.



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CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

DAILY PRACTICE PROBLEM — DPP 53

Alcohols, Phenols and Ethers | Alcohols: classification, nomenclature and preparation

Student Name: _____	Roll No.: _____
DPP No.: 53 Chapter: Alcohols, Phenols and Ethers	Date: _____
Topic: Alcohols: classification, nomenclature and preparation	Score: ____ / 30

Instructions: Answer all objective questions. Attempt any 3 short-answer questions and any 1 long-answer question.

Section A — Objective Questions (15 × 1 = 15)

- Functional group of alcohol is:
(A) –OH (B) –CHO (C) –COOH (D) –O–
- General formula of monohydric saturated alcohol is:
(A) $C_nH_{2n+2}OH$ (B) $C_nH_{2n}O$ (C) $C_nH_{2n+1}OH$ (D) $C_nH_{2n+1}OH$
- In primary alcohol, –OH carbon is attached to:
(A) one other carbon (B) two carbons (C) three carbons (D) no carbon
- tert-Butyl alcohol is:
(A) primary (B) secondary (C) tertiary (D) phenol
- IUPAC suffix for alcohol is:
(A) –al (B) –ol (C) –one (D) –oic acid
- Ethanol can be prepared by hydration of:
(A) ethane (B) ethene (C) ethyne (D) benzene
- Hydrolysis of ethyl bromide with aq KOH gives:
(A) ethene (B) ethanol (C) ether (D) ethanal
- Reduction of aldehyde gives:
(A) primary alcohol (B) secondary alcohol (C) tertiary alcohol (D) phenol
- Reduction of ketone gives:
(A) primary alcohol (B) secondary alcohol (C) tertiary alcohol (D) ether
- Grignard reagent with formaldehyde gives:
(A) primary alcohol (B) secondary alcohol (C) tertiary alcohol (D) alkane
- Grignard reagent with aldehyde (other than HCHO) gives:
(A) primary alcohol (B) secondary alcohol (C) tertiary alcohol (D) phenol
- Grignard reagent with ketone gives:
(A) primary alcohol (B) secondary alcohol (C) tertiary alcohol (D) ether
- Alcohols have higher boiling points because of:
(A) ionic bond (B) H-bonding (C) metallic bond (D) no polarity
- Lucas reagent is:
(A) conc HCl + anhyd $ZnCl_2$ (B) dil HCl + Cu (C) NaOH + Zn (D) H_2SO_4 + NaCl
- Lucas test distinguishes:
(A) alcohol classes (B) aldehydes/ketones (C) amines (D) halides only

Section B — Short Answer (Attempt any 3) (3 × 2 = 6)

- Classify alcohols with examples.
- Give IUPAC name of $CH_3CH(OH)CH_3$.
- Write preparation of ethanol from ethene.
- How are 1°, 2° and 3° alcohols obtained from carbonyl compounds?
- What is Lucas reagent?

Section C — Long Answer (Attempt any 1) (1 × 5 = 5)

- Explain preparation methods of alcohols.
- Explain classification/nomenclature and physical properties of alcohols.

Teacher record: MCQ ____/15 | Short ____/6 | Long ____/5 | Presentation/Homework ____/4 | Total ____/30



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CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

TEACHER ANSWER KEY — DPP 53

Alcohols, Phenols and Ethers | Alcohols: classification, nomenclature and preparation

MCQ answers: 1-A, 2-A, 3-A, 4-C, 5-B, 6-B, 7-B, 8-A, 9-B, 10-A, 11-B, 12-C, 13-B, 14-A, 15-A

Short-answer marking points

16. Primary, secondary, tertiary based on carbon bearing OH.

17. Propan-2-ol.

18. $\text{CH}_2=\text{CH}_2 + \text{H}_2\text{O}/\text{H}^+ \rightarrow \text{CH}_3\text{CH}_2\text{OH}$.

19. $\text{HCHO} + \text{RMgX} \rightarrow 1^\circ$; $\text{RCHO} + \text{RMgX} \rightarrow 2^\circ$; $\text{RCOR} + \text{RMgX} \rightarrow 3^\circ$ alcohol after hydrolysis.

20. Conc HCl and anhydrous ZnCl_2 .

Long-answer marking points

21. From alkenes hydration, haloalkane hydrolysis, carbonyl reduction and Grignard reactions.

22. Classification, IUPAC naming, hydrogen bonding, solubility and boiling-point trend.

Remedial rule: Score below 15/26: revise named reactions, equations and conversions; take a 10-MCQ re-test.



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CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

DAILY PRACTICE PROBLEM — DPP 54

Alcohols, Phenols and Ethers | Alcohols: reactions, oxidation, dehydration and identification

Student Name: _____	Roll No.: _____
DPP No.: 54 Chapter: Alcohols, Phenols and Ethers	Date: _____
Topic: Alcohols: reactions, oxidation, dehydration and identification	Score: ____ / 30

Instructions: Answer all objective questions. Attempt any 3 short-answer questions and any 1 long-answer question.

Section A — Objective Questions (15 × 1 = 15)

- Alcohol reacts with Na to form:
(A) alkoxide + H₂ (B) alkene only (C) aldehyde only (D) ether only
- Primary alcohol oxidation first gives:
(A) ketone (B) aldehyde (C) acid only (D) alkene
- Secondary alcohol oxidation gives:
(A) aldehyde (B) ketone (C) acid directly (D) alkane
- Tertiary alcohol resists mild oxidation because:
(A) no alpha H (B) no OH (C) is acidic (D) has no carbon
- Dehydration of alcohol generally gives:
(A) alkane (B) alkene (C) aldehyde (D) acid
- Reagent for dehydration:
(A) conc H₂SO₄/heat (B) aq KOH (C) NaCl (D) dil HCl
- Zaitsev product is:
(A) less substituted alkene (B) more substituted alkene (C) alcohol (D) ether only
- Ethanol with excess conc H₂SO₄ at 443 K gives:
(A) diethyl ether (B) ethene (C) ethanal (D) acetic acid
- Ethanol with conc H₂SO₄ at 413 K gives:
(A) ethene (B) diethyl ether (C) acetaldehyde (D) methane
- Alcohol with SOCl₂ gives:
(A) alkyl chloride (B) alkene (C) ketone (D) ether
- Ethanol with Cu at 573 K gives:
(A) ethanal (B) ethene (C) acetic acid (D) methane
- 2° alcohol with Cu at 573 K gives:
(A) aldehyde (B) ketone (C) alkane (D) ether
- Iodoform test is given by:
(A) ethanol and CH₃CH(OH)R (B) methanol only (C) tert-butanol only (D) phenol only
- Victor Meyer test distinguishes:
(A) 1°, 2°, 3° alcohols (B) amines (C) aldehydes (D) halides
- Primary alcohol with acidified K₂Cr₂O₇ gives:
(A) green Cr³⁺ (B) purple Mn²⁺ (C) orange only (D) no change

Section B — Short Answer (Attempt any 3) (3 × 2 = 6)

- Write reaction of ethanol with sodium.
- Differentiate oxidation of 1°, 2° and 3° alcohols.
- What is dehydration of alcohol?
- Why does 3° alcohol resist oxidation?
- Write ethanol dehydration reactions at 413 K and 443 K.

Section C — Long Answer (Attempt any 1) (1 × 5 = 5)

- Explain important chemical reactions of alcohols.
- Describe Lucas and Victor Meyer tests for distinguishing alcohols.

Teacher record: MCQ ____/15 | Short ____/6 | Long ____/5 | Presentation/Homework ____/4 | Total ____/30



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TEACHER ANSWER KEY — DPP 54

Alcohols, Phenols and Ethers | Alcohols: reactions, oxidation, dehydration and identification

MCQ answers: 1-A, 2-B, 3-B, 4-A, 5-B, 6-A, 7-B, 8-B, 9-B, 10-A, 11-A, 12-B, 13-A, 14-A, 15-A

Short-answer marking points

16. $2\text{C}_2\text{H}_5\text{OH} + 2\text{Na} \rightarrow 2\text{C}_2\text{H}_5\text{ONa} + \text{H}_2$.

17. $1^\circ \rightarrow$ aldehyde $\rightarrow$ acid; $2^\circ \rightarrow$ ketone; 3° resists mild oxidation.

18. Removal of water to form alkene, usually conc H_2SO_4 /heat.

19. It lacks α -hydrogen at carbinol carbon.

20. 413 K: ether; 443 K: ethene.

Long-answer marking points

21. Reactions with active metals, HX/SOCl_2 , oxidation, dehydrogenation, dehydration and esterification.

22. Lucas turbidity rate: 3° immediate, 2° slow, 1° only on heating; Victor Meyer colour outcomes.

Remedial rule: Score below 15/26: revise named reactions, equations and conversions; take a 10-MCQ re-test.



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CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

DAILY PRACTICE PROBLEM — DPP 55

Alcohols, Phenols and Ethers | Phenols: preparation, acidic character and electrophilic substitution

Student Name: _____	Roll No.: _____
DPP No.: 55 Chapter: Alcohols, Phenols and Ethers	Date: _____
Topic: Phenols: preparation, acidic character and electrophilic substitution	Score: ____ / 30

Instructions: Answer all objective questions. Attempt any 3 short-answer questions and any 1 long-answer question.

Section A — Objective Questions (15 × 1 = 15)

- Phenol has OH attached directly to:
(A) sp^3 carbon (B) benzene ring sp^2 carbon (C) oxygen (D) nitrogen
- Phenol is more acidic than ethanol because:
(A) phenoxide ion resonance stabilised (B) ethanol heavier (C) phenol is base (D) no O-H bond
- Phenol reacts with NaOH to form:
(A) sodium phenoxide (B) sodium ethoxide (C) benzene (D) aniline
- Ethanol does not react with NaOH because:
(A) it is less acidic than water (B) it is strong acid (C) no OH (D) it is ionic
- Phenol reacts with Na metal giving:
(A) phenoxide + H_2 (B) benzene only (C) ether only (D) acid only
- Phenol with bromine water gives:
(A) bromobenzene (B) 2,4,6-tribromophenol (C) chlorobenzene (D) nitrobenzene
- Tribromophenol precipitate colour:
(A) white (B) blue (C) green (D) orange
- Phenol with dilute HNO_3 gives:
(A) o- and p-nitrophenol (B) m-nitrophenol only (C) picric acid only (D) benzene
- Phenol with conc HNO_3 gives:
(A) picric acid (B) aniline (C) benzene (D) chlorobenzene
- Kolbe reaction of sodium phenoxide with CO_2 gives:
(A) salicylic acid (B) benzoic acid (C) phenol only (D) aniline
- Reimer-Tiemann reaction gives mainly:
(A) salicylaldehyde (B) acetaldehyde (C) benzaldehyde (D) formaldehyde
- Phenol is o,p directing due to:
(A) -I effect (B) +M effect of OH (C) no electrons (D) steric only
- Phenol with Zn dust gives:
(A) benzene (B) toluene (C) cyclohexane (D) aniline
- $FeCl_3$ test with phenol produces:
(A) violet colour (B) red precipitate (C) blue gas (D) white precipitate
- Phenol is weak acid with pK_a about:
(A) 1 (B) 5 (C) 10 (D) 14

Section B — Short Answer (Attempt any 3) (3 × 2 = 6)

- Why is phenol more acidic than ethanol?
- Write reaction of phenol with NaOH.
- What is Kolbe reaction?
- What is Reimer-Tiemann reaction?
- Why does phenol direct EAS to o/p positions?

Section C — Long Answer (Attempt any 1) (1 × 5 = 5)

- Explain acidic character and chemical reactions of phenol.
- Describe Kolbe and Reimer-Tiemann reactions with equations.

Teacher record: MCQ ____/15 | Short ____/6 | Long ____/5 | Presentation/Homework ____/4 | Total ____/30



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CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

TEACHER ANSWER KEY — DPP 55

Alcohols, Phenols and Ethers | Phenols: preparation, acidic character and electrophilic substitution

MCQ answers: 1-B, 2-A, 3-A, 4-A, 5-A, 6-B, 7-A, 8-A, 9-A, 10-A, 11-A, 12-B, 13-A, 14-A, 15-C

Short-answer marking points

16. Phenoxide ion is resonance stabilised, while ethoxide is not.

17. $\text{C}_6\text{H}_5\text{OH} + \text{NaOH} \rightarrow \text{C}_6\text{H}_5\text{ONa} + \text{H}_2\text{O}$.

18. Sodium phenoxide + CO_2 under pressure/heat gives salicylate; acidification gives salicylic acid.

19. Phenol + CHCl_3 + NaOH gives o-hydroxybenzaldehyde after hydrolysis.

20. OH donates by resonance (+M), increasing o/p electron density.

Long-answer marking points

21. Acidity, reactions with Na/NaOH, bromination, nitration, Zn reduction and FeCl_3 test.

22. Write conditions/intermediates and products: salicylic acid and salicylaldehyde.

Remedial rule: Score below 15/26: revise named reactions, equations and conversions; take a 10-MCQ re-test.



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CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

DAILY PRACTICE PROBLEM — DPP 56

Alcohols, Phenols and Ethers | Ethers: nomenclature, preparation and reactions

Student Name: _____	Roll No.: _____
DPP No.: 56 Chapter: Alcohols, Phenols and Ethers	Date: _____
Topic: Ethers: nomenclature, preparation and reactions	Score: ____ / 30

Instructions: Answer all objective questions. Attempt any 3 short-answer questions and any 1 long-answer question.

Section A — Objective Questions (15 × 1 = 15)

- Functional group of ether is:
(A) R–O–R' (B) R–OH (C) R–CHO (D) R–COOH
- IUPAC name of $\text{CH}_3\text{OCH}_2\text{CH}_3$ is:
(A) methoxyethane (B) ethoxymethane (C) propanol (D) dimethyl ether
- Williamson synthesis involves reaction of:
(A) alkoxide with alkyl halide (B) alcohol with Na only (C) phenol with HNO_3 (D) ether with water
- Williamson synthesis proceeds mainly by:
(A) $\text{S}_\text{N}1$ (B) $\text{S}_\text{N}2$ (C) $\text{E}1$ (D) free radical
- Best alkyl halide for Williamson synthesis is:
(A) tertiary (B) primary (C) aryl (D) vinyl
- Ethanol dehydration at 413 K gives:
(A) ethene (B) diethyl ether (C) ethanal (D) ethanoic acid
- Ethers have lower bp than isomeric alcohols because:
(A) no intermolecular H-bonding (B) ionic bonding (C) higher polarity (D) metal bonds
- Ether cleavage with excess HI yields:
(A) alkyl iodides + water (B) alcohol only (C) alkene only (D) acid only
- Anisole with HI gives:
(A) phenol + methyl iodide (B) iodobenzene + methanol (C) benzene only (D) aniline
- Ether oxygen acts as:
(A) Lewis base (B) strong acid (C) oxidant only (D) metal
- Diethyl ether forms peroxide on:
(A) standing in air/light (B) water addition (C) cooling (D) NaOH treatment
- Ethers are generally:
(A) highly soluble in water (B) slightly soluble (C) ionic solids (D) strong acids
- Cyclic ether is:
(A) THF (B) ethanol (C) phenol (D) acetone
- Crown ethers complex:
(A) metal cations (B) anions only (C) proteins only (D) gases
- Ethers are used as:
(A) solvents (B) strong acids (C) oxidising agents (D) metals

Section B — Short Answer (Attempt any 3) (3 × 2 = 6)

- Define ether and give general formula.
- Write Williamson synthesis of ethoxyethane.
- Why are ethers less soluble/lower-boiling than alcohols?
- Write cleavage of diethyl ether with HI.
- Why is anisole cleaved at alkyl-O bond?

Section C — Long Answer (Attempt any 1) (1 × 5 = 5)

- Explain Williamson ether synthesis with limitation.
- Describe preparation and chemical reactions of ethers.

Teacher record: MCQ ____/15 | Short ____/6 | Long ____/5 | Presentation/Homework ____/4 | Total ____/30



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CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

TEACHER ANSWER KEY — DPP 56

Alcohols, Phenols and Ethers | Ethers: nomenclature, preparation and reactions

MCQ answers: 1-A, 2-A, 3-A, 4-B, 5-B, 6-B, 7-A, 8-A, 9-A, 10-A, 11-A, 12-B, 13-A, 14-A, 15-A

Short-answer marking points

16. $R-O-R'$.

17. $C_6H_5ONa + C_6H_5Br \rightarrow C_6H_5OC_6H_5 + NaBr$.

18. No intermolecular H bonding; only weak H bonding with water, so lower bp/solubility.

19. $C_6H_5OC_6H_5 + 2HI \rightarrow 2C_6H_5I + H_2O$.

20. Aryl-O bond has partial double character; I^- attacks methyl by SN_2 .

Long-answer marking points

21. Alkoxide/phenoxide attacks primary RX via SN_2 ; tertiary RX gives elimination, aryl/vinyl X do not undergo SN_2 .

22. Preparation by dehydration/Williamson; cleavage by HI/HBr, peroxide formation and applications.

Remedial rule: Score below 15/26: revise named reactions, equations and conversions; take a 10-MCQ re-test.



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CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

DAILY PRACTICE PROBLEM — DPP 57

Alcohols, Phenols and Ethers | Mixed conversions and full chapter test

Student Name: _____	Roll No.: _____
DPP No.: 57 Chapter: Alcohols, Phenols and Ethers	Date: _____
Topic: Mixed conversions and full chapter test	Score: ____ / 30

Instructions: Answer all objective questions. Attempt any 3 short-answer questions and any 1 long-answer question.

Section A — Objective Questions (15 × 1 = 15)

- Alcohol functional group:
(A) –OH (B) –CHO (C) –COOH (D) –O–
- Phenol reacts with NaOH because:
(A) more acidic than water (B) less acidic than water (C) basic (D) no OH
- Ethanol with conc H_2SO_4 at 443 K gives:
(A) ether (B) ethene (C) ethanal (D) acid
- Ethanol with conc H_2SO_4 at 413 K gives:
(A) ethene (B) ether (C) ethanal (D) acid
- Phenol+bromine water gives:
(A) tribromophenol (B) bromobenzene (C) chlorobenzene (D) aniline
- Kolbe reaction gives:
(A) salicylic acid (B) benzoic acid (C) picric acid (D) aniline
- Reimer-Tiemann gives:
(A) salicylaldehyde (B) benzaldehyde (C) acetaldehyde (D) formaldehyde
- Williamson synthesis is:
(A) $\text{S}_\text{N}1$ (B) $\text{S}_\text{N}2$ (C) $\text{E}1$ (D) $\text{E}2$
- Ether cleavage reagent:
(A) HI/HBr (B) NaOH (C) H_2SO_4 only (D) Br_2 water
- Anisole+HI gives:
(A) phenol+ CH_3I (B) iodobenzene+methanol (C) benzene (D) aniline
- Lucas reagent:
(A) conc HCl/ZnCl_2 (B) dil HCl/Cu (C) NaOH/Zn (D) H_2SO_4
- 1° alcohol oxidation gives:
(A) aldehyde (B) ketone (C) alkene (D) acid directly always
- 2° alcohol oxidation gives:
(A) aldehyde (B) ketone (C) acid (D) ether
- Phenol FeCl_3 test:
(A) violet (B) blue (C) white (D) green
- Iodoform test given by:
(A) ethanol (B) methanol (C) phenol (D) tert-butanol

Section B — Short Answer (Attempt any 3) (3 × 2 = 6)

- Differentiate alcohol and phenol.
- Why is phenol acidic?
- Write ethanol oxidation and dehydration.
- Write Kolbe reaction.
- Write Williamson ether synthesis.

Section C — Long Answer (Attempt any 1) (1 × 5 = 5)

- Explain preparation/reactions of alcohols, phenols and ethers.
- Give conversion: ethanol → ethene → ethanol; phenol → salicylic acid; anisole → phenol.

Teacher record: MCQ ____/15 | Short ____/6 | Long ____/5 | Presentation/Homework ____/4 | Total ____/30



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CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

TEACHER ANSWER KEY — DPP 57

Alcohols, Phenols and Ethers | Mixed conversions and full chapter test

MCQ answers: 1-A, 2-A, 3-B, 4-B, 5-A, 6-A, 7-A, 8-B, 9-A, 10-A, 11-A, 12-A, 13-B, 14-A, 15-A

Short-answer marking points

16. Alcohol OH on aliphatic sp^3 C; phenol OH directly on aromatic sp^2 C; phenol reacts with NaOH, alcohol does not.

17. Resonance stabilisation of phenoxide.

18. C_6H_5OH oxidation gives C_6H_5CHO/C_6H_5COOH ; dehydration with conc H_2SO_4 yields ethene.

19. $C_6H_5ONa + CO_2 \rightarrow$ o-hydroxybenzoate; acidification gives salicylic acid.

20. $RONa + R'X \rightarrow ROR' + NaX$.

Long-answer marking points

21. Cover preparation, properties and named reactions with conditions.

22. Use hydration/dehydration; Kolbe; HI cleavage of anisole to phenol + CH_3I .

Remedial rule: Score below 15/26: revise named reactions, equations and conversions; take a 10-MCQ re-test.