SCERT Kerala · Class 10 · Chemistry

Chemistry Part 1

PADIKAM
CHEMISTRY
PART I
Complete Study Notes | Standard X | English Medium
SCERT Kerala 2025 syllabus coverage
Original explanations, revision tools, exam focus and practice

PADIKAM | CLASS 10 CHEMISTRY - PART I
Contents
Four connected chapters take you from the language of organic compounds to reactions, periodic behaviour and quantitative chemistry.
Chapter 1 | Nomenclature of Organic Compounds and Isomerism
Chapter 2 | Chemical Reactions of Organic Compounds
Chapter 3 | Periodic Table and Electron Configuration
Chapter 4 | Gas Laws and Mole Concept
How to use this book
• Read the chapter mission first to understand the learning target.
• Study the core notes and pause at every table, formula or process map.
• Use the exam focus list for last-minute revision.
• Answer the practice questions without looking back, then revise weak areas.
Official textbook links
SCERT Kerala Class 10 PART I
SCERT Kerala Standard 10 textbook catalogue

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CHAPTER 1
Nomenclature of Organic Compounds and Isomerism
Chapter mission: name common carbon compounds systematically, read structural formulae and distinguish important forms of isomerism.
The carbon framework
• Carbon forms four covalent bonds. Carbon atoms can join as straight chains, branched chains or rings.
• A homologous series is a family with the same functional group and general formula. Successive members differ by -CH - and by 14 u in molar mass.

• A functional group is the reactive part of an organic molecule. It largely controls chemical behaviour.
Root words and suffixes
Carbon atoms Root Basic alkane
1 meth- methane
2 eth- ethane
3 prop- propane
4 but- butane
5 pent- pentane
6 hex- hexane
Functional groups
Group Class Naming clue
C=C / C≡C alkene / alkyne -ene / -yne
-OH alcohol -ol

-CHO aldehyde -al
>C=O ketone -one
-COOH carboxylic acid -oic acid
-X halo compound fluoro-, chloro-, bromo-, iodo-
A reliable IUPAC naming method
• Choose the longest chain containing the principal functional group and maximum number of multiple bonds.
• Number the chain from the end that gives the principal functional group the lowest locant; then consider multiple bonds and substituents.
• Name substituents with their position numbers, arrange different substituent names alphabetically, and use di-, tri- or tetra- for repetition.

• Write the parent root, saturation part and functional-group suffix as one name. Use commas between numbers and hyphens between numbers and words.
Isomerism
• Isomers have the same molecular formula but different arrangements of atoms, so their properties may differ.
• Chain isomerism arises from different carbon skeletons; position isomerism from different positions of a substituent, multiple bond or functional group.
• Functional isomerism occurs when the same molecular formula represents different functional groups.
Exam focus
• Practise converting between molecular, condensed and displayed structural formulae.
• In a name, justify the parent chain, numbering and suffix separately.
• Do not confuse a homologous-series difference with isomerism.
Practice
1. Name CH -CH -CH(OH)-CH using IUPAC rules.
3 2 3
2. Draw two chain isomers of C H .
4 10
3. Explain why propanone and propanal are functional isomers.

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CHAPTER 2
Chemical Reactions of Organic Compounds
Chapter mission: connect molecular structure with the major reactions of hydrocarbons, alcohols, aldehydes, ketones, acids and esters.
Combustion and oxidation
• Complete combustion of a hydrocarbon in sufficient oxygen produces carbon dioxide, water and heat. Limited oxygen can form carbon monoxide or soot.
• Oxidation of a primary alcohol first gives an aldehyde and then a carboxylic acid. A secondary alcohol gives a ketone.
• Oxidising agents supply oxygen or remove hydrogen; the organic product depends on the starting functional group and reaction conditions.
CH + 2O → CO + 2H O + heat
4 2 2 2
ethanol → ethanal → ethanoic acid
Addition and substitution
• Unsaturated compounds undergo addition because atoms add across a C=C or C≡C bond. Hydrogenation converts an unsaturated compound into a more saturated one.
• Alkanes commonly undergo substitution: one atom or group is replaced by another, as in chlorination under suitable light.
• Bromine water is decolourised by many unsaturated compounds and can be used as a simple test for unsaturation.
Alcohols, acids and esters
• Alcohols can react with active metals to release hydrogen. They may also dehydrate to form alkenes under suitable conditions.

• Carboxylic acids show acidic behaviour: they react with metals, bases and carbonates.
• Esterification joins a carboxylic acid and an alcohol to form an ester and water. Many esters have pleasant odours.
• Hydrolysis breaks an ester using water. Alkaline hydrolysis of fats or oils produces soap and glycerol and is called saponification.
carboxylic acid + alcohol ⇌ ester + water
Polymers
• A monomer is a small molecule that can join repeatedly; the long product is a polymer.
• Addition polymerisation joins unsaturated monomers without eliminating a small molecule. Condensation polymerisation forms links while eliminating a small molecule such as water.
• Polymer properties depend on monomer structure, chain length, branching and cross-linking. Responsible use and recycling reduce environmental damage.

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Reading an organic equation
• Mark the carbon skeleton first, then identify the functional group before and after reaction.
• Classify the change as addition, substitution, elimination, oxidation, esterification, hydrolysis or polymerisation.
• Check atom balance and write the necessary catalyst or condition above the reaction arrow when known.
Exam focus
• Relate each reaction type to a visible structural change.
• Learn equations as transformations, not isolated lines.
• Distinguish esterification from saponification and addition polymerisation from condensation polymerisation.
Practice
1. Why does ethene decolourise bromine water while ethane usually does not?
2. Write the products of complete combustion of ethanol.
3. Describe esterification and state one use of esters.

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CHAPTER 3
Periodic Table and Electron Configuration
Chapter mission: use electron configuration to locate elements, explain periodic trends and predict chemical behaviour.
Modern periodic law
The properties of elements repeat periodically when elements are arranged by increasing atomic number. The modern table has periods as horizontal rows and groups as vertical columns.
Electronic configuration and position
• The period number equals the number of occupied electron shells for the main-group elements studied here.
• Elements with similar valence-shell configurations occur in the same group and show related chemical properties.
• For representative elements, one or two valence electrons usually indicate metallic behaviour; six or seven often indicate non-metallic behaviour; a complete shell is especially stable.
• The s, p, d and f blocks are based on the subshell receiving the differentiating electron.
Periodic trends
Property Across a period Down a group
Atomic size generally decreases generally increases
Ionisation energy generally increases generally decreases
Electronegativity generally increases generally decreases
Metallic character generally decreases generally increases
Why the trends occur
• Across a period, nuclear charge increases while electrons enter the same main shell, so attraction becomes stronger and atomic radius tends to shrink.
• Down a group, new shells increase distance and shielding, so atoms become larger and outer electrons are held less strongly.
• Cations are smaller than their parent atoms; anions are larger because electron-electron repulsion increases and effective attraction per electron falls.

Valency and reactivity

• Atoms gain, lose or share electrons to reach a more stable outer-shell arrangement. Valency expresses combining capacity.

• Among metals in a group, reactivity usually increases downwards because electron loss becomes easier. For halogens, reactivity generally decreases downwards because electron gain becomes less favourable.

Exam focus

• Write configurations correctly before predicting group and period.

• Give a particle-level reason for each trend.

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• Compare ions and atoms using nuclear attraction, distance and electron repulsion.

Practice

1. An element has configuration 2,8,7. Find its period, group tendency and likely ion.

2. Explain the change in atomic radius across a period.

3. Why is a sodium ion smaller than a sodium atom?

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CHAPTER 4

Gas Laws and Mole Concept

Chapter mission: solve pressure-volume-temperature problems and connect microscopic particles with measurable chemical quantities.

Describing a gas

• Gas pressure is caused by particle collisions with container walls. Temperature in kelvin reflects average kinetic energy.

• For gas-law calculations, temperature must be converted to kelvin: K = °C + 273.

• A fair gas-law comparison keeps the amount of gas fixed and changes only the stated variables.

The gas laws

Law Constant Relation

Boyle's law temperature $P_1V_1 = P_2V_2$

Charles's law pressure $V_1/T_1 = V_2/T_2$

Pressure law volume $P_1/T_1 = P_2/T_2$

Combined law amount of gas $P_1V_1/T_1 = P_2V_2/T_2$

The mole

• One mole contains Avogadro number, 6.022×10 , of specified particles.

• Molar mass is the mass of one mole and is numerically equal to relative formula mass when expressed in $g\,mol^{-1}$.

• Always name the entity: atoms, molecules, ions, electrons or formula units.

number of moles, n = mass, m / molar mass, M

number of particles, $N = n \times 6.022 \times 10$

Molar volume and stoichiometry

• At the stated standard conditions used in the course, equal moles of gases occupy equal volumes. Use the molar volume specified in the question or textbook convention.

• A balanced equation gives mole ratios. Convert the given quantity to moles, apply the ratio, and convert to the requested mass, particles or gas volume.

• The limiting reactant is consumed first and therefore fixes the maximum product amount.

Problem-solving routine

• Write the known values with units; convert temperature to kelvin and pressure or volume to consistent units.

• Choose the relation only after identifying what stays constant.

• Estimate the direction of change before calculating, then check significant units and physical sense.

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Exam focus

• Never insert Celsius temperature directly into a gas-law ratio.

• Show the mole bridge: given quantity → moles → required quantity.

• Use coefficients from a balanced equation, not subscripts in formulae, as reaction ratios.

Practice

1. A gas occupies 600 mL at 1 atm. Find its volume at 2 atm at constant temperature.
2. Find the number of molecules in 0.25 mol of oxygen.
3. Outline how to calculate product mass from a balanced equation.

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Final Revision Checklist

• I can name and draw organic compounds.

• I can classify organic reactions from structural change.

• I can explain periodic trends from electron arrangement.

• I can solve gas-law and mole problems with correct units.

Padikam Learning Content

Prepared as an independent learning companion using the SCERT textbook only as the syllabus and notation reference.