Lesson Plan: Carbon and its Compounds (CBSE Class X 2026-27)

Teacher:

Class: X

Subject: Science (Subject Code - 086)

Unit I: Chemical Substances - Nature and Behaviour (Unit Weightage: 25 Marks)

Chapter: 4 – Carbon and its Compounds

Estimated Number of Periods: 14

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1. Gist of the Lesson & Curricular Goals

- **Core Syllabus:** Covalent bonds, the versatile nature of carbon, and homologous series. Nomenclature of carbon compounds containing functional groups (halogens, alcohol, ketones, aldehydes, alkanes, alkenes, alkynes). Chemical properties of carbon compounds (combustion, oxidation, addition, and substitution reactions). Properties and uses of ethanol and ethanoic acid, alongside soaps and detergents.

- **Educational Aim:** To build an understanding of molecular structures and apply scientific principles to everyday materials, developing capacities for systemic analysis of organic compounds as envisioned by the NCF-SE 2023.

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2. Teaching-Learning Plan & Pedagogy

Key Concepts	**Competencies (C) & Learning Outcomes**	**Teaching-Learning Activities (Pedagogy)**	**Assessment Strategies**
Covalent Bonding & Versatile Nature	**C-1.1:** Explains how carbon compounds are formed based on atomic structure and properties. • *Outcome:* Students	• **Board Work/Drawing:** Illustrate electron sharing in H_2, O_2, N_2, CH_4, and CO_2 to form single, double, and triple covalent bonds. • **Discussion:** Why	• **[Demonstrate Knowledge - VSA]:** *Define* catenation. • **[Application - SA]:** *Illustrate* the electron dot structure of cyclopentane.

	will draw electron dot structures and explain catenation and tetravalency.	carbon cannot easily gain or lose 4 electrons (C^{4+}/C^{4-} issues), leading to covalent bonding.	
Homologous Series & Nomenclature	**C-1.1:** Explains structural formations. • *Outcome:* Students will name and draw structures for saturated/unsaturated hydrocarbons and functional groups.	• **Pattern Recognition:** Map the successive difference of -CH_2 units in alkanes, alkenes, and alkynes to deduce general formulas. • **Rule Mapping:** Step-by-step practice of IUPAC naming rules for halogens, alcohols, aldehydes, and ketones.	• **[Demonstrate Knowledge - Objective]:** *Identify* the functional group in CH_3COCH_3. • **[Formulate & Analyze - SA]:** *Construct* the structural formula for butanoic acid.
Chemical Properties of Carbon Compounds	**C-1.3:** Describes chemical interactions using equations. • *Outcome:* Students will distinguish between combustion, oxidation, addition, and substitution reactions.	• **Demonstration:** Burn camphor (unsaturated, sooty flame) vs. alcohol (saturated, clean flame) to show combustion differences. • **Equation Practice:** Mapping the addition of hydrogen to unsaturated oils (hydrogenation) and the substitution reaction of methane	• **[Application - SA]:** *Explain* the process of hydrogenation and its industrial application. • **[Analyze & Evaluate - Assertion-Reasoning]: ***Evaluate* statements regarding oxidizing agents converting alcohols to carboxylic acids.

		with chlorine in sunlight.	
Ethanol and Ethanoic Acid	**C-1.2:** Investigates the nature and properties of chemical substances. **C-8.2:** Accurately uses scientific instruments.	• **Mandatory Practical (Exp 8):** Study ethanoic acid properties: checking its vinegar-like odour, solubility in water, acidic effect on litmus, and its effervescent reaction with Sodium Hydrogen Carbonate.	• **[Demonstrate Knowledge - VSA]:** *State* two physical properties of ethanol. • **[Application - LA]:** *Write* the balanced chemical equation for esterification.
Soaps and Detergents	**C-1.2:** Investigates properties of mixtures and solutions. **C-8.2:** Draws inferences based on data.	• **Mandatory Practical (Exp 9):** Study the comparative cleaning capacity of a sample of soap in soft and hard water. Observe the formation of scum in hard water. • **Visual Aid:** Draw the structure of a micelle (hydrophilic head, hydrophobic tail).	• **[Formulate & Analyze - Case-Based]:** *Interpret* why detergents are preferred over soaps for washing clothes in hard water. • **[Demonstrate Knowledge - SA]:** *Describe* the mechanism of micelle formation.

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3. Assessment Structure & Weightage

Assessments are strictly modeled on the CBSE 2026-27 Theory Question Paper Design (80 marks):

- **Demonstrate Knowledge and Understanding (50%):** Assessed via questions asking students to *state, name, list, identify, define, suggest, describe, outline, and summarize* (e.g., identifying functional groups, defining homologous series).

- **Application of Knowledge/Concepts (30%):** Assessed via questions asking students to *calculate, illustrate, show, adapt, explain, and distinguish* (e.g., drawing electron dot structures, explaining cleansing action).

- **Formulate, Analyze, Evaluate and Create (20%):** Assessed via questions asking students to *interpret, analyze, compare, contrast, examine, evaluate, discuss, and construct* (e.g., comparing saturated vs. unsaturated behavior, evaluating practical experiment results).

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4. Digital Integration & Portfolio Enrichment (Internal Assessment - 20 Marks)

- **Subject Enrichment (Practical Work - 5 Marks):** Evaluated strictly on the execution of Experiment 8 (Properties of ethanoic acid) and Experiment 9 (Cleaning capacity of soap), emphasizing accurate observation of gas evolution and scum formation, alongside proper lab record maintenance .

- **Digital Integration Strategy:** To reinforce complex 3D spatial concepts ahead of Periodic Assessments (5+5 Marks), utilize digital 3D molecular modeling tools (available via DIKSHA or similar educational portals) to allow students to rotate and visualize the tetrahedral structure of methane, the double bond in ethene, and the spherical nature of a soap micelle.
- **Portfolio Task (5 Marks):** Students will *examine* the ingredient labels of five common household products (e.g., nail polish remover, vinegar, hand sanitizer, cooking oil, detergent). They will prepare a brief write-up identifying the specific carbon compounds or functional groups present in these items (e.g., acetone/ketone, acetic acid, ethanol), securely adding this real-world application mapping to their academic portfolio.