

Organic Chemistry: Some Basic Principles and Techniques — CBSE Pattern Test 1

Class 11 Chemistry · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

Test 1 — CBSE Pattern (90 minutes, 40 marks)

Class 11 Chemistry · Organic Chemistry: Some Basic Principles and Techniques · Narayan Gurukul Academy (ClassApna)

General Instructions: (1) This paper has four sections — Section A (1×10), Section B (2×4), Section C (3×4) and Section D (5×2) — total 40 marks. Time allowed: 90 minutes.

(2) All questions are compulsory. No overall choice is given; internal choice, where allowed, is clearly marked.

(3) For MCQ questions choose the single correct option; for VSA answers write a single line.

(4) Take $g = 10 \text{ m/s}^2$. All symbols carry their usual meaning. Use of a calculator is not permitted.

Section A — MCQ & VSA ($10 \times 1 = 10$ marks)

1. Carbon forms a large number of compounds mainly because of

- (A) catenation and tetravalency
- (B) its high atomic mass
- (C) its metallic nature
- (D) its large size

2. Catenation is the ability of carbon to

- (A) form chains and rings with other carbon atoms
- (B) gain electrons
- (C) lose electrons
- (D) form ionic bonds

3. The IUPAC name of $\text{CH}_3\text{CH}_2\text{CH}_3$ is

- (A) propane
- (B) ethane
- (C) butane
- (D) methane

4. The functional group present in CH_3COOH is

- (A) carboxylic acid ($-\text{COOH}$)
- (B) aldehyde ($-\text{CHO}$)
- (C) alcohol ($-\text{OH}$)
- (D) ketone ($-\text{CO}-$)

5. Butane (C_4H_{10}) has how many structural isomers?

- (A) 2
- (B) 1
- (C) 3
- (D) 4

6. In a saturated hydrocarbon, each carbon atom is

- (A) sp^3 hybridised
- (B) sp^2 hybridised
- (C) sp hybridised
- (D) unhybridised

7. The inductive effect is transmitted through

- (A) sigma bonds
 - (B) pi bonds
 - (C) space
 - (D) ions
8. A carbocation is a species with
- (A) a positively charged carbon
 - (B) a negatively charged carbon
 - (C) an unpaired electron
 - (D) a radical
9. What is catenation?
10. Define a functional group.

Section B — Short Answer I ($4 \times 2 = 8$ marks)

11. What is the hybridisation of carbon in ethyne (C_2H_2)?
12. Define isomerism.
13. What is a pi bond?
14. Distinguish between a substitution and an addition reaction.

Section C — Short Answer II ($4 \times 3 = 12$ marks)

15. Explain why carbon forms a very large number of compounds, referring to tetravalency, catenation and the strength of the C–C bond.
16. Write the IUPAC rules for naming organic compounds and assign the IUPAC name of 2-methylbutane.
17. Define structural isomerism and explain chain and position isomerism with one example each.
18. Explain the inductive effect and the resonance effect with one example each.

Section D — Long Answers ($2 \times 5 = 10$ marks)

19. Explain sp , sp^2 and sp^3 hybridisation in organic molecules with one example each, including bond angles. State the hybridisation of each carbon atom in propene ($CH_3-CH=CH_2$).
20. Explain the inductive, resonance and hyperconjugation effects with examples. Arrange the carbocations $(CH_3)_3C^+$, $(CH_3)_2CH^+$ and $CH_3CH_2^+$ in order of decreasing stability, giving a reason.

Answer Key (Marking Scheme)

- Q1 — (A) catenation and tetravalency. Q2 — (A) form chains and rings with other carbon atoms. Q3 — (A) propane. Q4 — (A) carboxylic acid ($-COOH$).
- Q5 — (A) 2. Q6 — (A) sp^3 hybridised. Q7 — (A) sigma bonds. Q8 — (A) a positively charged carbon.
- Q9 — The ability of carbon to form chains and rings with other carbon atoms.
- Q10 — An atom or group of atoms that defines the chemical behaviour of a compound.
- Q11 — sp .
- Q12 — Compounds with the same molecular formula but different structures.
- Q13 — A bond formed by the sideways overlap of p orbitals.
- Q14 — Substitution replaces an atom/group; addition adds atoms across a multiple bond.

Q15 — Tetravalency, catenation and strong C–C bonds give a huge number of compounds.

Q16 — IUPAC rules as in notes; 2-methylbutane.

Q17 — Chain and position isomerism with examples.

Q18 — Inductive and resonance effects with examples.

Q19 — sp (ethyne, 180°), sp^2 (ethene, 120°), sp^3 (ethane, 109.5°); propene: C1 sp^3 , C2 sp^2 , C3 sp^2 .

Q20 — Effects as in notes; stability $(CH_3)_3C^+ > (CH_3)_2CH^+ > CH_3CH_2^+$.