

Hydrocarbons — 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 · Hydrocarbons · 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)

- The general formula of alkanes is
 - $\text{C}_n\text{H}_{2n+2}$
 - C_nH_{2n}
 - $\text{C}_n\text{H}_{2n-2}$
 - C_nH_n
- The hybridisation of carbon in alkanes is
 - sp^3
 - sp^2
 - sp
 - sp^3d
- Alkanes undergo mainly
 - substitution reactions
 - addition reactions
 - elimination reactions
 - polymerisation
- The general formula of alkenes is
 - C_nH_{2n}
 - $\text{C}_n\text{H}_{2n+2}$
 - $\text{C}_n\text{H}_{2n-2}$
 - C_nH_n
- According to Markovnikov's rule, the negative part of the reagent adds to the carbon
 - with fewer hydrogen atoms
 - with more hydrogen atoms
 - at the end of the chain
 - with a positive charge
- The general formula of alkynes is
 - $\text{C}_n\text{H}_{2n-2}$
 - C_nH_{2n}
 - $\text{C}_n\text{H}_{2n+2}$
 - C_nH_n
- The molecular formula of benzene is
 - C_6H_6

(B) C_6H_{12}

(C) C_6H_{10}

(D) C_6H_4

8. Benzene undergoes mainly

(A) electrophilic substitution

(B) nucleophilic addition

(C) free radical addition

(D) elimination

9. Write the general formula of alkanes.

10. State Markovnikov's rule.

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

11. What is the hybridisation of the doubly bonded carbon in alkenes?

12. Name the reaction of an alkene with hydrogen in the presence of Ni.

13. What is the hybridisation of carbon in ethyne?

14. State Hückel's rule for aromaticity.

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

15. Explain the free radical mechanism of the halogenation of alkanes, showing the initiation, propagation and termination steps.

16. Describe the addition reactions of alkenes with equations and state Markovnikov's rule.

17. Describe the structure, preparation and addition reactions of alkynes with equations.

18. Explain the structure and aromaticity of benzene and describe two electrophilic substitution reactions with equations.

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

19. State Markovnikov's rule. Apply it to the addition of HBr to propene and justify the product using the stability of carbocation intermediates.

20. Explain why benzene undergoes electrophilic substitution rather than addition, using Hückel's rule. Describe the mechanism of the electrophilic nitration of benzene.

Answer Key (Marking Scheme)

Q1 — (A) C_nH_{2n+2} . Q2 — (A) sp^3 . Q3 — (A) substitution reactions. Q4 — (A) C_nH_{2n} .

Q5 — (A) with fewer hydrogen atoms. Q6 — (A) C_nH_{2n-2} . Q7 — (A) C_6H_6 . Q8 — (A) electrophilic substitution.

Q9 — C_nH_{2n+2} .

Q10 — The negative part of the reagent adds to the doubly bonded carbon with fewer hydrogen atoms.

Q11 — sp^2 .

Q12 — Hydrogenation.

Q13 — sp .

Q14 — A compound is aromatic if it is cyclic, planar and has $(4n + 2)$ pi electrons.

Q15 — Initiation, propagation and termination as in notes.

Q16 — Addition reactions and Markovnikov's rule as in notes.

Q17 — Structure, preparation and reactions of alkynes as in notes.

Q18 — Aromaticity and nitration/halogenation as in notes.

Q19 — $\text{CH}_3\text{-CHBr-CH}_3$; the secondary carbocation is more stable.

Q20 — Aromatic stabilisation; nitration mechanism via NO_2^+ .