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CLASS 11 | CHEMISTRY | EXTRA QUESTIONS

Class 11 Chemistry Chapter 9 Hydrocarbons – Extra Questions with Answers

Extra practice questions for Class 11 Chemistry Chapter 9 (Hydrocarbons), beyond the textbook. These Class 11 Chemistry Chapter 9 important questions are handy for last-minute exam practice.

Contents

Extra practice questions for Class 11 Chemistry Chapter 9 (Hydrocarbons), beyond the textbook. These Class 11 Chemistry Chapter 9 important questions are handy for last-minute exam practice.

Very Short Answer Questions (1 mark)

Q1. What is the general formula for alkynes?
Ans: C_nH_{2n-2}.

Q2. Name the reaction used to prepare alkanes by coupling two alkyl halides with sodium.
Ans: Wurtz reaction.

Q3. What type of reaction do alkenes typically undergo?
Ans: Electrophilic addition reactions.

Q4. What type of reaction does benzene typically undergo?
Ans: Electrophilic substitution reactions.

Q5. Which compound is produced when calcium carbide reacts with water?
Ans: Ethyne (acetylene, C_2H_2).

Short Answer Questions (2–3 marks)

Q6. Write the molecular formula of an alkane with 5 carbon atoms.
Ans: C_nH_{2n+2}=C_5H_{12} (pentane).

Q7. State Markovnikov's rule and apply it to predict the major product of HBr addition to propene (CH_3-CH=CH_2).
Ans: Markovnikov's rule: H adds to the carbon with more H atoms already. In propene, the terminal CH_2 has more H atoms, so H adds there and Br adds to the middle carbon, giving 2-bromopropane (CH_3-CHBr-CH_3) as the major product.

Q8. Is the -NO_2 group ortho/para-directing or meta-directing in electrophilic aromatic substitution?
Ans: Meta-directing (and deactivating).

Higher-Order Thinking / Application Questions

Q9. Explain, using the mechanism of electrophilic addition, why the addition of HBr to propene follows Markovnikov's rule, connecting this to the stability of the carbocation intermediate formed.
Ans: In the electrophilic addition of HBr to propene (CH_3-CH=CH_2), the reaction proceeds by first protonating (adding H^+) to one of the double-bond carbons, generating a carbocation intermediate, followed by attack of Br^- on this carbocation. If H^+ adds to the terminal CH_2 carbon, a secondary carbocation forms at the middle carbon (CH_3-CH^+-CH_3), which is more stable than the alternative primary carbocation that would form if H^+ instead added to the middle carbon (leaving a primary carbocation at the terminal position). Since reactions proceed through the lower-energy, more stable intermediate (secondary carbocation, stabilized by +I effect and hyperconjugation from two adjacent alkyl groups), the reaction preferentially follows the pathway giving this more stable carbocation, which is then attacked by Br^- to give 2-bromopropane as the major product — this mechanistic preference for the more stable carbocation intermediate is the underlying reason for Markovnikov's rule.

Q10. Explain why benzene, despite having three formal C=C double bonds in its Kekulé structure, does not undergo typical addition reactions like alkenes do, using the concept of resonance/delocalization and aromatic stability.
Ans: Although benzene's Kekulé structure appears to show three alternating double bonds, the reality (confirmed by molecular orbital theory and resonance) is that all six p-orbitals on the ring carbons overlap to form a continuous, delocalized pi-electron cloud above and below the plane of the ring, with all six carbon-carbon bonds being equivalent (of intermediate length between single and double bonds) rather than three distinct double bonds and three single bonds. This delocalization confers substantial extra stability (called resonance/aromatic stabilization energy) compared to a hypothetical non-delocalized 'cyclohexatriene' structure. If benzene underwent an addition reaction (like alkenes do), one or more of the ring carbons would become sp^3 hybridized, breaking the continuous pi system and destroying this aromatic stabilization, which is energetically highly unfavourable. Therefore, benzene instead undergoes electrophilic substitution reactions, where a hydrogen atom on the ring is replaced by another group while the aromatic pi system and its associated stability are fully preserved throughout the reaction, making substitution energetically much more favourable than addition for aromatic compounds.

Class 11 Chemistry Chapter 9 – Solutions and Notes

For complete step-by-step answers and a quick summary, check the Class 11 Chemistry Chapter 9 Solutions and Class 11 Chemistry Chapter 9 Revision Notes.

See also: Chapter 1 | Chapter 2 | Chapter 3 | Chapter 4 | Chapter 5 | Chapter 6 | Chapter 7 | Chapter 8 | Chapter 9

Practice more: Chapter 1 | Chapter 2 | Chapter 3 | Chapter 4 | Chapter 5 | Chapter 6 | Chapter 7 | Chapter 8

Quick revision: Chapter 1 | Chapter 2 | Chapter 3 | Chapter 4 | Chapter 5 | Chapter 6 | Chapter 7 | Chapter 8