Class 11 Chemistry · Chapter 9: Hydrocarbons

Worksheet · 20 marks · about 40 minutes · based on NCERT

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1. Which of the following molecular formulae can belong to an alkane? [1]

(a) C_6H_{10} (b) C_8H_{18}
(c) C_9H_{18} (d) C_7H_{14}

2. Which of the following alkanes contains a quaternary (4°) carbon atom? [1]

(a) 2-methylpentane (b) 3-methylpentane
(c) 2,3-dimethylbutane (d) 2,2-dimethylbutane

3. Which of the following is a chain-propagation step in the chlorination of methane? [1]

(a) $\dot{C}H_3 + Cl{-}Cl \rightarrow CH_3{-}Cl + \dot{C}l$ (b) $Cl{-}Cl \rightarrow 2\dot{C}l$
(c) $\dot{C}H_3 + \dot{C}l \rightarrow CH_3{-}Cl$ (d) $\dot{C}H_3 + \dot{C}H_3 \rightarrow CH_3{-}CH_3$

4. Methane cannot be prepared by Kolbe's electrolytic method because [1]

(a) methane is oxidised to carbon dioxide at the anode (b) acetate ions do not lose electrons at the anode
(c) the alkane is formed by joining two alkyl free radicals, so it has at least two carbon atoms (d) methane is formed at the cathode along with hydrogen

5. The correct order of increasing boiling point is [1]

(a) 2,2-dimethylpropane < 2-methylbutane < butane < pentane (b) butane < 2,2-dimethylpropane < 2-methylbutane < pentane
(c) 2,2-dimethylpropane < butane < 2-methylbutane < pentane (d) butane < pentane < 2-methylbutane < 2,2-dimethylpropane

6. Using $\Delta_c H°$ (CH_4) = −890 kJ mol^{-1} and $\Delta_c H°$ (C_4H_{10}) = −2875.84 kJ mol^{-1}, show which fuel releases more heat per gram on complete combustion. (C = 12 u, H = 1 u) [2]

7. Write the electrophile, and the equation for its formation, in (i) the chlorination of benzene with anhydrous $AlCl_3$ and (ii) the Friedel–Crafts acylation of benzene with ethanoyl chloride. [2]

8. The conformations of ethane cannot be separated, but cis- and trans-but-2-ene can. Explain. [2]

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9. Starting from sodium propanoate, CH_3CH_2COONa, show how you would obtain (i) ethane, (ii) chloroethane and (iii) butane, giving the reagent and conditions for each step. [3]

10. Write the structure and name of the main product when but-1-ene reacts with (i) cold concentrated sulphuric acid, (ii) water containing a few drops of concentrated sulphuric acid, (iii) bromine in carbon tetrachloride. State which of these additions follow the Markovnikov rule. [3]

11. The Kekulé structure of benzene predicts two different 1,2-dibromobenzenes and two different C–C bond lengths. State what is actually observed in each case and how the resonance (delocalised) picture accounts for both. [3]