1. Structural and Semistructural Formulas (Hydrocarbons with Halides and Methyl Groups)

Question 1: Write the structural formula for 2-chloro-3-methylbutane.

Question 2: Write the semistructural formula for 1-bromo-2,2-dimethylpropane.

Question 3: Write the name of the hydrocarbon with the semistructural formula $CH_3CHBrCH(CH_3)CH_3$.

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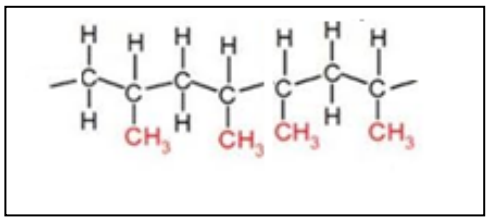
2. Addition Polymerisation

Question 1: Given the monomer pent-2-ene (C_5H_{10}), draw the repeating unit of the polymer formed by addition polymerisation.

Question 2: Consider the polymer chain shown on the right.
Give the IUPAC name of the monomer.



Question 3: Explain the general process of addition polymerisation and what happens to the double bond during polymer formation.

3. Naming Alcohols and Carboxylic Acids; Alkanes and Alkenes from Semistructural Formulas

Question 1: Name the alcohol with the semistructural formula shown below

$$CH_3CH(OH)CH_2\ CH_3.$$

Question 2: Write the name of the carboxylic acid with the formula

$$CH_3CH(CH_3)COOH.$$

Question 3: Given the semistructural formula $CH_3CHCHCH_3$, name the alkene.

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4. Isomers of Pentene

Question 1: Draw the structural formula of the two possible unbranched isomers of pentene (C_5H_{10}).

Question 2: Draw one possible branched isomer of pentene.

Question 3: Explain briefly why these isomers have different physical properties, such as MP and BP.

5. Amino Acids and Chromatography

Question 1: Draw the structures of glycine and alanine.

Question 2: Explain why glycine and alanine would have different Rf values when run on a chromatogram using water as the solvent.

Question 3: Predict which amino acid (glycine or alanine) would travel further on the chromatogram, and justify your answer.

6. Empirical Formula Experiment

A metal Y (molar mass 9.19 g/mol) is burned in oxygen to form an oxide.

Question 1: Given the masses before and after burning, calculate the empirical formula of the oxide formed.

- Mass of empty crucible = 25.000 g
- Mass of crucible + metal Y before burning = 26.780 g
- Mass of crucible + oxide after burning = 28.640 g

Question 2: Why is it important to keep the crucible lid slightly open during the experiment?

Question 3: List two possible sources of error in this empirical formula experiment and how they might affect the result.

7. Isotopic Mass and Percentage Abundance

Question 1: An element has two isotopes: isotope A (mass 10 amu, abundance 20%) and isotope B (mass 11 au, abundance 80%). Calculate the average atomic mass.

Question 2: If the abundance of isotope A changed to 25%, how would the average atomic mass change?

Question 3: Explain why the average atomic mass is usually not a whole number.