2024 Higher Chemistry Paper 1 – Q6

Section: Nature’s Chemistry
Topic: Isomerism & Nomenclature (Carboxylic acids)

Question summary (Q6):
Isovaleric acid has shortened structural formula $(CH_3)_2CHCH_2COOH$. Which option is an isomer of isovaleric acid?

Worked Solution:
• Determine the molecular formula of isovaleric acid:
  $(CH_3)_2CHCH_2COOH \rightarrow C_5H_{10}O_2$.
• An isomer must have the same molecular formula but a different structure.
• Check each option:
  A. 2-methylbutanoic acid → $C_5H_{10}O_2$ and is a position isomer (methyl at C-2, not C-3).
  B. 3-methylbutanoic acid → this is isovaleric acid itself (identical, not an isomer).
  C. 2-methylpentanoic acid → $C_6H_{12}O_2$ (different formula).
  D. 3-methylpentanoic acid → $C_6H_{12}O_2$ (different formula).

Final Answer: A — 2-methylbutanoic acid

Revision Tips:
• For common names: isovaleric acid = 3-methylbutanoic acid ($C_5H_{10}O_2$).
• Isomers share the same molecular formula; position isomers differ in the location of a substituent.
• Pentanoic acids have 5 carbons; any “methylpentanoic acid” has 6 carbons (not an isomer here).