2024 Higher Chemistry Paper 1 – Q12

Section: Nature’s Chemistry
Topic: Alcohols (Dehydration)

Question summary (Q12):
Dehydration of butan-2-ol produces two isomeric alkenes, but-1-ene and but-2-ene. Which other alcohol can also produce two isomeric alkenes on dehydration?

Worked Solution:
• Dehydration removes water across adjacent carbons → a C=C double bond forms.
• To form two different alkenes, the alcohol’s –OH group must be on a carbon atom that is not at the end of the chain (so that two different adjacent carbons are possible).
• Check each option:
  A. Propan-2-ol → only one possible alkene (propene).
  B. Pentan-3-ol → central –OH, but symmetry gives only pent-2-ene.
  C. Hexan-3-ol → –OH on C-3, can dehydrate to give hex-2-ene or hex-3-ene (two isomers).
  D. Heptan-4-ol → similar symmetry to pentan-3-ol, only one product.

Final Answer: C — Hexan-3-ol

Revision Tips:
• Dehydration = elimination of water → alkene.
• To get two alkenes, the –OH must be on a middle carbon where removal of H from either side gives different results.
• Symmetry reduces the number of distinct products.