2024 Higher Chemistry Paper 2 – Q4

Section: Nature’s Chemistry
Topic: Proteins (Keratin, Disulfide Bonds, Essential Amino Acids)

Question summary (Q4):
Proteins such as keratin (in hair and skin) contain amino acids like cysteine.
(a) (i) Name the other product formed when amino acids join to form proteins.
(a) (ii) Suggest a name for the reaction when a disulfide bond forms between cysteine units.
(a) (iii) State what is meant by an essential amino acid.

Worked Solution:
(a) (i) When amino acids join by condensation, the other product is water (H_2O).

(a) (ii) Two cysteine –SH groups oxidise to form a covalent disulfide (–S–S–) bond.
This is an oxidation reaction (loss of hydrogen).

(a) (iii) An essential amino acid is one that the human body cannot synthesise and must therefore be obtained from the diet.

Final Answer:
(a) (i) Water
(a) (ii) Oxidation
(a) (iii) Cannot be made by body, must come from diet

Revision Tips:
• Peptide bond formation = condensation reaction: amino acid + amino acid → peptide + water.
• Disulfide bonds provide rigidity and stability in protein structure (e.g. keratin, insulin).
• Essential amino acids: examples include valine, methionine,

lysine, histidine.

- Non-essential amino acids can be synthesised by the body.