3.2 Carbohydrates, lipids and proteins – summary of previous mark schemes

3.2.2 Identify amino acids, glucose, ribose and fatty acids from diagrams showing their structure.

**Mark Scheme**

The diagrams below show various molecular structures.

I. \[ \text{CH}_3 \text{CH}_2 \text{COOH} \]

II. \[ \text{HO}_2\text{C} \text{C} \text{OH} \]

III. \[ \text{CH}_2\text{OH} \]

IV. \[ \text{N} \text{C} \text{C} \text{OH} \]

3.2.5 Outline the role of condensation and hydrolysis in the relationships between monosaccharides, disaccharides and polysaccharides; between fatty acids, glycerol and triglycerides; and between amino acids and polypeptides.

**Mark Scheme**

**Proteins:**

A. carboxyl / COOH group of one amino acid reacts with amine / NH$_2$ group of another;

B. These steps can be shown diagrammatically, eg

\[ \text{N} \text{C} \text{CO} \text{OH} \]

\[ \text{N} \text{C} \text{CO} \text{OH} \]

\[ \text{condensation} \]

\[ \text{H}_2\text{O} \]

C. peptide / covalent bond is produced;

D. diagram of dipeptide, with peptide bond shown, eg

\[ \text{N} \text{C} \text{C} \text{N} \text{C} \text{CO} \text{OH} \]
E. condensation / dehydration synthesis: water produced (when two amino acids joined);
F. hydrolysis: water needed to break bond;
G. dipeptide → amino acids - hydrolysis occurs;
H. amino acids → dipeptide - condensation occurs;

3.2.7 Compare the use of carbohydrates and lipids in energy storage.

Mark Scheme

carbohydrates:
A. more easily digested than lipids so energy can be released more quickly;
B. more soluble in water for easier transport;
C. energy stored as glycogen in animals / fungus;
D. glycogen / carbohydrates used for short-term energy storage;
E. glycogen converted to glucose when energy is required;
F. carbohydrates are readily used in cell respiration / sugars are quick access energy stores;
G. energy stored as starch in plants;
H. complex carbohydrates / polysaccharides / starch / glycogen are also long term energy stores;
I. complex carbohydrates / polysaccharides / starch / glycogen and lipids are insoluble / will not diffuse out of cells;
J. complex carbohydrates / polysaccharides / starch / glycogen / lipids do not contribute (significantly) to osmotic pressure;
K. complex carbohydrates / polysaccharides / starch / glycogen can be converted into sugars by hydrolysis;

lipids:
L. stored as fat in animals;
M. lipids are insoluble in water less osmotic effect;
N. lipids have more / twice the energy content per unit mass of carbohydrates;
O. lipids / triglycerides used for long-term energy storage;
P. triglycerides converted to fatty acids and glycerol (when energy is required);
Q. triglycerides broken down to yield acetyl CoA;
R. carbohydrates and lipids burn cleaner than proteins / do not yield N waste;