B4 Biological Molecules

B4.1 Biological molecules

1 List the chemical elements that make up: carbohydrates, fats and proteins

2 State that large molecules are made from smaller molecules, limited to: (a) starch, glycogen and cellulose from glucose (b) proteins from amino acids (c) fats and oils from fatty acids and glycerol

3 Describe the use of: (a) iodine solution test for starch (b) Benedict's solution test for reducing sugars (c) biuret test for proteins (d) ethanol emulsion test for fats and oils

Carbohydrates are made of: Carbon (C), Hydrogen (H), and Oxygen (O)

Fats and oils are made of: Carbon (C), Hydrogen (H), and Oxygen (O); the same elements as carbohydrates but in a different arrangement.

Proteins are made of: Carbon (C), Hydrogen (H), Oxygen (O), and Nitrogen (N) and some also contain sulfur.

Large molecules (called macromolecules) are made by joining together smaller units:

Large Molecule	Smaller Units	Example / Use
Starch, glycogen, cellulose	Many glucose molecules	Energy storage (starch/glycogen), plant cell walls (cellulose)
Proteins	Amino acids	Used for growth, enzymes, and repair
Fats and oils (lipids)	Fatty acids + glycerol	Long-term energy storage, insulation

How to test for biological molecules

Test	What it detects	How to do it	Positive result
Iodine solution	Starch	Add iodine to the sample	Turns blue-black if starch is present
Benedict's solution	Sugars like glucose	Heat with Benedict's solution in a water bath	Turns from blue → green → yellow → orange → red depending on how much sugar is present
Biuret test	Protein	Add Biuret solution (sodium hydroxide + copper sulfate)	Turns purple if protein is present
Ethanol emulsion test	Fats and oils (lipids)	Mix with ethanol, then add water	A cloudy white emulsion forms if fats are present