CHAPTER 04
BIOLOGICAL MOLECULES

The stuff you need to know in this chapter:

Core:

- List the chemical elements that make up carbohydrates, fats and proteins
- State that large molecules are made from smaller molecules, limited to: starch and glycogen from glucose, cellulose from glucose, proteins from amino acids, fats and oils from fatty acids and glycerol
- Describe the use of: iodine solution to test for starch, Benedict's solution to test for reducing sugars, biuret test for proteins, ethanol emulsion test for fats and oils, DCPIP test for vitamin C
- State that water is important as a solvent

Extended:

- Explain that different sequences of amino acids give different shapes to protein molecules
- Relate the shape and function of protein molecules to their function, limited to the active site of enzymes and the binding site of antibodies
- Describe the structure of DNA as: two strands coiled together to form a double helix, each strand contains chemicals called bases, cross-links between the strands are formed by pairs of bases, the bases always pair up in the same way: A with T and C with G (full names not required)
- Describe the roles of water as a solvent in organisms with respect to digestion, excretion and transport

What biological molecules are made of

1. Tick the boxes to show which elements are present in the following biological molecules.

Molecule	Carbon	Hydrogen	Oxygen	Nitrogen
Carbohydrates	☐	☐	☐	☐
Fats	☐	☐	☐	☐
Proteins	☐	☐	☐	☐

2. Give an example of the following:

Example of a carbohydrate: _____

Example of a protein: _____

3. Draw and label the structure of a simple carbohydrate made of a chain of glucose molecules

4. Draw and label the structure of a protein

5. Draw and label the structure of a lipid

6. State the relationship between glucose, cellulose, starch and glycogen.

Food tests

1. Complete the table summarizing the tests we do for biological molecules

Biological Molecule	Solution	Positive result
	DCPIP	
Safe Procedure:		
Protein		
Safe Procedure:		
Reducing sugar		
Safe Procedure:		
	Iodine	
Safe Procedure:		
	Ethanol emulsion	
Safe Procedure:		

Proteins

1. State the small subunits that make up proteins

2. State 3 examples of types of proteins

i. _____

ii. _____

iii. _____

3. Chains of amino acids fold up to give proteins specific shapes. State why these shapes are important for:

Enzymes:

Antibodies:

DNA

1. Draw a molecule of DNA showing its twisted shape. Label the cross links.

2. State the name of the twisted structure of the DNA molecule

3. List the four bases present in DNA.

3. Draw another DNA strand - show it uncoiled. Draw it with 9 bases in exactly this order:

A-G-G-C-C-T-G-G-C

WATER

1. What percentage of most organisms is water

_____ %

2. With reference to metabolic reactions, explain why cells would die if they dry out.

3. Complete the sentences below

Many molecules need to be _____ in water. For example, glucose is dissolved in blood _____ so it can be transported around the body.

In addition, _____ (molecules that speed up reactions without being used up themselves) are needed in digestion, so they are found dissolved in water in the _____ canal so that chemical reactions can take place.

Mammals produce nitrogen-based waste in the form of _____, which must exit that body as it would be toxic. It is dissolved in water and exits the body as _____.