

# Carbohydrates and Lipids

## Question Paper 2

|                   |                          |
|-------------------|--------------------------|
| <b>Level</b>      | International A Level    |
| <b>Subject</b>    | Biology                  |
| <b>Exam Board</b> | CIE                      |
| <b>Topic</b>      | Biological Molecules     |
| <b>Sub Topic</b>  | Carbohydrates and Lipids |
| <b>Booklet</b>    | Theory                   |
| <b>Paper Type</b> | Question Paper 2         |

**Time Allowed :** 65 minutes

**Score :** / 54

**Percentage :** /100

**Grade Boundaries:**

| A*   | A      | B   | C     | D     | E   | U    |
|------|--------|-----|-------|-------|-----|------|
| >85% | '77.5% | 70% | 62.5% | 57.5% | 45% | <45% |

1 (a) Fig. 5.1 represents a molecule of a triglyceride.

Name the components **A** and **C** and name the bond **B**.

Write your answers on the dotted lines provided in Fig. 5.1.

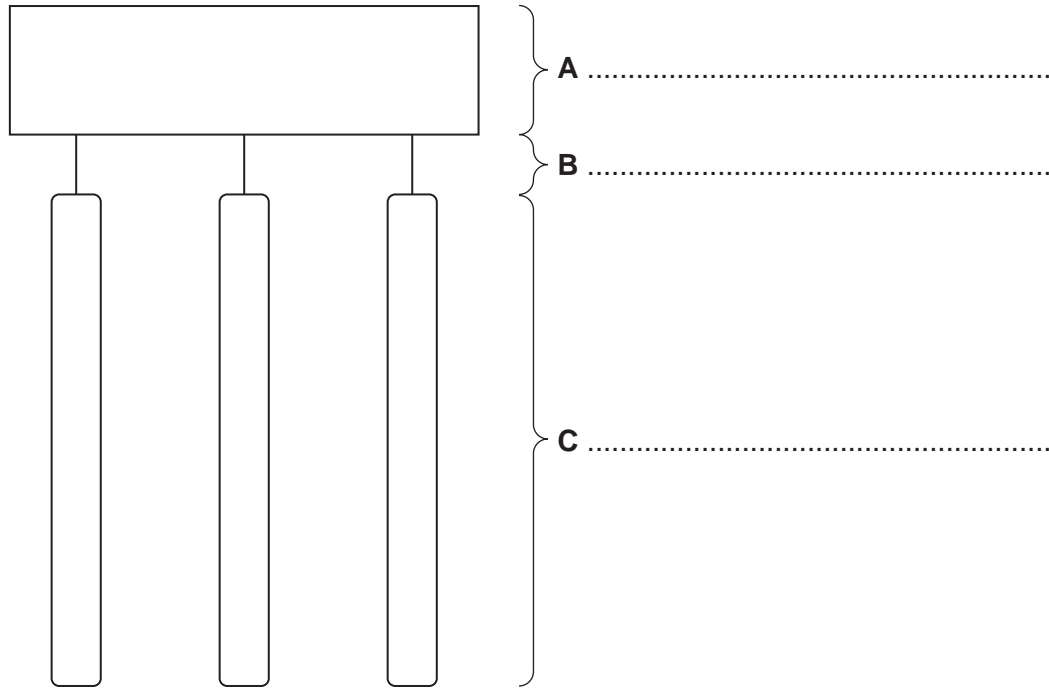


Fig. 5.1

[3]

(b) A phospholipid is sometimes described as a modified triglyceride.

(i) State how the structure of a phospholipid differs from a triglyceride.

.....  
.....  
..... [2]

(ii) Explain how a phospholipid is suited to its role in cell membranes.

.....  
.....  
.....  
.....  
.....  
..... [3]

A student carried out an investigation into the digestion of triglycerides using lipase.

Ten cm<sup>3</sup> of olive oil, adjusted to pH 8.0, was added to a test-tube, which was then put in a water bath at 37 °C for ten minutes.

One cm<sup>3</sup> of lipase solution was incubated at the same temperature in a separate test-tube before being added to the olive oil.

The initial pH of the reaction mixture was measured using a pH meter. The pH was recorded at five minute intervals for 60 minutes.

(c) Suggest why the olive oil was adjusted to pH 8.0 before the lipase was added.

..... [1]

(d) Fig. 5.2 shows the results of the investigation.

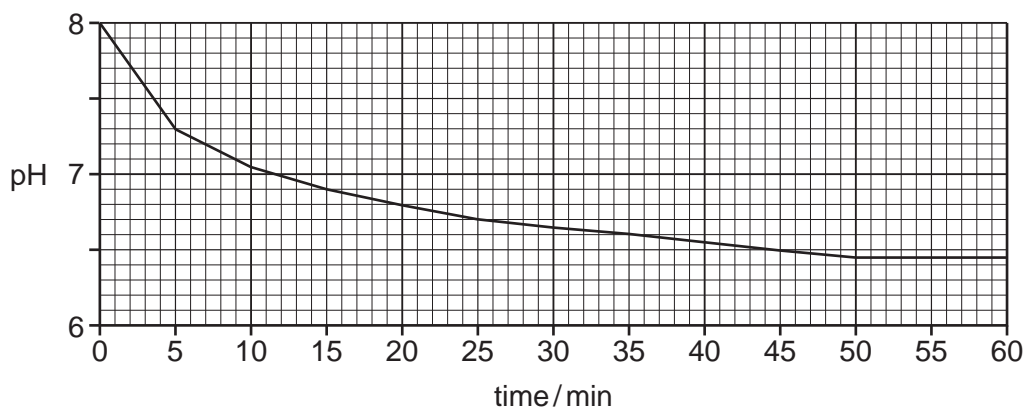


Fig. 5.2

With reference to Fig. 5.2,

**(i)** describe the results of the investigation

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.....  
.....  
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.....  
.....  
..... [2]

**(ii)** explain the results of the investigation.

.....  
.....  
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.....  
..... [4]

[Total: 15]

2 (a) Fig. 1.1 shows the breakdown of a molecule of sucrose.

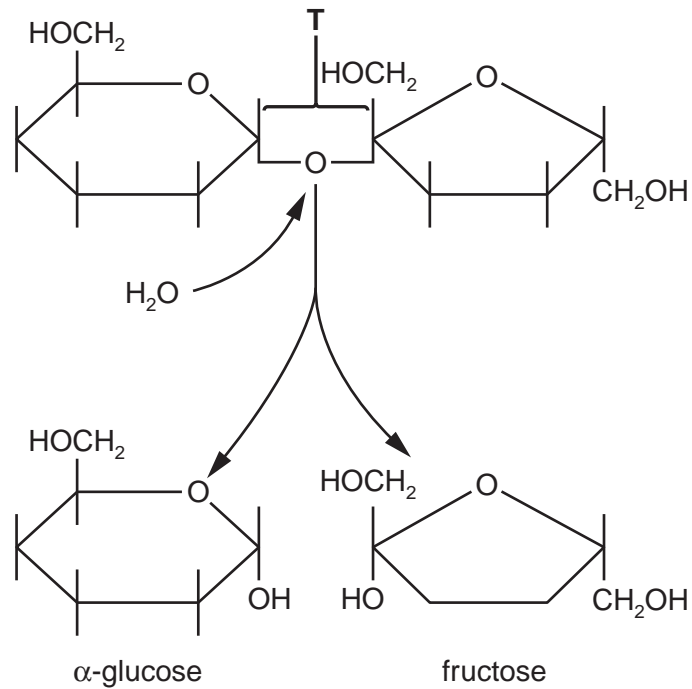


Fig. 1.1

(i) Name the bond indicated by T.

.....[1]

(ii) State the name given to this type of reaction in which water is involved.

.....[1]

(iii) State two roles of water **within plant cells** other than taking part in breakdown reactions.

1. ....

2. ....[2]

(b) Enzymes are globular proteins.

State what is meant by the term *globular*.

.....  
 .....  
 .....  
 .....[2]

- (c) The reaction shown in Fig. 1.1 is catalysed by the enzyme sucrase. Fig. 1.2 shows an enzyme-catalysed reaction.

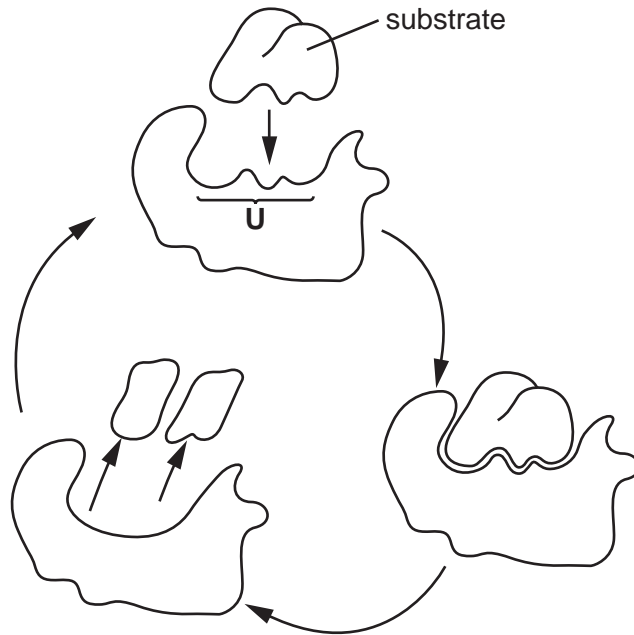


Fig. 1.2

- (i) Name the part of the enzyme labelled **U**.

.....[1]

- (ii) With reference to Fig. 1.2, explain the mode of action of enzymes.

.....  
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.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....[4]

[Total: 11]

- 3 (a) Fig. 4.1 shows the structure of deoxyribose sugar.

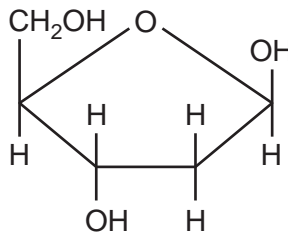


Fig. 4.1

State the differences between the structure of deoxyribose shown in Fig. 4.1 and the ring structure of  $\alpha$ -glucose.

You may use the space below to help you in your answer.

.....

.....

.....

.....

[3]

- (b) Match the biological macromolecule with the type of bond that is formed when the molecule is synthesised. Choose from the list below.

**amylose**    **cell**                      **lyceride**                      **otein**                      **ylopectin**

| type of bond(s)  | biological macromolecule |
|--|--------------------------|
| $\beta$ , 1-4 glycosidic                                       |                          |
| $\alpha$ , 1-4 glycosidic <b>and</b> $\alpha$ , 1-6 glycosidic |                          |
| phosphodiester   |                          |
| peptide  |                          |

[4]

Semi-conservative replication of DNA and transcription involve the formation of polynucleotide chains.

(c) State the type of reaction that occurs in the formation of a polynucleotide chain.

.....[1]

(d) Complete Table 4.1 to show **four** differences between DNA replication and DNA transcription.

Table 4.1

|   | replication | transcription |
|---|-------------|---------------|
| 1 |             |               |
| 2 |             |               |
| 3 |             |               |
| 4 |             |               |

[4]

[Total: 12]



- 4 (a) Cellulose is a polysaccharide.

Fig. 5.1 shows three sub-units from a molecule of cellulose.

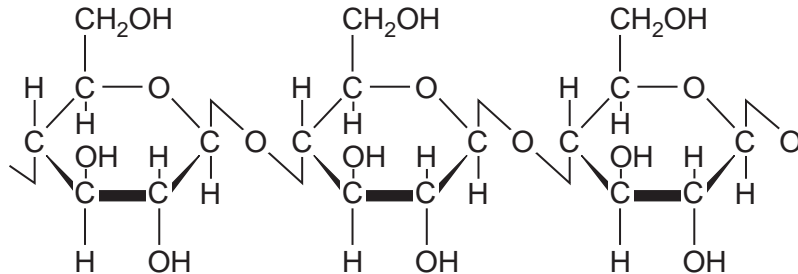


Fig. 5.1

- (i) Name the sub-unit molecule of cellulose.

.....[1]

- (ii) Name the bonds that attach the sub-unit molecules together within cellulose.

.....[1]

- (b) Cellulose has high mechanical strength which makes it suitable for the cell walls of plants.

Explain how cellulose has such a high mechanical strength making it suitable for the cell walls of plants.

.....  
 .....  
 .....  
 .....[2]

Plant cell walls consist of cellulose that is embedded in a matrix of compounds, such as pectins and proteins.

Cell wall material is synthesised inside the cell and transported to the cell surface membrane as shown in the drawing made from an electron micrograph in Fig. 5.2.

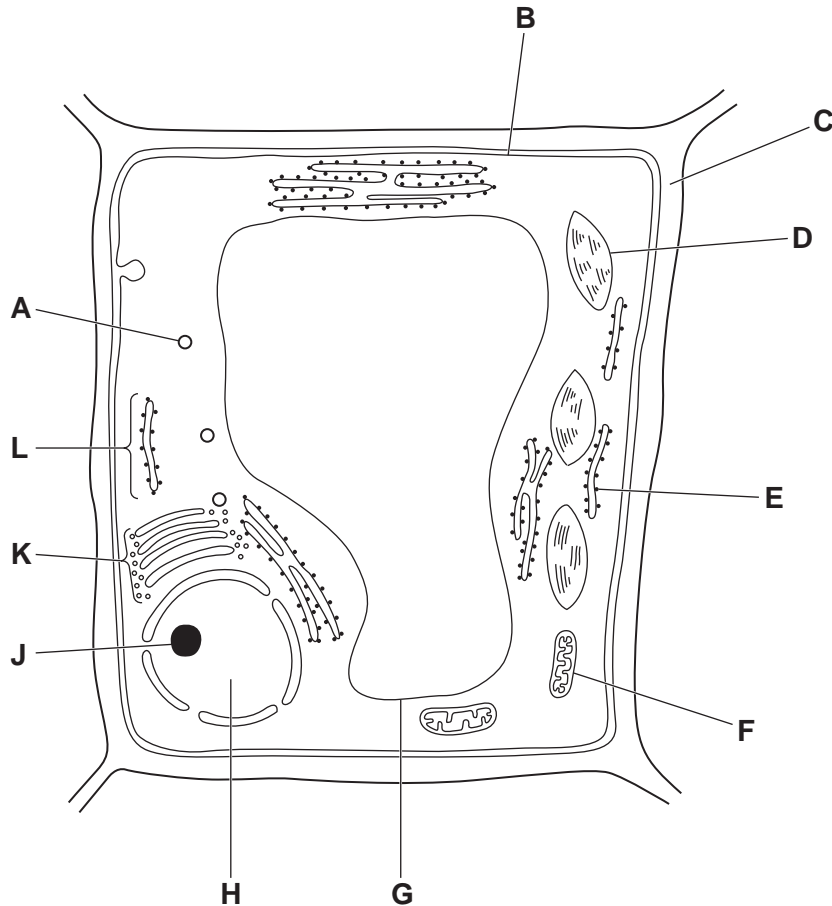


Fig. 5.2

- (c) Locate the parts of the cell labelled in Fig. 5.2 which apply to each of the following statements. You must only give one letter in each case. You may use each letter once, more than once or not at all. The first answer has been completed for you.

| statement  | letter from Fig. 5.2 |
|--|----------------------|
| organelle that contains DNA                                | <b>H</b>             |
| transports cell wall material to the cell surface membrane |                      |
| site of transcription                                      |                      |
| site of ribosome synthesis                                 |                      |
| site of photosynthesis                                     |                      |

- (d) Enzymes known as expansins are found in the matrix of cell walls to help the growth of cells.

Use the information in Fig. 5.2 to describe how proteins made by the ribosomes reach the matrix of the cell wall.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 11]

**5** State the term that applies to each of the descriptions **(a)** to **(e)**.

**(a)** Storage polysaccharide in animals made of chains of 1,4 linked  $\alpha$ -glucose with 1,6 linkages forming branches.

..... [1]

**(b)** A plant that has adaptations to enable it to live in areas where water is in short supply.

..... [1]

**(c)** Any cell containing one complete set of chromosomes.

..... [1]

**(d)** The name of the trophic level to which photosynthetic organisms belong.

..... [1]

**(e)** A process carried out by bacteria that involves the conversion of atmospheric nitrogen into nitrogenous compounds that can be used directly by plants.

..... [1]

[Total: 5]