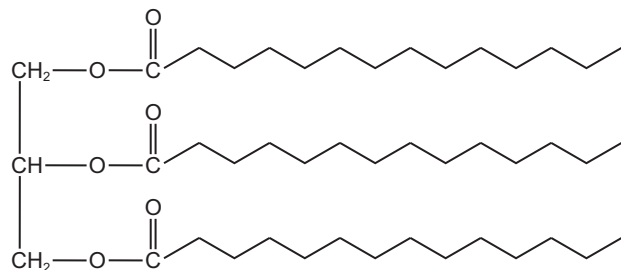


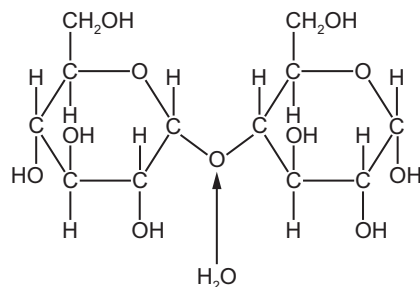
8 The diagram shows a triglyceride molecule.



Which statement is correct for the structure and function of this triglyceride?

- A The glycerol head forms hydrogen bonds with water in cytoplasm to produce oil droplets.
- B The hydrophobic fatty acids allow only small molecules to pass through the cell surface membrane.
- C It packs closely with identical triglyceride molecules to form energy reserves in lysosomes.
- D It has long hydrocarbon chains that release high energy output per unit mass when oxidised.

10 Which statement correctly explains the result when the two molecules shown in the diagram react together?



- A A hydrolysis reaction is forming the disaccharide maltose.
- B A reducing sugar is split into two monosaccharides by hydrolysis.
- C Condensation of two α -glucose molecules is taking place.
- D A condensation reaction is forming two reducing sugars.

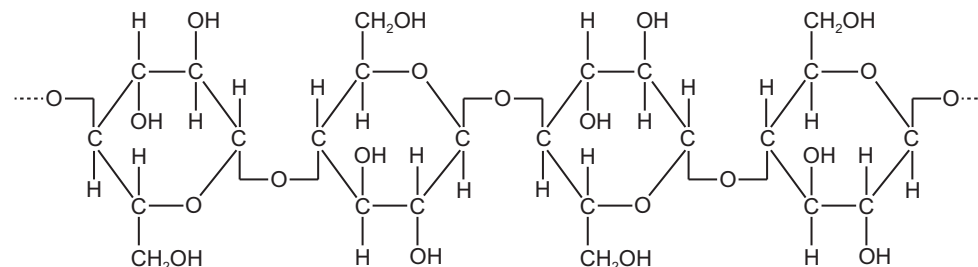
12 What is a feature of triglyceride molecules?

- A They are hydrophobic molecules.
- B They are molecules with a single ester bond.
- C They are polar molecules.
- D They are water-soluble molecules.

8 Which statement about monosaccharides and disaccharides is correct?

- A Sucrose is a non-reducing disaccharide produced from two identical monosaccharides joined together by a condensation reaction.
- B The hydrolysis of the reducing disaccharide maltose produces a reducing monosaccharide, and a non-reducing monosaccharide.
- C Maltose is a non-reducing disaccharide that contains two identical reducing monosaccharides connected by a glycosidic bond.
- D The addition of a water molecule to the glycosidic bond in a sucrose disaccharide produces two different reducing monosaccharides.

10 The diagram shows a section of a polysaccharide.



Which statement about this polysaccharide is correct?

- A It coils into a tight helix that provides a compact shape for energy storage in cells.
- B It has high tensile strength when arranged into fibrils in plant cell walls.
- C It folds into a globular shape that is soluble in water and easily transported.
- D It combines with protein molecules to act as cell markers on the cell surface membrane.

- 4 Fig. 4.1 is a photomicrograph of a copepod. These animals are found living in sea water and in fresh water environments.

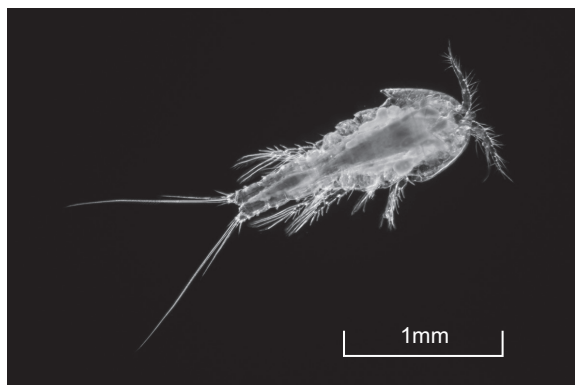


Fig. 4.1

- (a) The outer surface of a copepod is covered in a layer of the polysaccharide chitin.

Fig. 4.2 shows part of a chitin molecule.

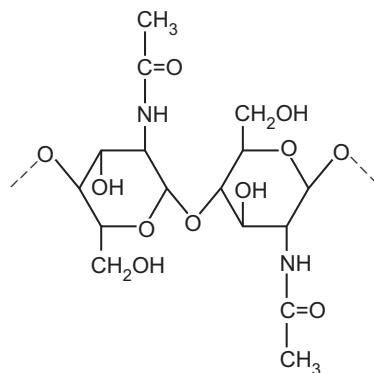


Fig. 4.2

- (i) Draw a circle around a glycosidic bond in Fig. 4.2.

- (ii) In aquatic environments, *Vibrio cholerae* can live on the surface of copepods. *V. cholerae* secretes enzymes to hydrolyse chitin to its N-acetylglucosamine monomers. These can be broken down to provide carbon, nitrogen and a source of energy.

Draw the monomer that is formed when chitin is hydrolysed by *V. cholerae*.

5

©

- 1 (a) A plant produces sugars in its leaves. The sugars produced are needed by other parts of the plant and are transported through the phloem as sucrose.

Sucrose is transported to the roots where it is stored as starch. Some of the sucrose is transported to the fruit of the plant where it is stored as fructose and glucose. Sucrose is also transported to the seeds of the plant.

Water and mineral ions are taken up through the roots where they are transported through the xylem to the rest of the plant.

Solutions were made to represent extracts of different tissues and fluids found in a plant:

- fluid in the phloem
- root tissue
- seed tissue
- fruit tissue
- fluid in the xylem

You are provided with **4** solutions, **S1**, **S2**, **S3** and **S4**.

You will:

- identify the biological molecules present in each of the 4 solutions
- suggest which solution, **S1**, **S2**, **S3** or **S4**, could represent each of the plant extracts.

You are provided with the materials shown in Table 1.1.

Table 1.1

labelled	contents	hazard	volume / cm ³
A	dilute hydrochloric acid	irritant	20
H	sodium hydrogencarbonate powder	low	-
Benedict's	Benedict's solution	harmful irritant	40
Iodine	iodine solution	irritant	20
S1	solution 1	low	60
S2	solution 2	low	60
S3	solution 3	low	60
S4	solution 4	low	60

If any solution comes into contact with your skin, wash off immediately with cold water.

It is recommended that you wear suitable eye protection.

You will need to:

- carry out the test for reducing sugars
 - carry out the test for non-reducing sugars
 - carry out the test for starch
 - identify the biological molecules in **S1**, **S2**, **S3** and **S4**.
- (i) State the reagent or reagents that are used to test for reducing sugars **and** the colour or colours produced if reducing sugars are present.

reagent or reagents

colour or colours

Describe how you will carry out the test for reducing sugars.

.....

[1]

step 1 Label 4 test-tubes **S1**, **S2**, **S3** and **S4**.

step 2 Put 1 cm³ of each solution into the appropriately labelled test-tube.

step 3 Carry out the test for reducing sugars on **S1**, **S2**, **S3** and **S4** described in (a)(i).

step 4 Record the colours observed in (a)(iii).

- (ii) State the reagent or reagents that are used to test for non-reducing sugars **and** the colour or colours produced if non-reducing sugars are present.

reagent or reagents

colour or colours

Describe how you will carry out the test for non-reducing sugars.

.....

- step 5Label 4 clean test-tubes **S1**, **S2**, **S3** and **S4**.
- step 6Put 1 cm³ of each solution into the appropriately labelled test-tube.
- step 7Carry out the test for non-reducing sugars on **S1**, **S2**, **S3** and **S4** described in **(a)(ii)**.
- step 8Record the colours observed in **(a)(iii)**.
- step 9Label 4 clean test-tubes **S1**, **S2**, **S3** and **S4**.
- step 10Put 1 cm³ of each solution into the appropriately labelled test-tube.
- step 11Carry out the test for starch on **S1**, **S2**, **S3** and **S4**.
- step 12Record the colours observed in **(a)(iii)**.
- (iii)** Record your results in an appropriate table.

[5]

- (iv)** Complete Table 1.2 to suggest which solution (**S1**, **S2**, **S3** or **S4**) could represent each of the plant extracts.

Use your results in **(a)(iii)** and the information on plant transport given in **(a)**.

A solution could represent more than one plant extract.

Table 1.2

plant extract	solution
fluid in the phloem	S...
root tissue	S...
seed tissue	S...
fruit tissue	S...
fluid in the xylem	S...

[2]

- (v)** Protein could be present in some of the solutions.

Describe how you would identify which solutions contain protein.

.....

.....

.....

..... [2]

(b) A scientist investigated the effect of light on the concentration of sugars in a plant for 24 hours. The plant was kept in the dark for the first 8 hours and then exposed to light for the remaining 16 hours.

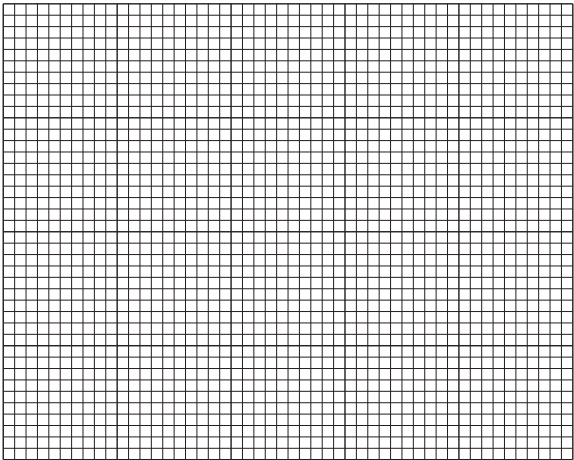
Samples were taken from the leaves and from the phloem sieve tubes. The concentration of sugars in each sample was measured.

The results are shown in Table 1.3.

Table 1.3

time / hours	concentration of sugars / μmol	
	leaves	phloem sieve tubes
0	0.38	0.22
5	0.21	0.17
8	0.13	0.11
15	0.24	0.16
24	0.39	0.22

(i) Plot a line graph of the data in Table 1.3 on the grid in Fig. 1.1.
Use a sharp pencil.



(ii) Describe the trend for the concentration of sugars in the leaves and phloem sieve tubes shown in Fig. 1.1.

.....
.....
.....
..... [1]

(iii) Suggest an explanation for the trend in the data when the plant was in the dark and when the plant was in the light.

plant in the dark
.....
.....
plant in the light
.....
..... [2]

(iv) Calculate the percentage increase in the concentration of sugars in the leaves between 15 and 20 hours.

Show your working.

percentage increase%

[Total: 21]