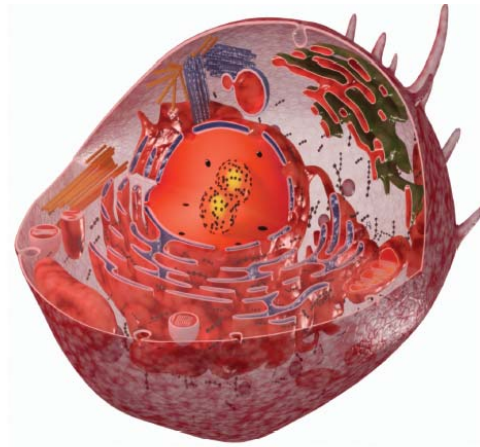


1)



A |----- 20 μ m -----| B

Fig. 5.1

(a) Fig. 5.1 is provided for you **on the insert**.

(i) State **two** features of the cell shown in Fig. 5.1 that indicate it is eukaryotic.

..... [2]

(ii) The line **A–B** on Fig. 5.1 represents 20 μ m.

Calculate the magnification of the cell shown in Fig. 5.1.

Show your working.

Answer = x [2]

(iii) Microtubules and microfilaments are part of the cytoskeleton.

Suggest **two** roles of the cytoskeleton in the type of cell shown in Fig. 5.1.

..... [2]

2)

(a) Plants are the producers in most food chains.

Complete the following passage by using the most appropriate terms from the list to fill the gaps.

A term should not be used more than once.

- | | | |
|-----------|----------------|-------------|
| cellulose | nucleic acids | respiration |
| lipids | photosynthesis | starch |
| monomers | proteins | sucrose |

Plants carry out the process of in which energy from the sun is used to produce a storage carbohydrate such as

Plants also absorb phosphates which are used to produce

..... . When humans eat the plants, the various polymers are

hydrolysed to and absorbed, but molecules such as

..... cannot be digested by humans and are egested. [5]

(b) Fig. 1.1 shows the yield of rye plants (in tonnes per hectare) grown on the same soil for 80 years. These plants were grown without the addition of nitrogen fertiliser.

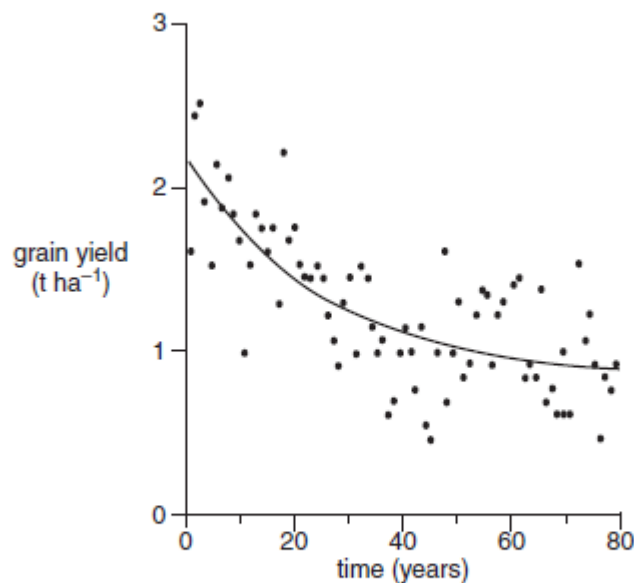


Fig. 1.1

Using Fig. 1.1 and your own knowledge, explain why nitrogen fertiliser needs to be applied to farmland.

..... [3]

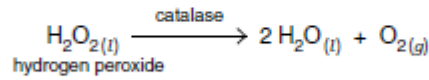
3)

(a) Enzymes are biological catalysts.

Explain the term *biological catalyst*.

..... [2]

(b) When the enzyme catalase is added to hydrogen peroxide, the following reaction occurs:



In an investigation into the effect of temperature on the rate of this reaction, a student set up apparatus as shown in Fig. 2.1, using liquidised celery as a source of catalase.

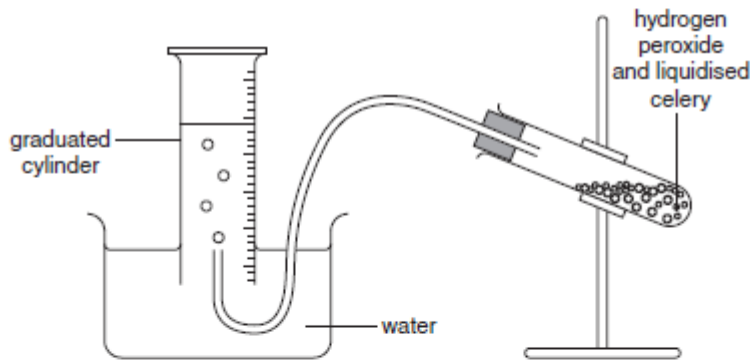


Fig. 2.1

The student measured the volume of oxygen produced at five different temperatures using samples of the liquidised celery.

(i) State the other variable that needs to be measured in order to calculate the **rate** of reaction.

..... [1]

(ii) Identify **one** potential problem with using samples of liquidised celery as a source of catalase in this investigation **and** suggest a way to minimise this problem.

..... [2]

(iii) The student collected the data shown in Table 2.1.

Table 2.1

| temperature (°C) | volume of oxygen (cm ³) |
|------------------|-------------------------------------|
| 5 | 4 |
| 10 | 7 |
| 12 | 10 |
| 25 | 28 |
| 28 | 32 |

Suggest how the student could check the reliability of the data.

..... [2]

Another student carried out a similar procedure and presented his results as a graph. The graph that he drew is shown in Fig. 2.2.

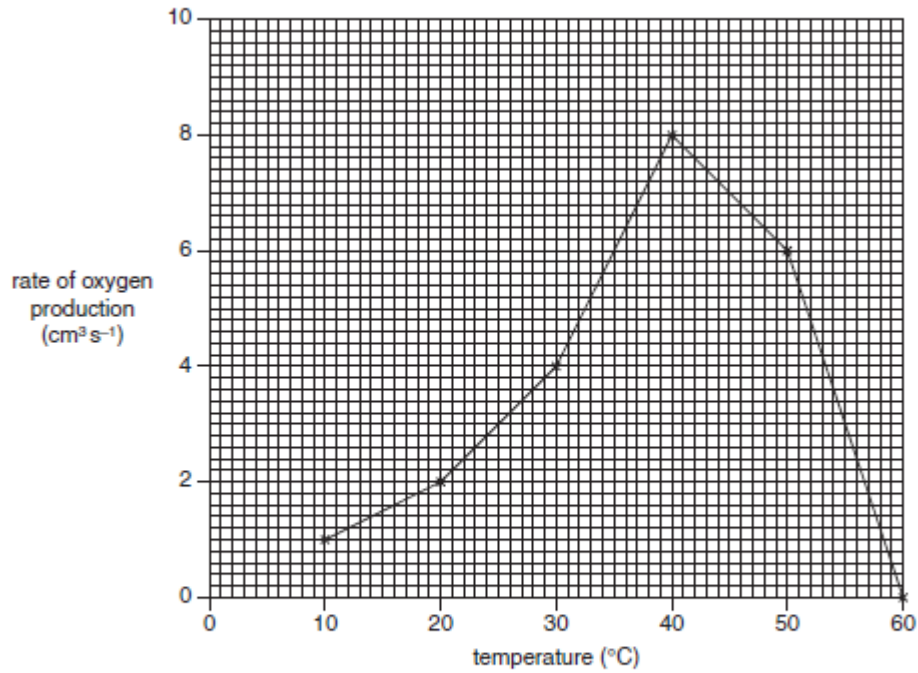


Fig. 2.2

(i) Describe the data shown in Fig. 2.2.

..... [4]

(ii) Q_{10} is a measure of the increase in the rate of reaction for a 10°C rise in temperature.

It is calculated using the following formula:

$$Q_{10} = \frac{\text{rate at } (t + 10^\circ\text{C})}{\text{rate at } t^\circ\text{C}}$$

where $t + 10^\circ\text{C}$ = rate at the higher temperature

t = rate at the lower temperature

Using the information in Fig. 2.2, calculate Q_{10} between 15°C and 25°C.

Answer = [1]

(iii) In the conclusion to this experiment, the student wrote the following:

As the heat increased, the reaction went faster until it got to its highest. After this, the rate of reaction fell. This happened because the enzyme was killed and the hydrogen peroxide could not fit into the enzyme's key site.

Suggest a more appropriate word to replace each of the underlined words.

heat should be replaced with

highest should be replaced with

killed should be replaced with

key should be replaced with

[4]

4)

A number of different biological molecules are represented in Fig. 3.1.

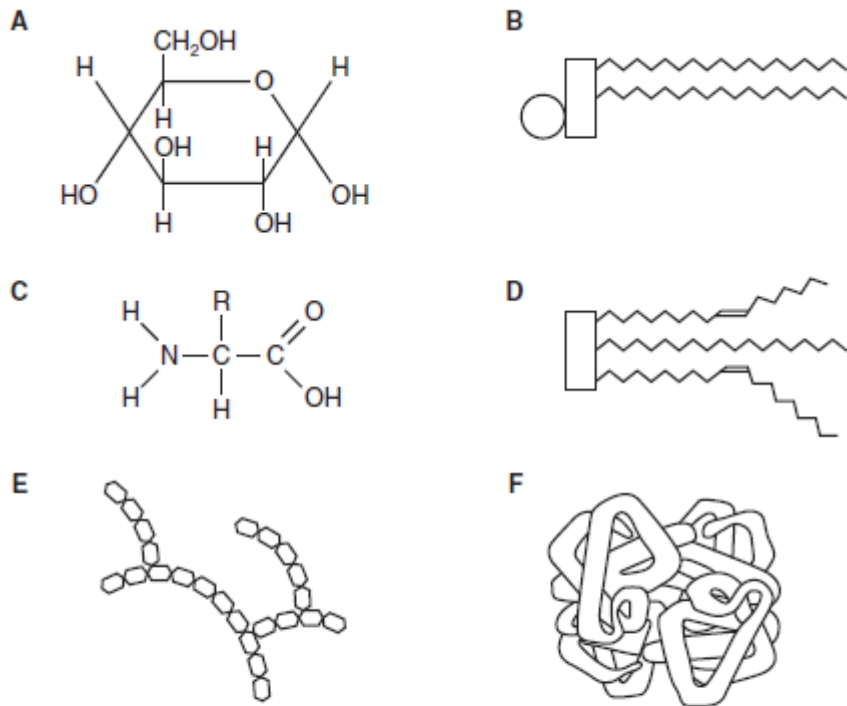


Fig. 3.1

(a) (i) State the letter of the molecule shown in Fig. 3.1 that represents:

a triglyceride

a monosaccharide

a protein

[3]

(ii) State the letter of the molecule shown in Fig. 3.1 that contains:

phosphate

glycosidic bonds

peptide bonds

disulfide bonds

[4]

(b) Molecule E shown in Fig. 3.1 is part of the carbohydrate molecule glycogen.

Explain why glycogen makes a good storage molecule.

..... [3]

(c) (i) When glycogen is hydrolysed, molecule A shown in Fig. 3.1 is produced.

State the precise name of molecule A [1]

(ii) State one function of molecule A. [1]

(iii) State the letter of a molecule shown in Fig. 3.1, other than molecule E, that is used as a storage molecule.

..... [1]

(d) Cellulose is a carbohydrate molecule found in plants.

Complete the table below to give three differences in the structures of glycogen and cellulose.

[3]

One difference has been done for you.

| glycogen | cellulose |
|----------------------------|-------------------------|
| <i>no hydrogen bonding</i> | <i>hydrogen bonding</i> |
| | |

5)

(a) Fig. 7.1 represents part of a DNA molecule.

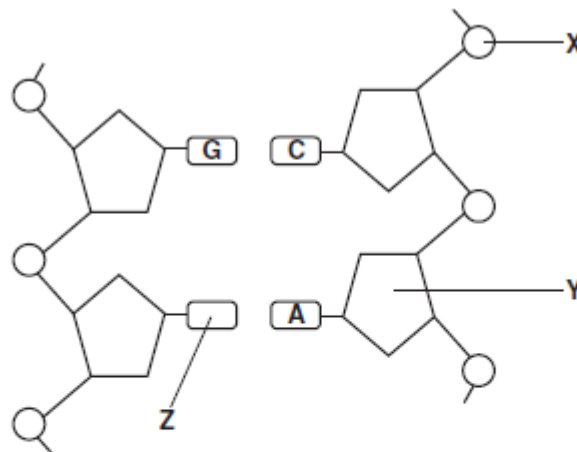


Fig. 7.1

State the precise name of each of the parts of the DNA molecule labelled X, Y and Z.

X

Y

Z [3]

(b) Describe how the DNA molecule replicates.



In your answer, you should make clear the sequence of events.

.....[7]