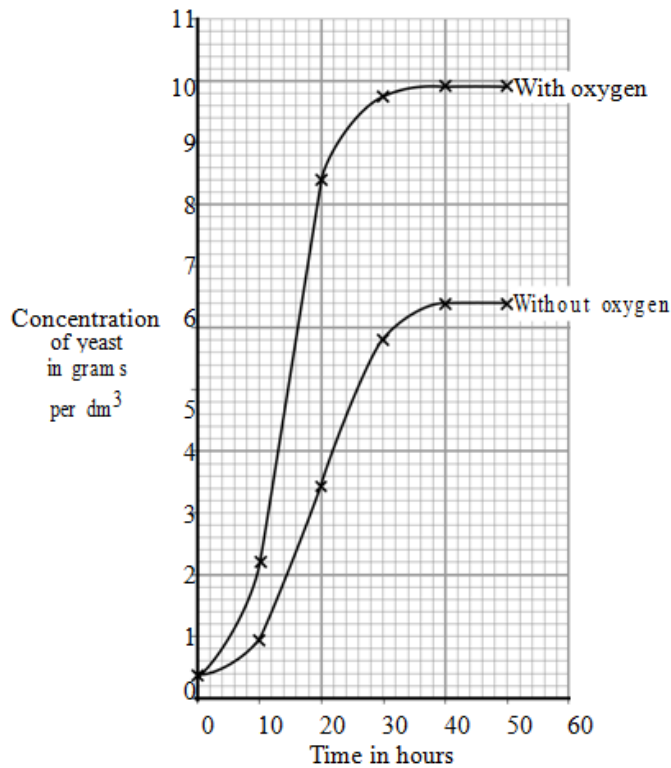# Anaerobic Respiration in Plants and yeast

Q:1 A student grew two batches of yeast in separate flasks.

The conditions in each flask were the same except that one flask had a supply of oxygen and the other was without oxygen.

The results are shown in the graph.

(a) Calculate the average hourly increase in mass of the yeast between 10 hours and 20 hours in the presence of oxygen.

Show your working.

_____

_____

Answer _____ grams per dm3 per hour

(2 marks)

(b) Explain why the yeast grew better in the presence of oxygen.

_____

_____

_____

_____

(2 marks)

Q:2   Ethanol (alcohol) can be mixed with petrol and used as a fuel in motor vehicles.

(a) Which type of microorganism is used to make ethanol from sugar? Draw a ring around one answer.

bacterium   mould   yeast

(1 mark)

(b) Read the information about ethanol and petrol.

Ethanol

One litre releases 23.5 megajoules of energy when it is burned.

It releases carbon dioxide and water when it is burned.

It can be made from crops such as sugar cane and maize.

Petrol

One litre releases 34.8 megajoules of energy when it is burned.

It releases carbon dioxide, water, carbon monoxide, sulfur dioxide and oxides of

nitrogen when it is burned.

It is made from crude oil which is pumped out of the ground.

(b)(i) Use the information above to explain two advantages of using ethanol rather than petrol as a fuel in motor vehicles.
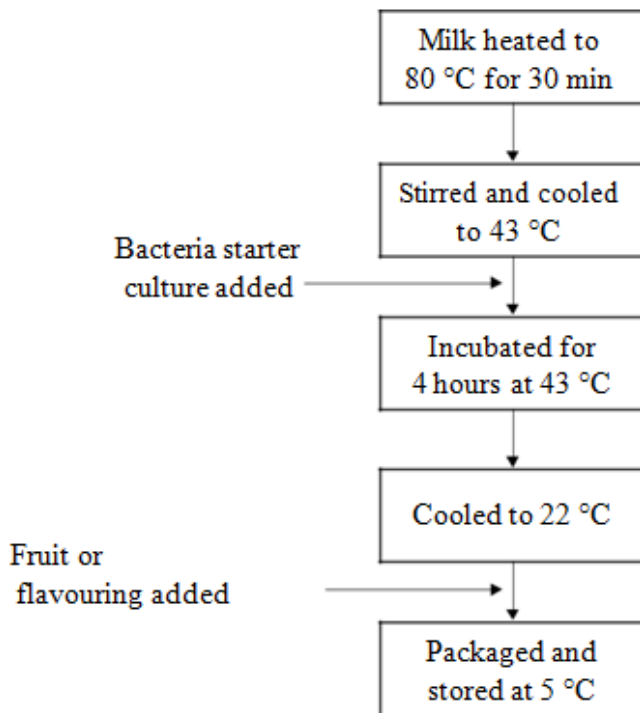
Explanation 1

_____

_____

_____

Explanation 2

_____

_____

_____

_____

(4 marks)

(b)(ii) Give one disadvantage of using ethanol rather than petrol as a fuel in motorvehicles.

_____

_____

(1 mark)

Q:3   The diagram shows how yoghurt is produced.

```
                          ┌──────────────────┐
                          │  Milk heated to  │
                          │ 80 °C for 30 min │
                          └──────────────────┘
                                   │
                                   ▼
                          ┌──────────────────┐
                          │ Stirred and cooled│
                          │     to 43 °C      │
    Bacteria starter      └──────────────────┘
    culture added ───────────────▶│
                          ┌──────────────────┐
                          │  Incubated for   │
                          │ 4 hours at 43 °C │
                          └──────────────────┘
                                   │
                                   ▼
                          ┌──────────────────┐
                          │  Cooled to 22 °C │
    Fruit or              └──────────────────┘
    flavouring added ─────────────▶│
                          ┌──────────────────┐
                          │  Packaged and    │
                          │  stored at 5 °C  │
                          └──────────────────┘
```

(a)   After being heated to 80 °C, the milk is cooled to 43 °C. Why is the milk cooled before the bacteria are added?

_____

_____   (1 mark)

(b) The pH of milk falls from 6.7 to 4.0 when it is incubated with the bacteria.

(b)(i)   What causes this fall in pH?

_____

_____

_____

_____

_____

(2 marks)

(b)(ii) Give one way in which this fall in pH is useful in yoghurt production.
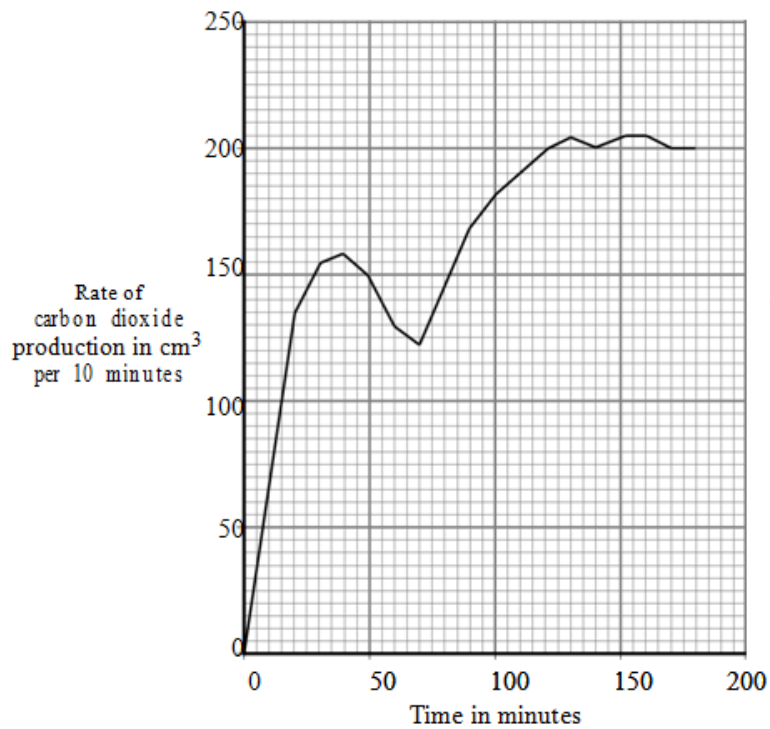
_____

_____

(1 mark)

(c) Suggest why the yoghurt is stored at 5 °C.

_____

_____

(1 mark)

Q:4 Bread dough contains flour, sugar, water and yeast. Yeast makes the dough rise.

Some scientists measured the production of carbon dioxide by yeast in bread dough at 35 ºC. The results are shown in the graph.

(a) Over the first 70 minutes, the rate of carbon dioxide production increased at first and then decreased.

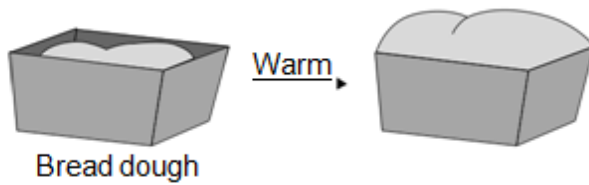Explain why the rate decreased towards the end of this period.

_____

_____

_____

_____

_____

_____

_____

(2 marks)

(b) The flour contains starch and enzymes similar to those in germinating barley grains.

Use this information to suggest an explanation for the increase in the rate of carbon dioxide production after 70 minutes.

_____

_____

_____

_____

_____

_____

_____

(3 marks)

Q:5   Yeast produces a gas. This gas makes bread dough rise.

Bread dough   Warm

(a)   Draw a ring around the correct answer to complete each sentence.

(a) (i)   The gas that makes bread dough rise is

| carbon dioxide. |
| methane. |
| oxygen. |

(1 mark)

(a) (ii) The process which produces this gas is called

| biogenesis. |
| fermentation. |
| malting. |

(1 mark)

(b)   The table shows the effect of temperature on how quickly bread dough rises.

Temperature in °C	Rate of rising in arbitrary units
10	0.14
15	0.41
20	1.00
25	1.73
30	1.50
35	0.00

At which temperature did the bread dough rise fastest? _____°C

(1 mark)

**Q:6** A student investigated the production of yoghurt.

The student:

boiled 200 cm3 of milk in a flask for 10 minutes let the milk cool to room temperature

then added 20 cm3 of 'yoghurt starter culture' (plain yoghurt which contains living bacteria)

put the flask in a water bath at room temperature measured the pH of the yoghurt every 50 minutes.

The results are shown in the graph.
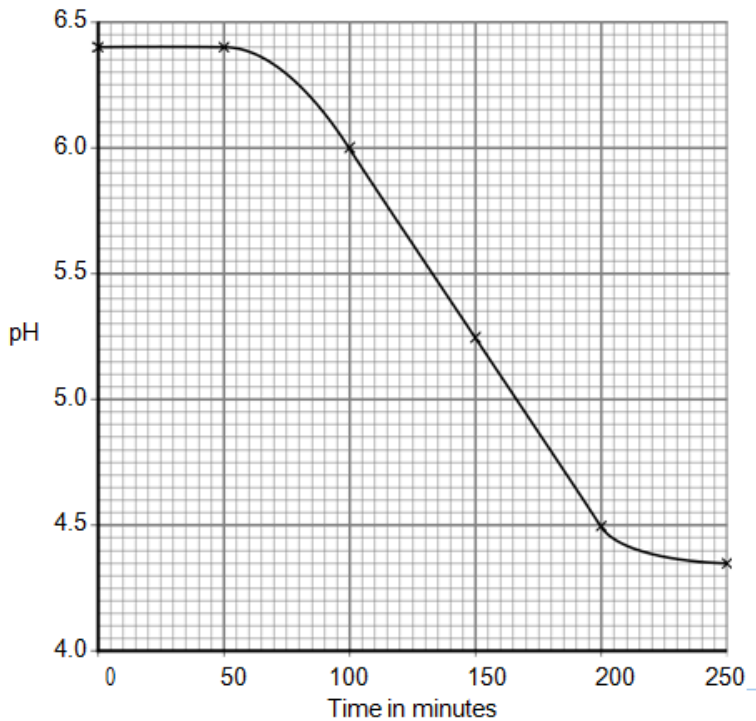
(a) The milk was boiled for 10 minutes before it was used.

Explain why this was necessary.

_____

_____

(1 mark)

(b) (i) Use information from the graph to calculate the rate of fall in pH between 100 and 200 minutes.

Show clearly how you work out your answer.

_____

_____

_____

Answer = _____ pH units per minute

(2 marks)

(b) (ii) Suggest one reason why the rate of fall in pH slowed down after 200 minutes.

_____

_____

(1 mark)

(c) What substance causes the yoghurt to thicken after 200 minutes?

_____

_____

(2 marks)

(d) The yoghurt would have been produced more quickly at 35 °C.

(d) (i) What is the maximum temperature at which bacteria should be grown in a school laboratory?
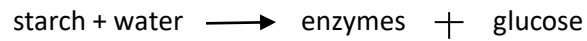
_____ °C

(1 mark)

(d) (ii) It is not safe to grow bacteria at 35 °C in a school laboratory. Explain why.

_____

_____

(1 mark)

Q:7(a) Ethanol can be produced from glucose.

The glucose is often made by the digestion of maize starch.

The equation shows the digestion of starch.

$$\text{starch} + \text{water} \xrightarrow{\hspace{1cm}} \text{enzymes} + \text{glucose}$$

(a) (i)   Name the type of enzyme that can be used to digest starch.

_____

(1 mark)

(a) (ii)   The glucose can then be used by yeast in the following process.

$$\text{glucose} + \text{enzymes} \xrightarrow{\hspace{1cm}} \text{ethanol} + \text{carbon dioxide} (+ \text{energy})$$

Name this process.

_____

(1 mark)

(b)   Ethanol, produced as described in part (a) (ii), can be used in car engines.

This is more environmentally friendly than using petrol.

Explain why.

_____

_____

_____

_____

_____

_____

(3 marks)

Q:8 Some students investigated the effect of temperature on the rising of bread dough. They mixed flour, yeast and water to make the dough.

They then placed pieces of dough into separate measuring cylinders, as shown in the diagram.
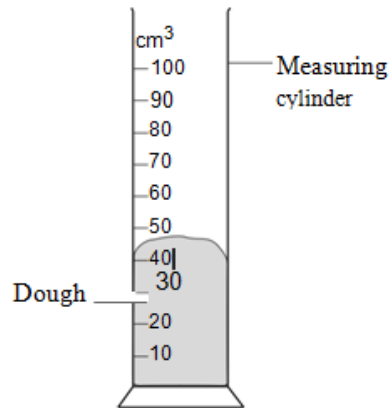
The students placed each measuring cylinder in a separate water bath.

Each water bath was at a different temperature.

The table shows the increase in volume of each piece of dough after 30 minutes.

Temperature in °C	0	10	20	25	30	35	40	50
Increase in volume of dough in cm³	0	6	20	30	42	50	40	11

(i)   Give one variable which the students should have kept constant for each measuring cylinder.

.   _____

(1 mark)

(ii)   Use the table of results to find the temperature which gave the largest increase in the volume of the dough.

_____ °C

(1 mark)

TOTAL MARKS=36