

Candidate forename						Candidate surname					
Centre number						Candidate number					

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GCSE

A323/01

TWENTY FIRST CENTURY SCIENCE
CHEMISTRY A

Unit 3: Ideas in Context plus C7 (Foundation Tier)

THURSDAY 24 MAY 2012: Morning

DURATION: 1 hour
plus your additional time allowance

MODIFIED ENLARGED

Candidates answer on the Question Paper.
A calculator may be used for this paper.

OCR SUPPLIED MATERIALS:

Insert (supplied)

OTHER MATERIALS REQUIRED:

Pencil


Ruler (cm/mm)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- The Insert will be found in the centre of this document.
- Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer ALL the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is 55.
-  Where you see this icon you will be awarded a mark for the quality of written communication in your answer.
- An enlarged copy of the Periodic Table will be provided.

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Answer ALL the questions.

1 THIS QUESTION IS BASED ON THE ARTICLE, 'DO PLASTICIZERS MAKE BOYS MORE FEMININE?'

(a) Look at these sentences about PVC.

In each box, put a **ring** around the correct word to make the sentences correct.

The first box has been done for you.

PVC is made by joining many

SMALL
LARGE

molecules together to make

SHORT
LONG

molecules

called

POLYMERS.
PLASTICIZERS.

The process is called

POLYMERISATION.
CRYSTALLISATION.

[2]

(b) (i) Plasticizers change the properties of PVC.

Describe two of the changes they cause.

1 _____

2 _____ **[2]**

- (ii) Tests have shown that plasticizers are present in most people.**

Explain how plasticizers get into people's bodies.

[2]

- (c) A recent research study on boys' play activities suggests that phthalates may affect boys' behaviour.**

- (i) Explain how the article suggests that phthalates may affect boys' behaviour.**

[2]

- (ii) This conclusion is controversial.**

Suggest what additional evidence is needed to help evaluate this conclusion.

[1]

- (d) One scientist quoted in the article suggests that the danger from phthalates is low.**

Give two properties of phthalates that support this suggestion.

1 _____

2 _____ [2]

- (e) The two scientists quoted in the article have opposite opinions on the health risks of phthalate plasticizers.**

They disagree even though they have both looked at the same data.

Suggest why they have different opinions.

_____ **[2]**

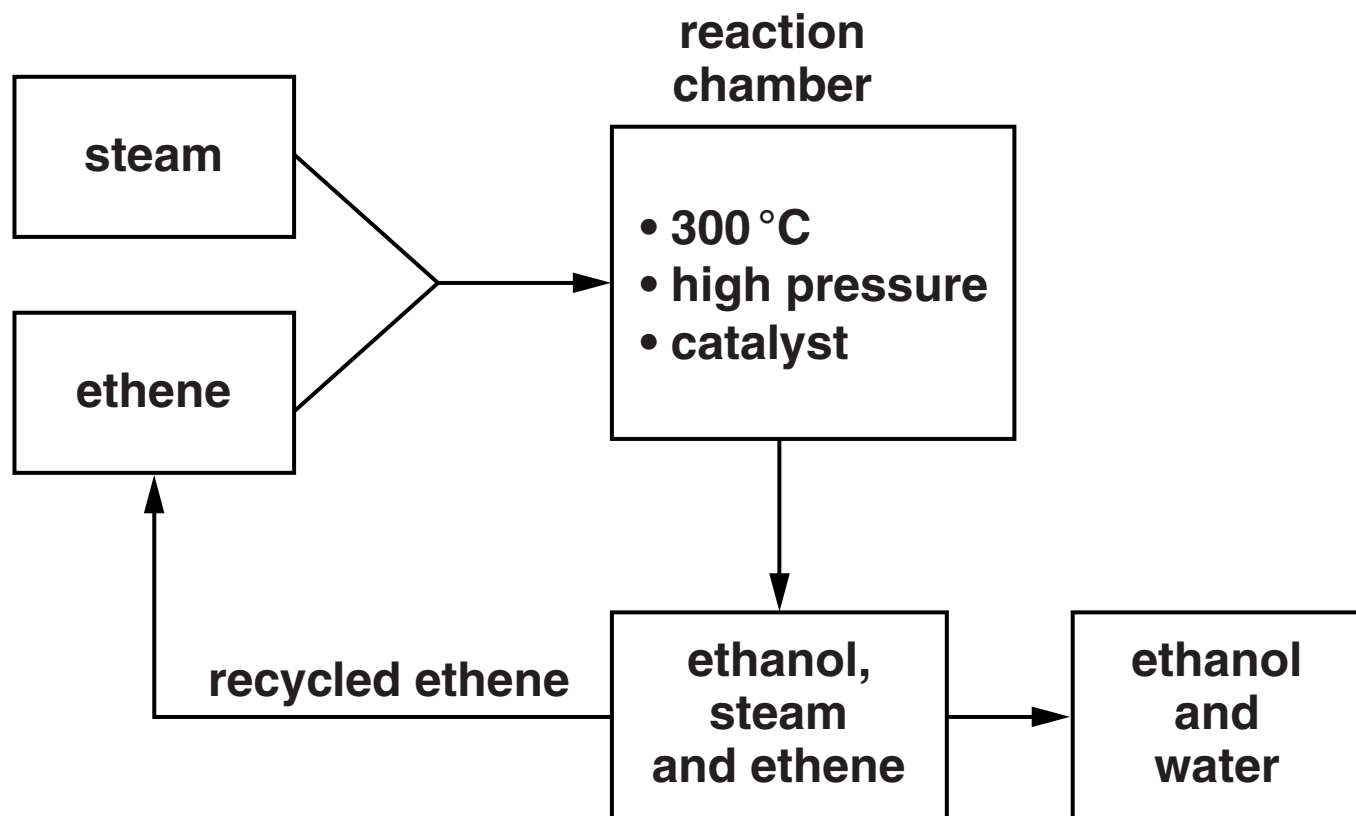
[Total: 13]

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2 Ethanol is manufactured from ethene and steam.



The flow diagram shows the process.



(a) The equation for the reaction between ethene and steam has a \rightleftharpoons sign.

What does this tell you about the reaction?

[2]

- (b) The process makes a mixture of ethanol and water.**

This ethanol solution is then made more concentrated.

What process can be used to make the ethanol solution more concentrated?

Put a ring around the correct answer.

CHROMATOGRAPHY

CRYSTALLISATION

DISTILLATION

FILTRATION

REFLUX

[1]

- (c) Only 5% of the ethene is converted into ethanol as it passes through the reaction chamber.**

However, the process converts 95% of the ethene to ethanol.

Use information from the diagram to help you explain this.

[2]

- (d) (i) The reaction between ethene and steam is exothermic.**

Complete the energy level diagram opposite by adding all of the terms from this list to the diagram.

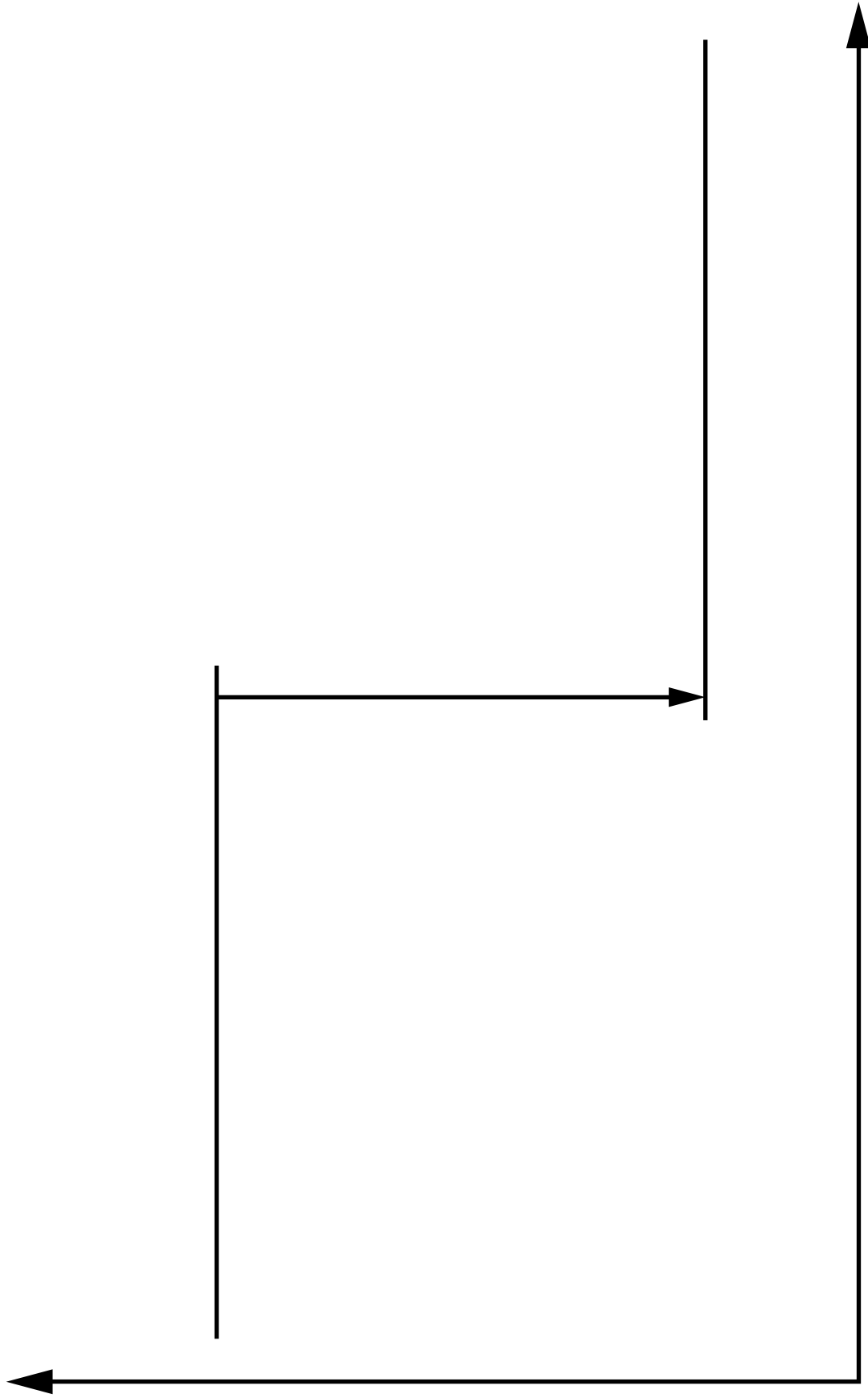
ENERGY CHANGE

ETHANOL

ETHENE

STEAM

energy



course of reaction

[3]

(ii) Finish these sentences about an exothermic reaction.

Choose the correct words from this list.

BROKEN

GIVES OUT

LESS

MADE

MORE

TAKES IN

In the first stage of a chemical reaction bonds are _____ .

In the next stage bonds are _____ to make new compounds.

The reaction is exothermic if it _____ energy. [2]

- (e) Ethene does not react with water at room temperature.**

Ethene does react with steam at a high temperature.

Use ideas about activation energy to explain this difference.

[2]

- (f) A catalyst is used to speed up the reaction between ethene and steam.**

Explain how a catalyst speeds up a reaction.

[2]

[Total: 14]

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- 3 Vegetable oils can be changed into bio-diesel for use in diesel engines.

Bio-diesel contains methyl esters.

Gas chromatography is used to identify the methyl esters in a sample of bio-diesel.

The gas chromatography apparatus is first calibrated using a standard mixture of methyl esters.

The table shows the retention times for five methyl esters.

METHYL ESTER	NUMBER OF CARBON ATOMS	RETENTION TIME IN MIN
LAURIC	12	1.6
MYRISTIC	14	2.2
PALMITIC	16	3.1
HEPTADECANOIC	17	3.5
STEARIC	18	3.9

- (a) (i) What is meant by retention time?

[1]

- (ii) Why is it important to find the retention times for a standard mixture of the methyl esters?

[1]

- (iii) The data in the table suggest that there is a correlation between the number of carbon atoms in the methyl esters and their retention times.

Describe this correlation.

_____ [1]

- (b) The gas chromatography trace from one sample of bio-diesel is shown opposite.

The sample contains methyl esters and impurities.

- (i) Which three methyl esters are present in the sample of bio-diesel?

1 _____
2 _____
3 _____ [2]

- (ii) There are only three methyl esters in this sample of bio-diesel.

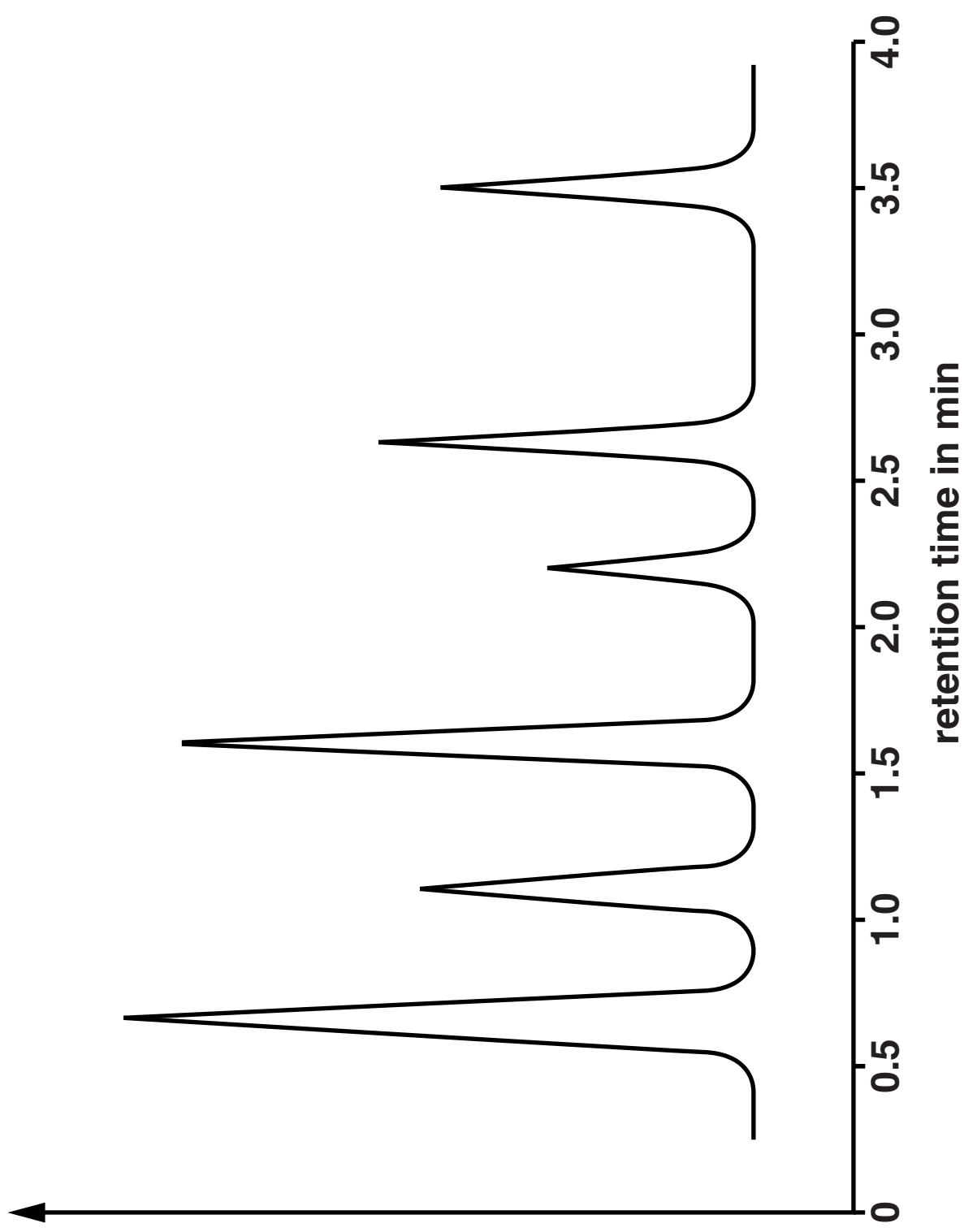
Explain why there are more than three peaks on the gas chromatography trace.

_____ [1]

- (iii) Which methyl ester was present in the LOWEST concentration?

_____ [1]

recorder response



- (c) Describe how gas chromatography is used to separate a mixture.**

Use the following in your answer.

CARRIER GAS

SAMPLE

STATIONARY PHASE

[4]

- (d) (i) Esters are used in perfumes.**

Explain why.

[1]

- (ii) Give one other common use of esters.**

[1]

[Total: 13]

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- 4 Amy works in the quality control department of a company that makes aspirin tablets.**

The tablets are made in batches. Each batch contains millions of tablets.

Amy uses titration to get a best estimate of the mass of aspirin per tablet in each batch.

This is what she does.

- A She measures out the correct volume of a stock solution containing 40 g/dm^3 of sodium hydroxide. She mixes this with water to make 1 dm^3 of a standard solution containing 4.0 g/dm^3 sodium hydroxide.**
- B She crushes an aspirin tablet and mixes it with 25 cm^3 of water in a conical flask.**
- C She titrates the aspirin mixture with the 4.0 g/dm^3 sodium hydroxide solution using an indicator.**
- D She repeats the titration several times using more aspirin tablets from the same batch.**
- E She works out the mean of her results and uses this to calculate a best estimate for the mass of aspirin in each tablet.**

- (a) (i) In step A, what volumes of stock solution and water should Amy use?

[2]

- (ii) Which step, A, B, C, D or E, helps Amy to identify any outliers in her titration results?

step _____ [1]

- (iii) Amy uses a burette to do the titration in step C.

Describe how Amy does this titration.

[3]

(b) Amy works out the mass of aspirin in each tablet.

(i) Aspirin has a relative formula mass of 180.

Show that the relative formula mass of sodium hydroxide, NaOH, is 40.

Use the Periodic Table to help you.

[2]

- (ii) The average of Amy's titration results for one batch of aspirin tablets is 27.4 cm^3 of 4.0 g/dm^3 sodium hydroxide solution.

Use this formula to work out the mass of aspirin in each tablet.

$$\text{mass} = \frac{\text{volume of } 4.0 \text{ g/dm}^3 \text{ sodium hydroxide solution} \times \text{relative formula mass of aspirin}}{10\,000}$$

Show your working.

mass of aspirin in each tablet = _____ g [2]

[Total: 10]

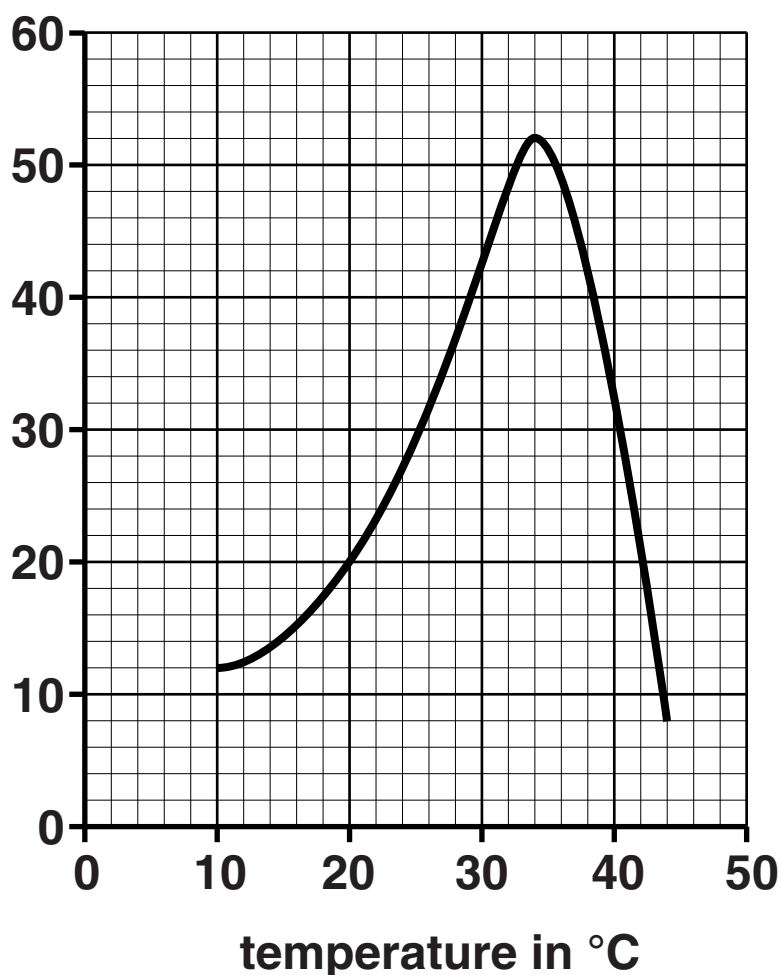
5 Ethanol can be made by fermentation using yeast.

Joe carries out fermentation reactions at each of several different temperatures. He keeps all other conditions the same each time.

He measures the rate at which carbon dioxide is given off at each temperature.

His results are shown in the graph.

rate at which carbon dioxide
is given off in cm^3/min



- (a) In the reaction glucose is changed into ethanol and carbon dioxide.

Write a word equation for this reaction.

_____ [1]

- (b) (i) Use the graph to suggest an optimum temperature for the fermentation of glucose by yeast.

optimum temperature = _____ °C [1]

- (ii) Describe and explain the shape of the graph.



One mark is for correct spelling.

_____ [2+1]

[Total: 5]

END OF QUESTION PAPER

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