

FOR OFFICIAL USE

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**0500/401**NATIONAL  
QUALIFICATIONS  
2004MONDAY, 10 MAY  
9.00 AM - 10.30 AMCHEMISTRY  
STANDARD GRADE  
General Level**Fill in these boxes and read what is printed below.**

Full name of centre

Town

Forename(s)

Surname

Date of birth

Day Month Year

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Scottish candidate number

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Number of seat

- All questions should be attempted.
- Necessary data will be found in the Data Booklet provided for Chemistry at Standard Grade and Intermediate 2.
- The questions may be answered in any order but all answers are to be written in this answer book, and must be written clearly and legibly in ink.
- Rough work, if any should be necessary, as well as the fair copy, is to be written in this book.  
Rough work should be scored through when the fair copy has been written.
- Additional space for answers and rough work will be found at the end of the book.
- The size of the space provided for an answer should not be taken as an indication of how much to write. It is not necessary to use all the space.
- Before leaving the examination room you must give this book to the invigilator. If you do not, you may lose all the marks for this paper.



2. Hydrocarbons are compounds containing hydrogen and carbon only.

A	$\text{CH}_4$	B	$\text{C}_2\text{H}_4$	C	$\text{C}_6\text{H}_{14}$
D	$\text{C}_5\text{H}_{12}$	E	$\text{C}_3\text{H}_8$	F	$\text{C}_4\text{H}_8$

(a) Identify the molecular formula for pentane.

A	B	C
D	E	F

(b) Identify the **two** molecular formulae which represent alkenes.

A	B	C
D	E	F

(c) Identify the hydrocarbon which has a boiling point of  $69^\circ\text{C}$ .  
You may wish to use page 6 of the data booklet to help you.

A	B	C
D	E	F

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3. The grid contains the names of some metals.

A	zinc	B	calcium	C	iron
D	magnesium	E	silver	F	sodium

(a) Identify the metal which is used as the catalyst in the Haber process.

A	B	C
D	E	F

(b) Identify the metal which does **not** react with dilute acid.

A	B	C
D	E	F

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4. The grid contains the names of some elements.

A	B	C
hydrogen	aluminium	carbon
D	E	F
nitrogen	phosphorus	fluorine

(a) Identify the non-metal element which can conduct electricity.

A	B	C
D	E	F

(b) Identify the **two** elements which plants obtain from fertilisers.

A	B	C
D	E	F

(c) Identify the element which is present in all acids.

A	B	C
D	E	F

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5. The grid contains the names of some gases.

A	oxygen	B	hydrogen	C	helium
D	nitrogen	E	chlorine	F	xenon

(a) Identify the gas which makes up approximately 80% of the air.

A	B	C
D	E	F

(b) Identify the **two** gases which do **not** exist as diatomic molecules.

A	B	C
D	E	F

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6. The grid contains the names of some processes.

A	B	C
respiration	cracking	distillation
D	E	F
filtration	photosynthesis	galvanising

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(a) Identify the process which produces water and carbon dioxide.

A	B	C
D	E	F

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(b) Identify the process which can be used to separate alcohol and water.

A	B	C
D	E	F

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7. Metals and their compounds take part in many reactions.

A	$\text{Fe}_2\text{O}_3 + 3\text{CO} \longrightarrow 2\text{Fe} + 3\text{CO}_2$
B	$2\text{Mg} + \text{SiO}_2 \longrightarrow 2\text{MgO} + \text{Si}$
C	$\text{CuCO}_3 \longrightarrow \text{CuO} + \text{CO}_2$
D	$2\text{Zn} + \text{O}_2 \longrightarrow 2\text{ZnO}$

(a) Identify the reaction which takes place in the blast furnace.

A
B
C
D

(b) Identify the reaction which produces a non-metal element.

A
B
C
D

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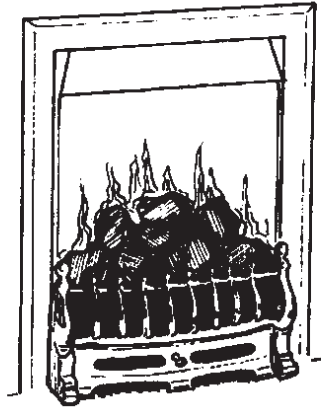
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**PART 2**

**A total of 40 marks is available in this part of the paper.**

9. Coal is an example of a fossil fuel.



(a) What is meant by a **fuel**?

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(b) Describe how coal was formed.

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(c) Give another example of a fossil fuel.

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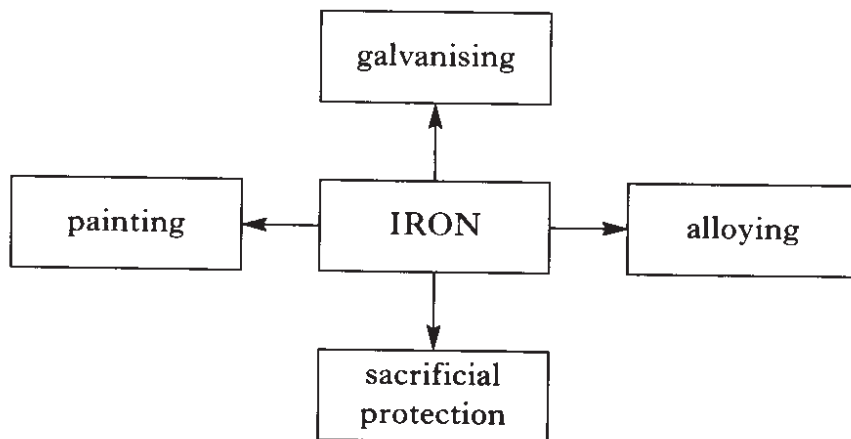
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10. The diagram shows some ways in which iron can be protected from rusting.



(a) Name a metal which is suitable for the sacrificial protection of iron.

\_\_\_\_\_

(b) Which metal is used to galvanise iron?

\_\_\_\_\_

(c) How does painting prevent the rusting of iron?

\_\_\_\_\_  
\_\_\_\_\_

(d) Alloys of iron are called steels.

Name **another** alloy.

\_\_\_\_\_

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11. Some plastic bags are made from a synthetic polymer called polythene.

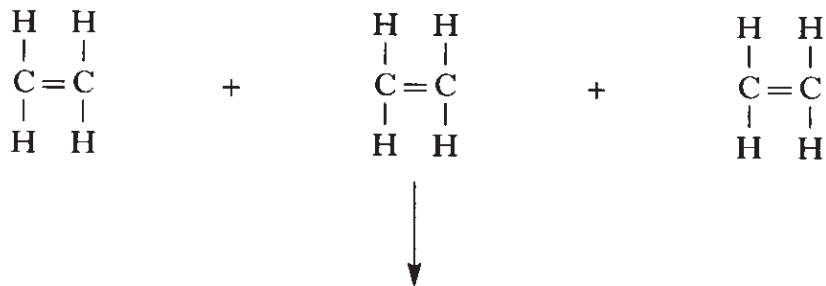
(a) What is meant by the term **synthetic**?

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(b) Draw a section of polythene, showing 3 monomer units joined together.



(c) Polythene is not biodegradable.  
What is meant by **biodegradable**?

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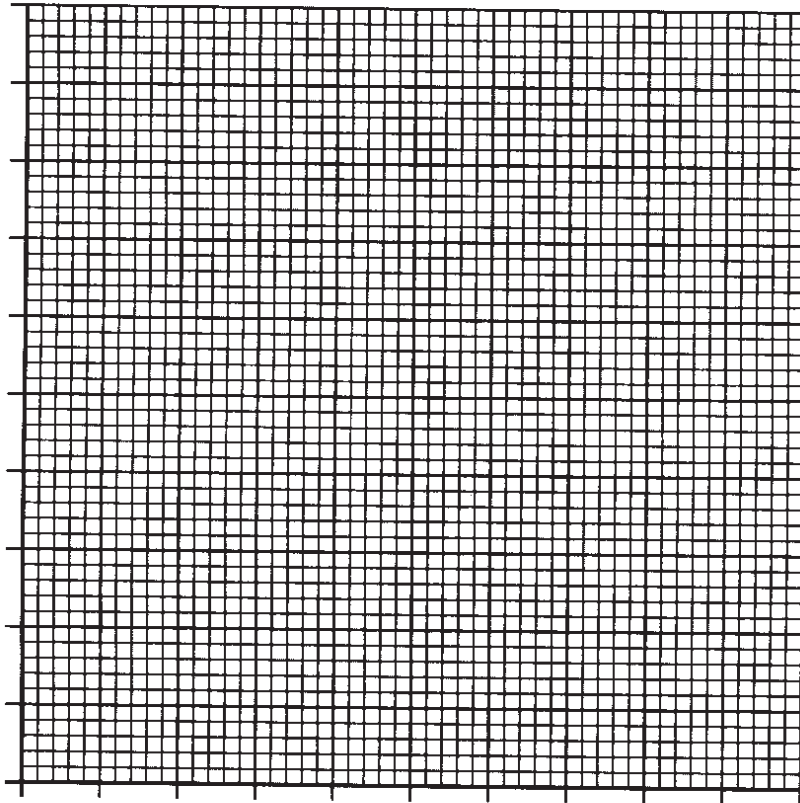
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**12. (continued)**

(b) Draw a bar graph to show the information in the table.

*Use appropriate scales to fill most of the graph paper.*

(Additional graph paper, if required, can be found on page 24.)



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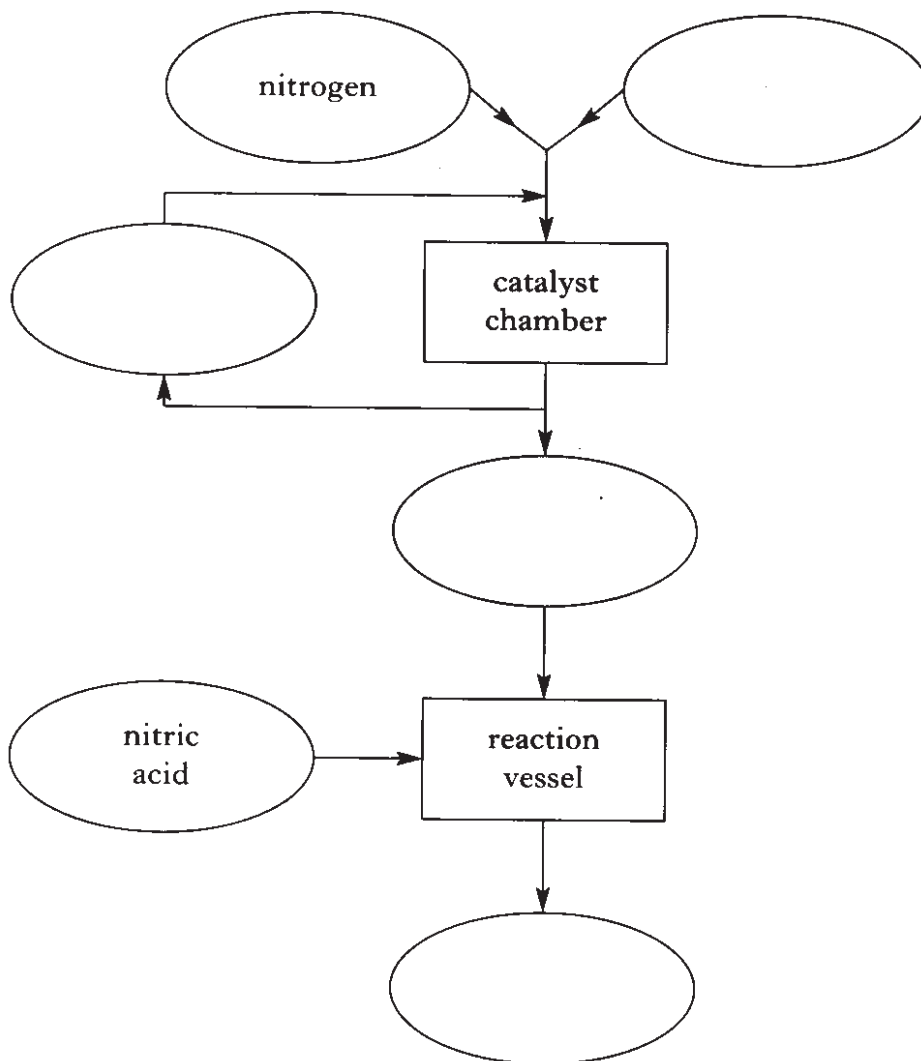
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13. Ammonium nitrate is made by the reaction of ammonia with nitric acid.

Ammonia is made by passing a mixture of nitrogen and hydrogen through a catalyst chamber. Unreacted nitrogen and hydrogen are removed and returned to the catalyst chamber. The ammonia gas then enters a reaction vessel in which ammonium nitrate is produced.

(a) Use this information to complete the flow diagram.







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14. Magnesium sulphate is a compound present in Epsom Salts.

(a) Name the elements present in magnesium sulphate.

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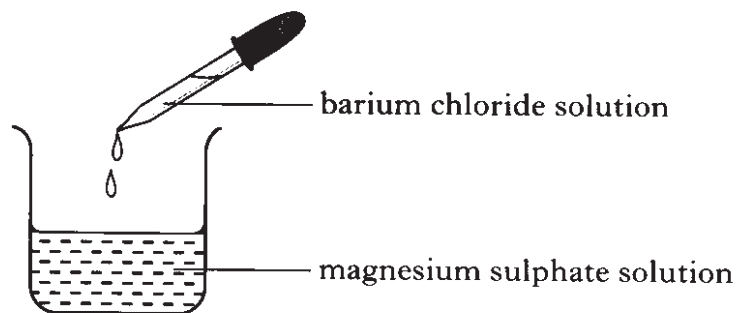


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(b) A **solution** can be made by dissolving magnesium sulphate in water. What term can be used to describe the water?

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(c) When drops of barium chloride solution are added to magnesium sulphate solution a solid forms and the mixture turns cloudy.



(i) What type of chemical reaction takes place?

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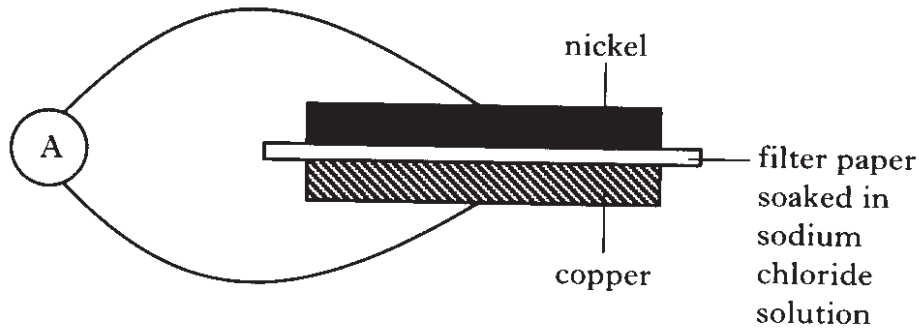
(ii) Name the solid formed in this reaction.

You may wish to use page 5 of the data booklet to help you.

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15. Pairs of metals can be used to produce a cell.



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(a) What is the purpose of the filter paper soaked in sodium chloride solution?

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(b) On the wires, indicate the direction of electron flow.

1

(c) Give the name of a metal which could replace the nickel and cause the electrons to flow in the opposite direction.

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(d) Cells are used in calculators and watches.

Give a **disadvantage** of a cell compared with mains electricity.

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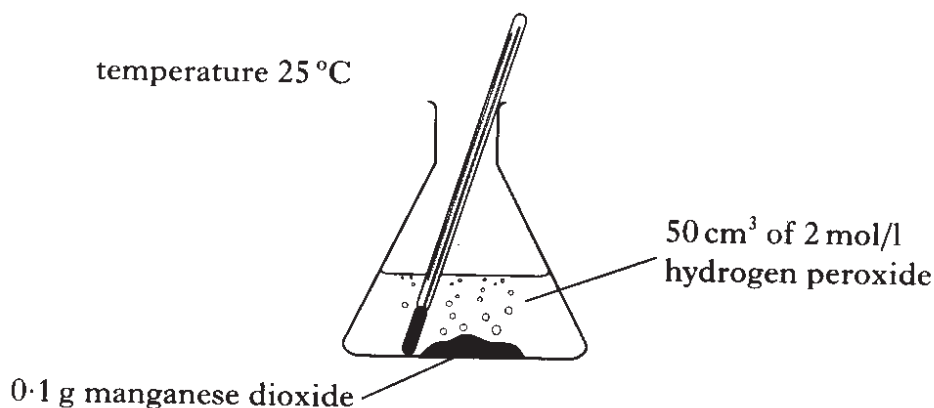
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17. When Matthew added manganese dioxide to hydrogen peroxide solution, oxygen was produced.  
Manganese dioxide is a catalyst.



- (a) (i) What is the purpose of a catalyst?

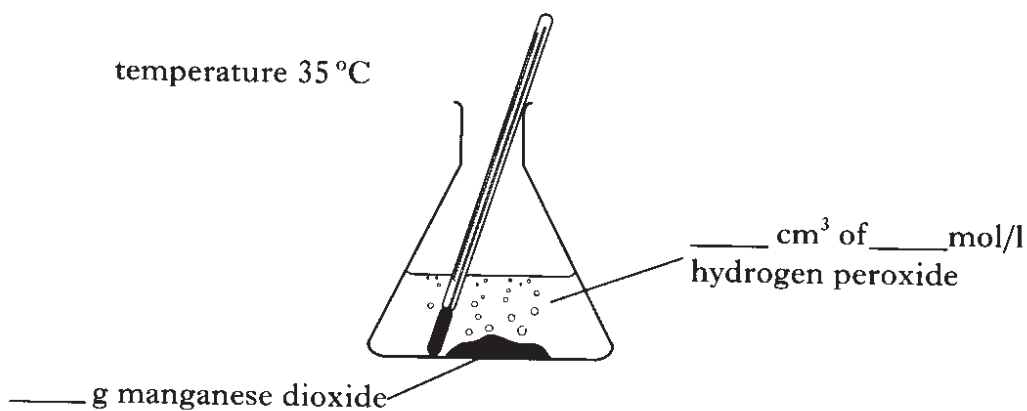
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- (ii) What will be the mass of the manganese dioxide at the end of the reaction?

\_\_\_\_\_ g

- (b) He then wanted to see if raising the temperature to 35 °C would speed up the reaction.

Complete the labelling of the diagram to show how he would make his second experiment a fair test.

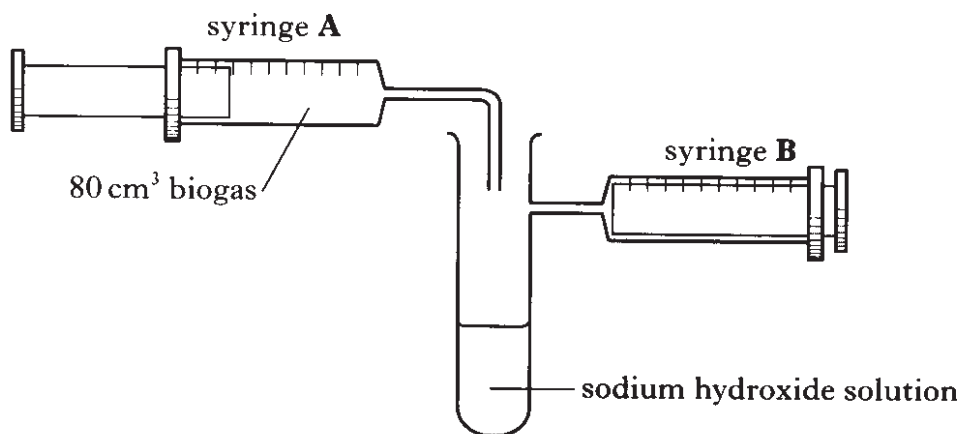


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18. A chemist used the following apparatus to investigate biogas. Biogas is a mixture of carbon dioxide and methane.



80 cm<sup>3</sup> of biogas was bubbled into the sodium hydroxide solution which removed the carbon dioxide. The remaining gas was collected in syringe B.

- (a) Complete the diagram to show how the biogas was passed into the sodium hydroxide solution.
- (b) She found that the biogas contained 60% carbon dioxide and 40% methane.

What volume of gas was collected in syringe B?

\_\_\_\_\_ cm<sup>3</sup>

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19. Starch and glucose are carbohydrates.

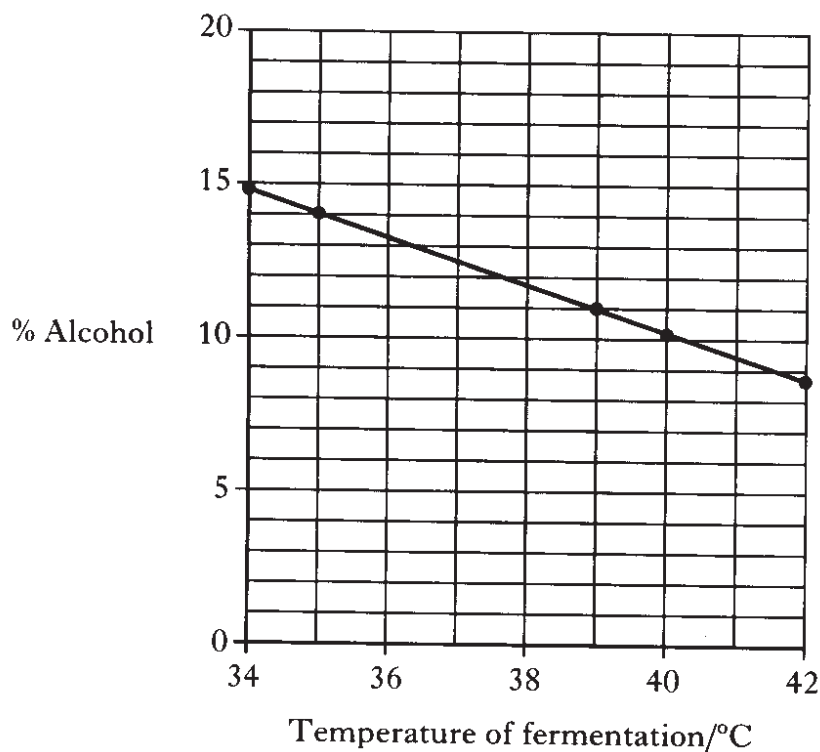
(a) Which chemical would you use to test for starch?

\_\_\_\_\_

(b) What is the chemical name for the alcohol produced by the fermentation of glucose?

\_\_\_\_\_

(c) The percentage of alcohol in a wine depends on the temperature of the fermentation process. Some results are shown on the graph.



(i) Describe how the temperature of fermentation affects the % alcohol produced.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(ii) Use the graph to estimate the % alcohol when the temperature is 37°C.