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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

B642/01

GATEWAY SCIENCE

CHEMISTRY B

Unit 2 Modules C4 C5 C6 (Foundation Tier)

WEDNESDAY 16 JUNE 2010: Morning

DURATION: 1 hour

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the Question Paper

A calculator may be used for this paper

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Pencil

Ruler (cm/mm)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- **Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **Read each question carefully and make sure that you know what you have to do before starting your answer.**
- **Answer ALL the questions.**
- **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 60.**
- **The Periodic Table is provided separately.**

Answer ALL the questions.

SECTION A – MODULE C4

1 Sea-water contains many different ions.

Look at the table. It shows some of the ions in sea-water.

ION	FORMULA	PERCENTAGE BY MASS IN SEA-WATER
chloride	Cl^-	55.0
magnesium	Mg^{2+}	3.7
potassium	K^+	1.1
sodium	Na^+	30.6
sulfate	SO_4^{2-}	7.7

(a) (i) Which POSITIVE ion has the GREATEST percentage by mass in sea-water?

Choose from the ions in the table.

answer _____ [1]

(ii) Silver nitrate solution is used to test for halide ions.

Which ion in sea-water is a halide ion?

Choose from the ions in the table.

answer _____ [1]

(b) Katharine wants to test for sulfate ions in sea-water.

Which one of these solutions should she use?

Choose from the list.

BARIUM CHLORIDE

DILUTE SULFURIC ACID

SODIUM HYDROXIDE

SODIUM NITRATE

answer _____ [1]

(c) Sea-water has a pH value of 8.

(i) What does this tell you about sea-water?

Choose from:

IT IS ACIDIC

IT IS NEUTRAL

IT IS ALKALINE

answer _____ [1]

(ii) Ryan wants to show that sea-water has a pH of 8.

He does some research on the internet. Ryan finds out he can use a pH meter.

Describe one OTHER way Ryan can find out the pH of sea-water.

[2]

[Total: 6]

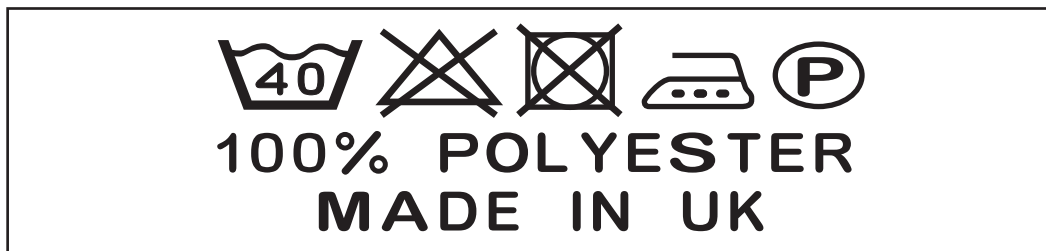
2 This question is about washing clothes.

Kieran wants to wash his dirty shirt.

Kieran's shirt has several food stains.

He decides to use a biological washing powder that contains enzymes.

He looks at the wash label on his shirt.



(a) What temperature should he choose to wash his shirt?

Explain your answer.

temperature _____ °C

explanation _____

_____ [2]

(b) The washing powder also contains an optical brightener and a bleach.

(i) What is the job of the optical brightener?

_____ [1]

(ii) What is the job of the bleach?

_____ [1]

[Total: 4]

3 Medicines and pharmaceutical drugs are speciality chemicals.

(a) Digitalis is a medicine used to treat heart disease.

Digitalis can be extracted from the foxglove plant.

Describe how chemicals such as digitalis can be extracted from plants.

[2]

(b) Statins are speciality chemicals.

They are medicines used to reduce cholesterol levels.

Many statins are made in a BATCH process.

(i) What is a batch process?

_____ [1]

(ii) Several factors affect the cost of making and developing a speciality chemical.

One factor is the cost of the energy used.

Write down two OTHER factors.

1 _____

2 _____ [2]

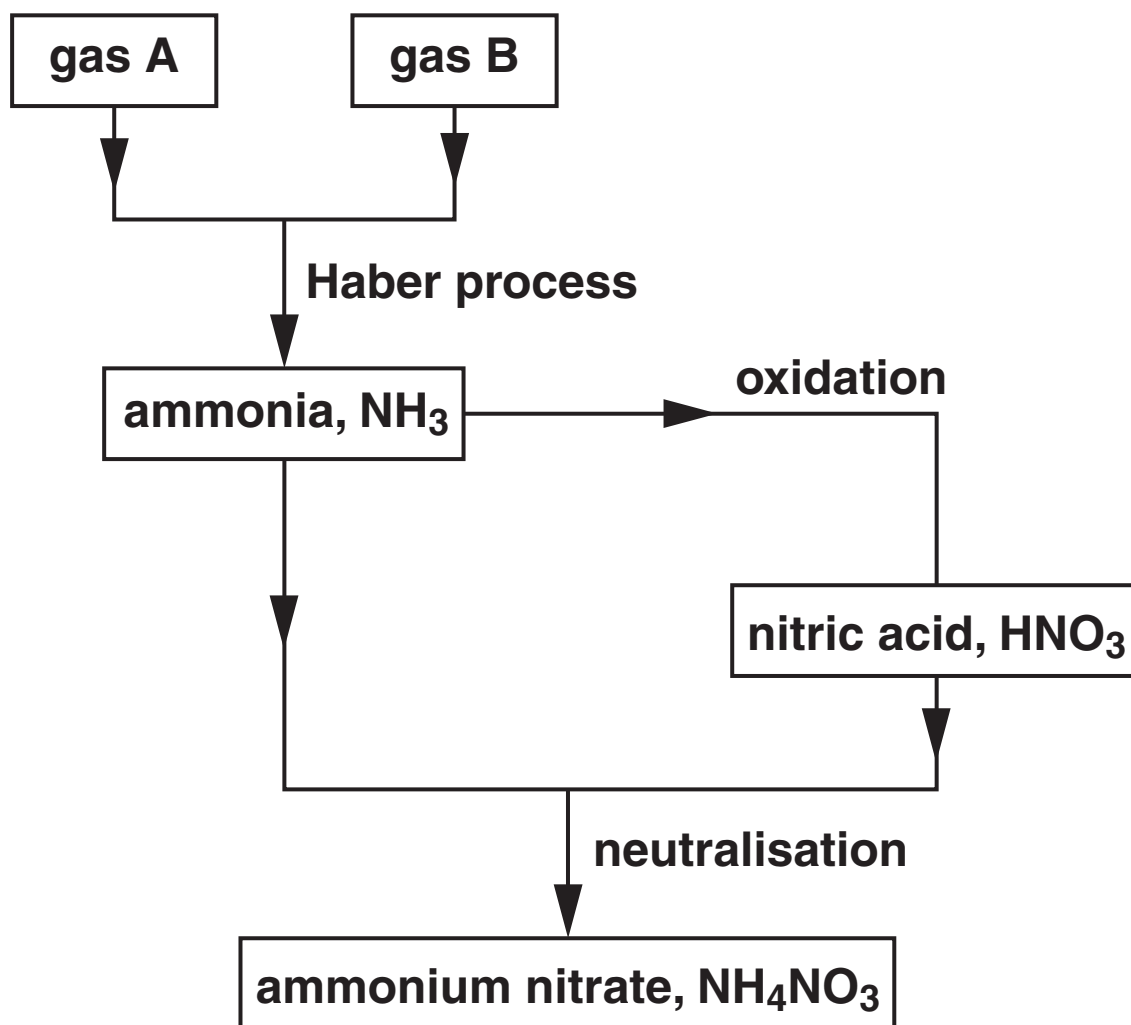
[Total: 5]

4 Ammonium nitrate is a fertiliser used by farmers.

(a) Why do farmers use fertilisers?

[1]

(b) Look at the flow chart. It shows how ammonium nitrate can be made from ammonia.



Write down the NAMES of the two gases needed to make ammonia.

Gas A is _____

Gas B is _____ [1]

(c) A factory makes ammonium nitrate.

Jordan predicts the factory should make 50 tonnes of ammonium nitrate.

The factory actually makes 37.5 tonnes of ammonium nitrate.

What is the percentage yield?

percentage yield = _____% [2]

(d) Ammonium nitrate has the formula NH_4NO_3 .

How many nitrogen atoms are there in the formula?

Choose from:

1 2 7 9 14 28

answer _____ [1]

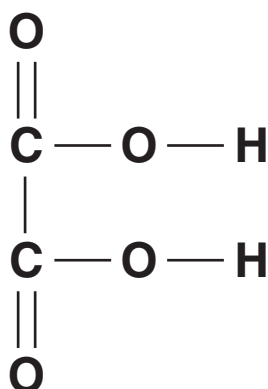
[Total: 5]

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SECTION B – MODULE C5

- 5 Research chemists have isolated a weak acid from the leaves of rhubarb.

Look at the displayed formula of the weak acid.



- (a) (i) How many different ELEMENTS are there in the weak acid?

_____ [1]

- (ii) What is the molecular formula of the weak acid?

_____ [1]

(b) Chris dissolves some of the weak acid in water.

He tests the pH of the solution.

The pH value is 3.5.

(i) Chris adds litmus to the solution of the weak acid.

What colour does Chris see?

_____ [1]

(ii) The weak acid ionises in water.

Which ONE of the following ions is present in the solution?

Choose from:

CO_3^{2-} HCO_3^- H^- H^+ H_2^+

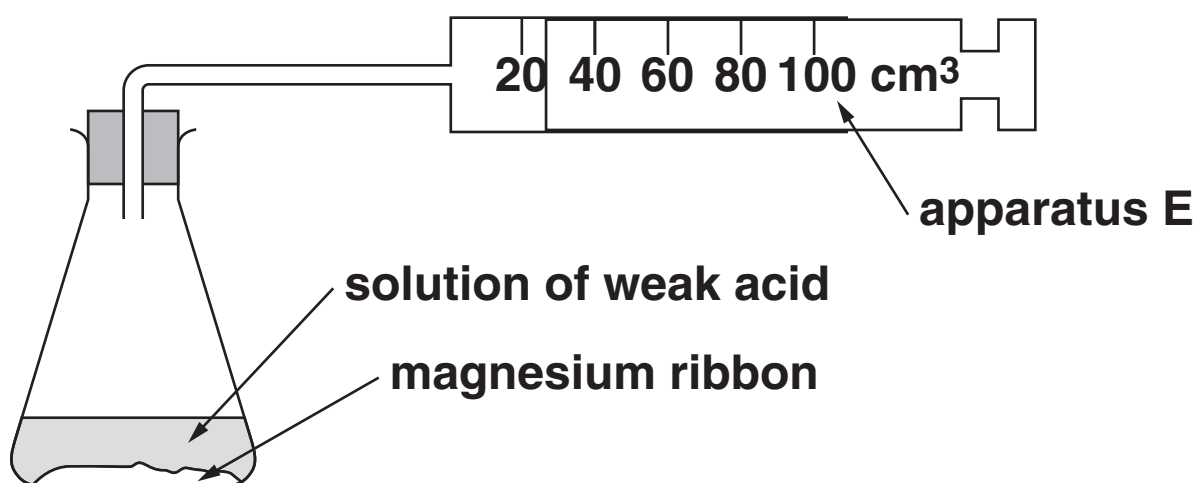
answer _____ [1]

(c) Chris investigates the reaction of a dilute acid with magnesium ribbon.

He adds a small amount of magnesium ribbon to 50 cm³ of the acid.

He measures the volume of hydrogen every 10 seconds.

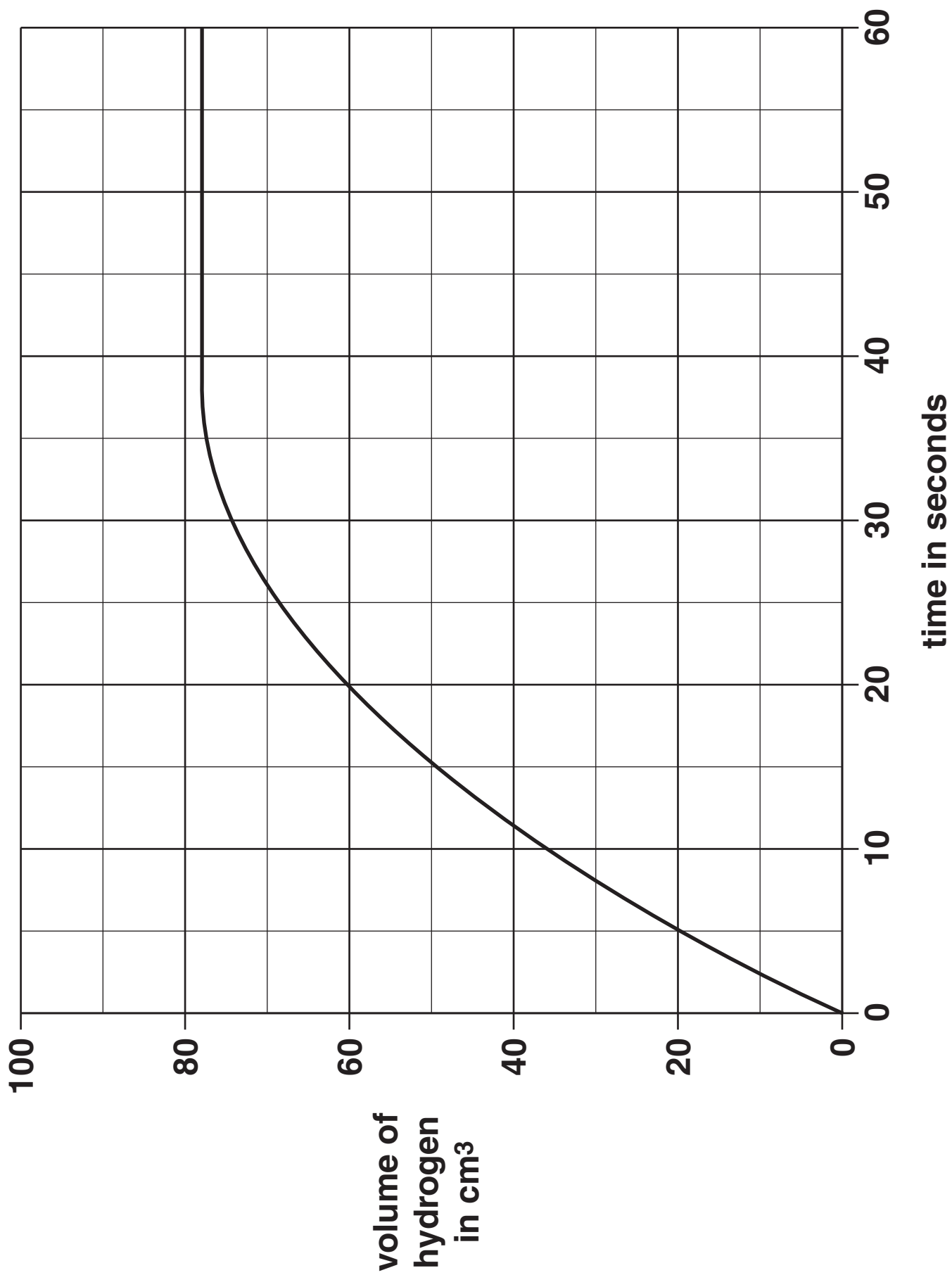
Look at the apparatus he uses.



What is the name of the apparatus labelled E?

_____ [1]

(d) Look at the graph of Chris' results.



(i) What is the volume of hydrogen made after 20 seconds?

_____ cm³ [1]

(ii) After what time did the reaction stop?

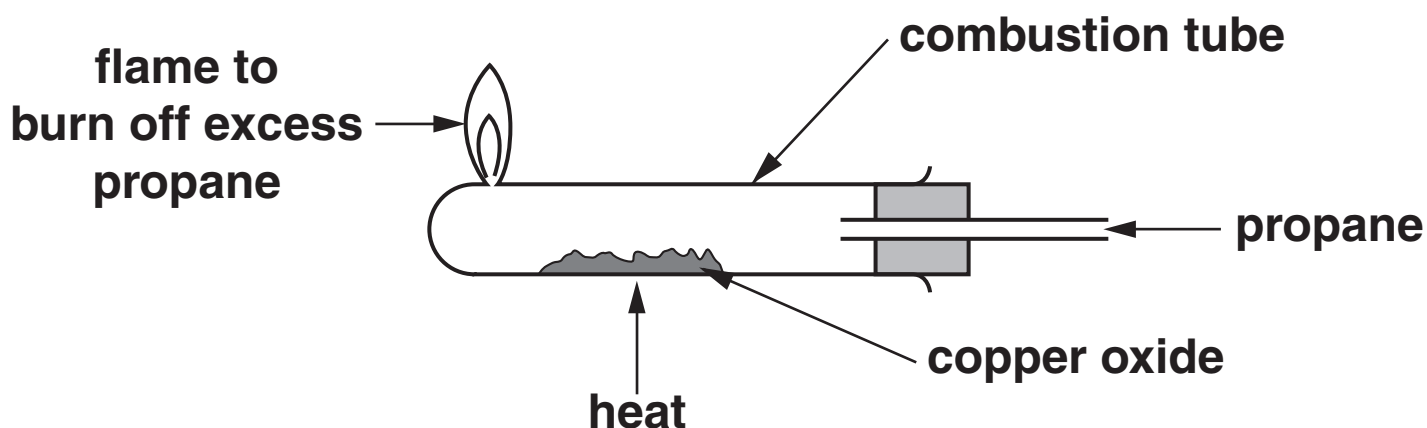
_____ seconds [1]

(iii) Suggest why the reaction stops.

_____ [1]

[Total: 8]

6 Alyce investigates a sample of copper oxide. Look at the apparatus she uses.



Alyce puts 2.88 g of copper oxide into the combustion tube.

Alyce passes propane gas over the heated copper oxide.

After 20 minutes she makes 2.56 g of copper.

(a) During the reaction all the oxygen in the copper oxide is removed.

What mass of oxygen was in the sample of copper oxide?

mass of oxygen = _____ g [1]

(b) Alyce repeats the experiment.

This time she uses 5.76 g of copper oxide instead of 2.88 g.

What mass of copper should Alyce make?

mass of copper = _____ g [1]

(c) Propane has the formula, C_3H_8 .

Calculate the molar mass of propane.

The relative atomic mass, A_r , of H is 1 and of C is 12.

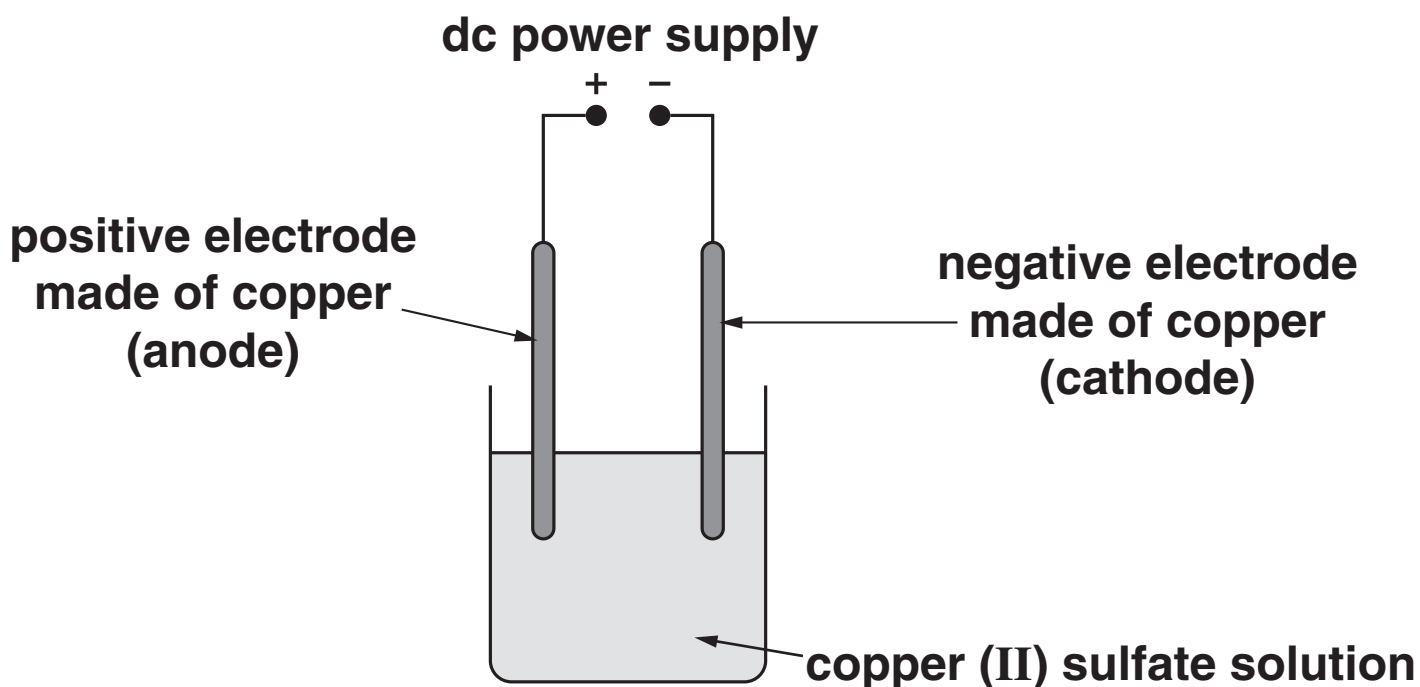
molar mass = _____ g/mol [1]

[Total: 3]

7 This question is about the electrolysis of copper(II) sulfate solution.

Look at the diagram.

Jess uses this apparatus to electrolyse copper(II) sulfate solution.



(a) Look at the list of particles found in copper(II) sulfate solution.



(i) Which particle is a molecule?

Choose from the list.

answer _____

[1]

(ii) Some particles are attracted to the negative electrode.

Choose one from the list.

answer _____ [1]

(b) Jess finds the mass of the copper electrodes before and after doing the electrolysis.

What happens to the mass of each electrode during the electrolysis?

mass of negative electrode _____

mass of positive electrode _____

_____ [2]

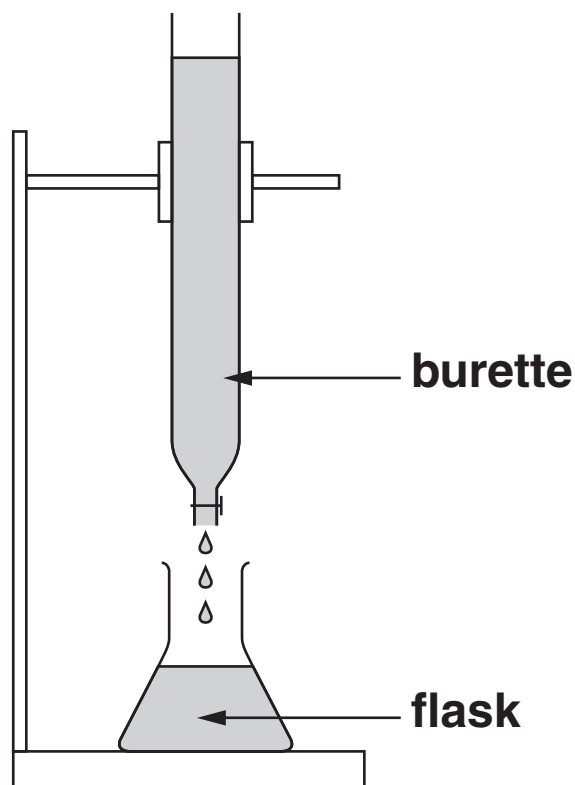
[Total: 4]

8 Matt wants to find the concentration of some dilute nitric acid.

He decides to do an acid-base titration.

Look at the diagram.

It shows some of the apparatus he uses.



Matt uses nitric acid and potassium hydroxide solution.

He uses phenolphthalein as an indicator.

(a) Describe how Matt does his acid-base titration.

Include any measurements he should make.

[3]

(b) Matt finds out that the nitric acid is too concentrated.

How can Matt dilute the nitric acid?

[1]

(c) Nitric acid is a STRONG acid.

Write down the name of ONE OTHER strong acid.

[1]

[Total: 5]

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SECTION C – MODULE C6

9 This question is about CFCs.

The molecular formula of one CFC is CF_2Cl_2 .

(a) (i) Write down the NAMES of the THREE elements in CF_2Cl_2 .

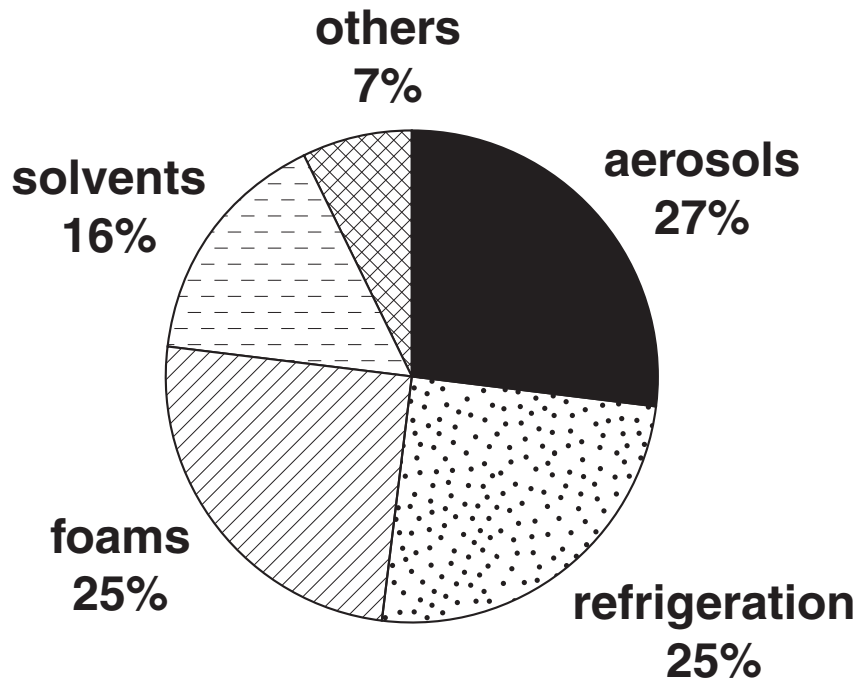
You may use the Periodic Table provided separately to help you.

_____ [1]

(ii) Write down the total number of ATOMS in a molecule of CF_2Cl_2 .

answer _____ [1]

(b) The pie chart shows the uses of CFCs in 1986.



(i) One product used the HIGHEST percentage of CFCs in 1986.

Which one?

_____ [1]

(ii) CFCs were used in aerosols.

Suggest one suitable safe alternative for CFCs.

_____ [1]

(c) CFCs in the atmosphere decrease the ozone layer.

This is called ozone depletion.

Ozone depletion causes more ultraviolet light to reach the Earth's surface.

Write down TWO medical problems which can be caused by an increase in levels of ultraviolet light.

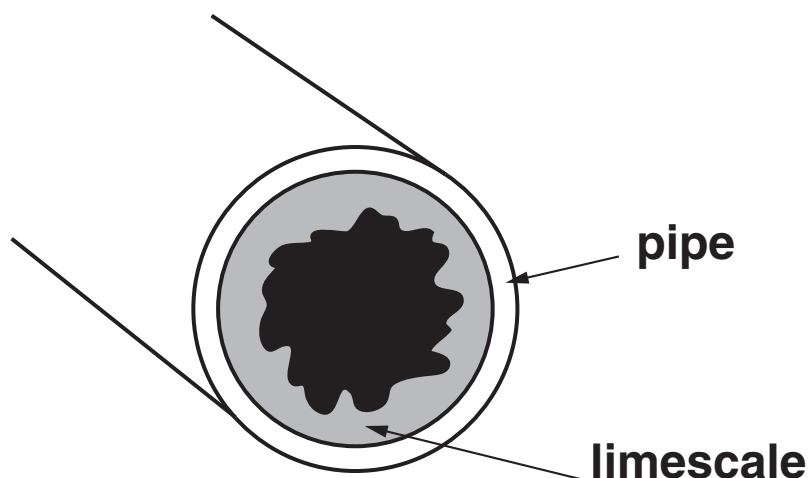
1 _____

2 _____ [2]

[Total: 6]

10 Hot water pipes are often coated with limescale.

Look at the picture of a hot water pipe.



(a) Limescale is made when hard water is heated.

Which of the following can be used to remove hardness from water?

Choose from the list.

CATALYST

ION-EXCHANGE RESIN

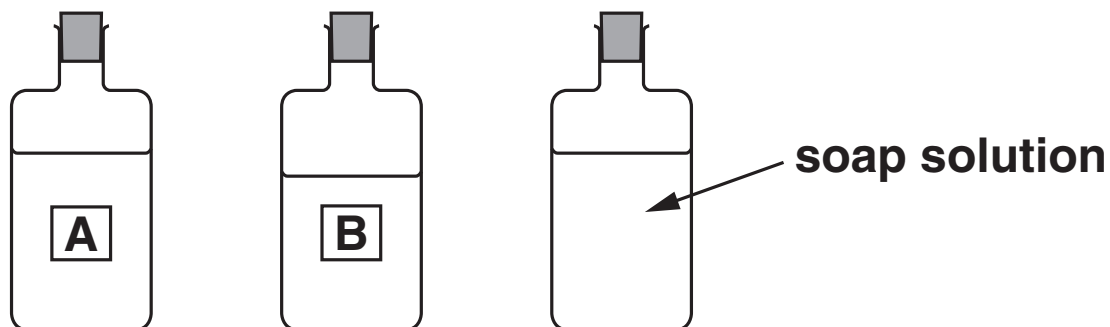
MAGNESIUM SULFATE

answer _____ [1]

(b) Bev and Jeff bring in two water samples, A and B.

They want to find out which has the most hardness.

They use soap solution in their experiment.



Write about how they do their experiment.

Your answer should include

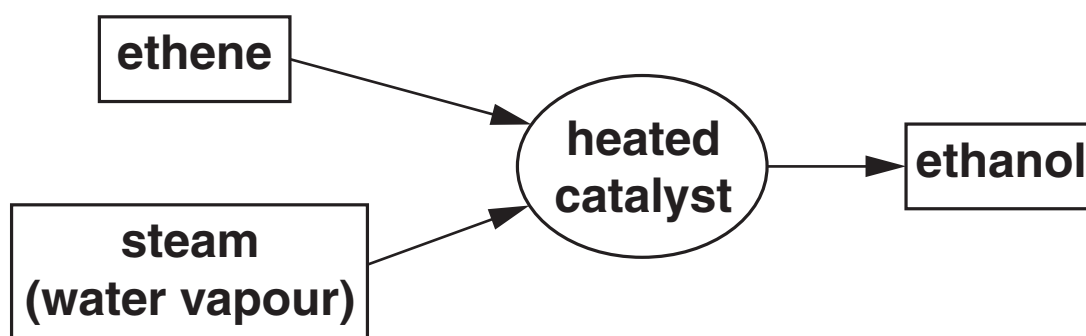
- the apparatus they use**
- the measurements they take**
- how they tell which sample of water has the most hardness.**

[3]

[Total: 4]

11 This question is about ethanol.

Look at the flow chart. It shows how ethanol is made from ethene.



- (a) (i) Write down the WORD equation for making ETHANOL from ethene.

_____ [1]

- (ii) Look at the list. It shows some different types of chemical reactions.

Which reaction type is used to make ethanol from ethene?

Choose from the list.

DEHYDRATION

ELECTROLYSIS

HYDRATION

SAPONIFICATION

answer _____ [1]

(iii) ETHENE can be made from ethanol.

Write down ONE condition for this reaction.

_____ [1]

(b) Ethanol can be made from glucose solution and yeast.

This reaction is called fermentation.

Fermentation makes a solution of ethanol.

What is the name of the process used to obtain ethanol from this solution?

_____ [1]

[Total: 4]

12 This question is about metals.

- (a) Some iron objects are covered with tin to stop them rusting.**

Write down TWO other methods used to stop iron from rusting.

1 _____

2 _____ **[2]**

- (b) Look at the table of results.**

It shows what happens when a metal is put into a solution.

SOLUTION USED	METAL BEING ADDED		
	IRON	TIN	ZINC
iron sulfate		X	✓
tin sulfate	✓		✓
zinc sulfate	X	X	

X means that nothing happens

✓ means that the metal gets coated

Write down the **THREE** metals, iron, tin and zinc, in order of reactivity.

Use the table of results to help you.

MOST reactive metal _____

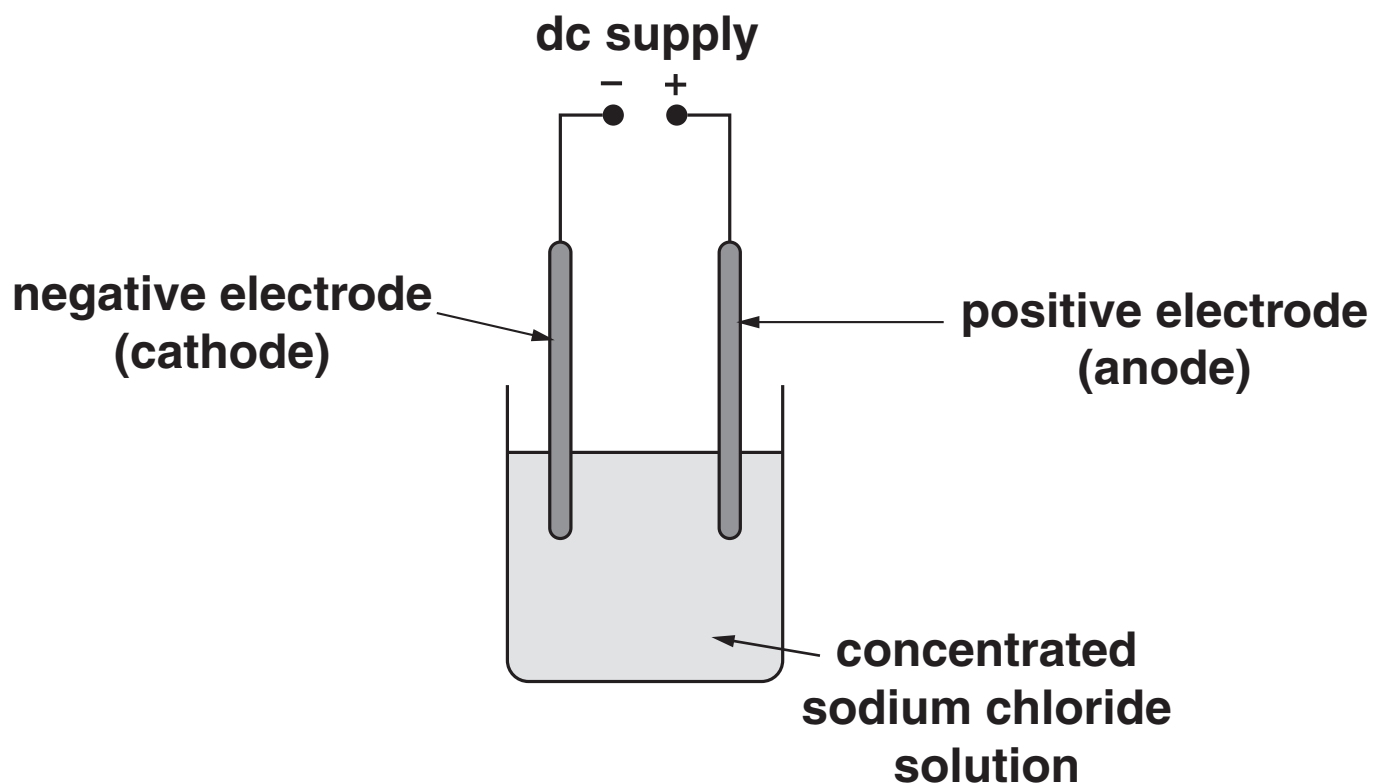
LEAST reactive metal _____ [1]

[Total: 3]

13 This question is about electrolysis and fuel cells.

(a) Ahmed investigates the electrolysis of concentrated sodium chloride solution.

Look at the apparatus he uses.

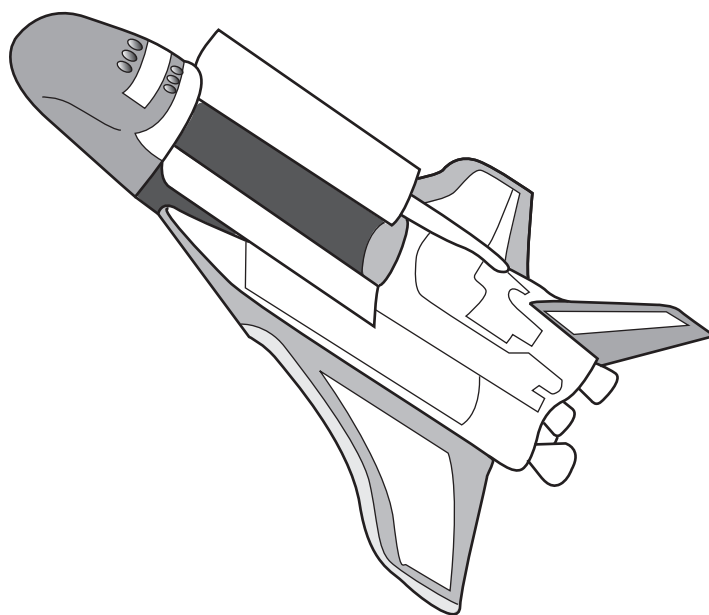


Hydrogen gas is made at the cathode.

Write down the NAME of the gas made at the ANODE.

_____ [1]

(b) The picture shows a spacecraft that uses a fuel cell.



In a fuel cell hydrogen reacts with oxygen.

Water is the only product.

(i) Hydrogen is a pollution-free fuel.

Write down ONE reason why.

_____ [1]

(ii) Fuel cells produce energy.

Look at the list. It shows different types of energy.

ELECTRICAL

HEAT

KINETIC

SOUND

What is the type of energy produced by a fuel cell?

Choose from the list.

answer _____ **[1]**

[Total: 3]

END OF QUESTION PAPER



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