

FOR OFFICIAL USE

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KU PS

Total Marks

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0500/402NATIONAL
QUALIFICATIONS
2000MONDAY, 22 MAY
10.50 AM – 12.20 PM**CHEMISTRY**
STANDARD GRADE
Credit 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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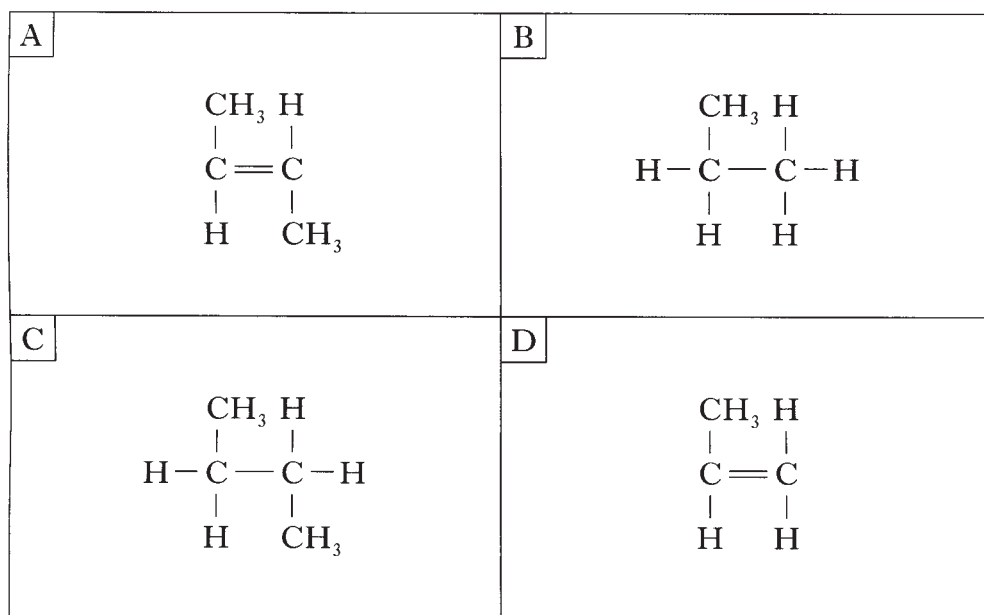
Scottish candidate number

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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.

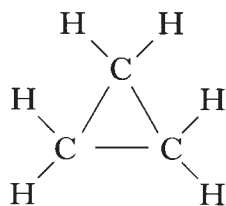
3. Hydrocarbon compounds have many uses.



(a) Identify the hydrocarbon which is used to make poly(butene).

A	B
C	D

(b) Identify the hydrocarbon which is an isomer of



A	B
C	D

[Turn over

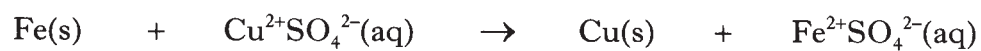
5. There are different types of chemical reaction.

A	B	C
displacement	hydrolysis	fermentation
D	E	F
condensation	addition	redox

(a) Identify the type of reaction that occurs when glucose molecules join to form starch.

A	B	C
D	E	F

(b) Identify the type(s) of reaction represented by the following equation.



A	B	C
D	E	F

[Turn over

10. There are three different types of silicon atom.

Type of atom	Number of protons	Number of neutrons
${}^{28}_{14}\text{Si}$		
${}^{29}_{14}\text{Si}$		
${}^{30}_{14}\text{Si}$		

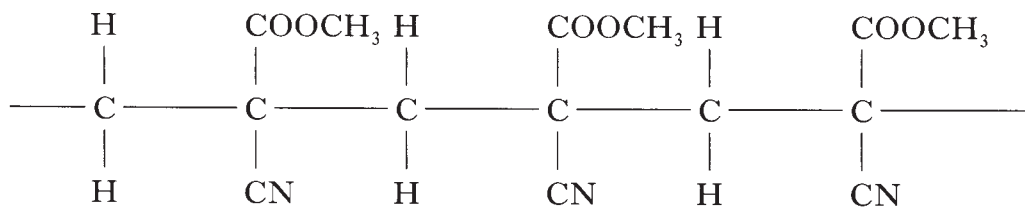
- (a) Complete the table to show the number of protons and neutrons in each type of silicon atom.
- (b) What name is used to describe these different types of silicon atom?
- _____
- (c) A natural sample of silicon has an average atomic mass of 28.11. What is the mass number of the most common type of atom in the sample of silicon?
- _____

Marks

KU	PS
1	
1	
1	
(3)	

Marks

12. When superglue sets a polymer is formed. The polymer has the following structure.



- (a) Draw the structural formula for the monomer in superglue.

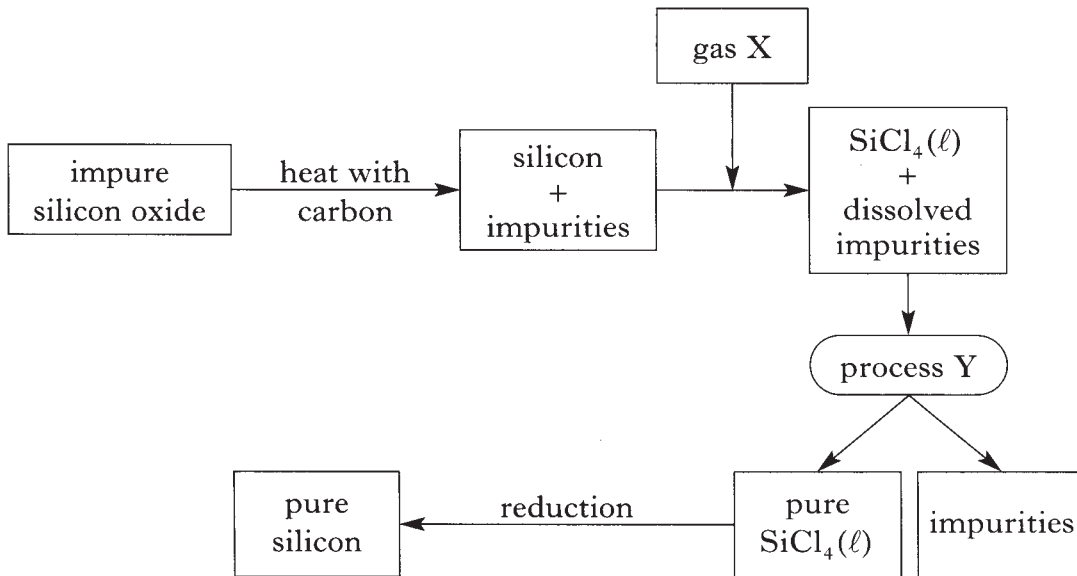
- (b) Name a toxic gas given off when superglue burns.

1

1
(2)

Marks

13. Silicon is used in the electronics industry and exists naturally as silicon oxide. It can be extracted in the following way.



- (a) Write the formula for silicon oxide.

1

- (b) Name gas X.

1

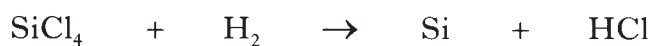
- (c) Name process Y.

1

- (d) Draw a diagram to show the **shape** of a SiCl₄ molecule.

1

- (e) The equation for the reduction of SiCl₄ is:

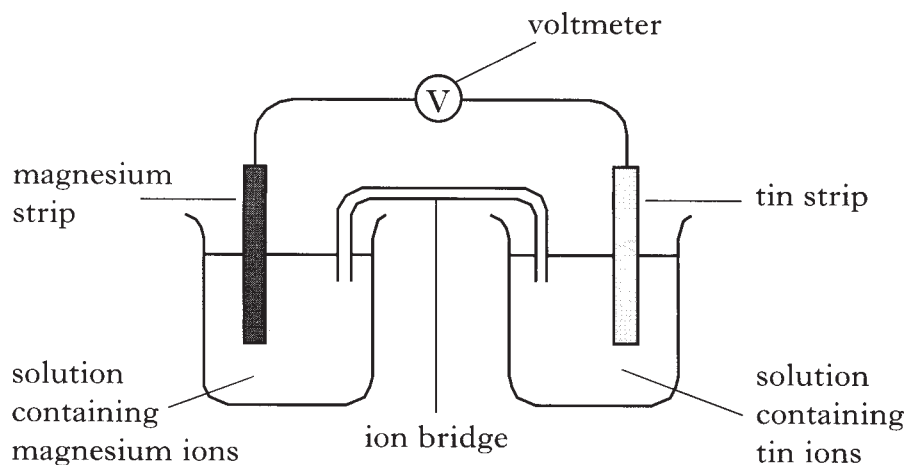


Balance this equation.

1

Marks

14. The diagram shows a cell which can produce electricity.



(a) What is the purpose of the ion bridge?

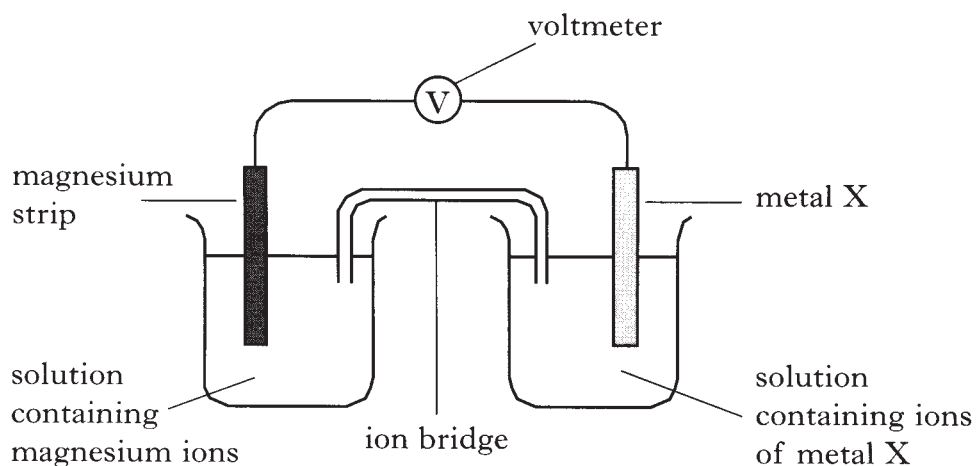
1

(b) Name a tin compound which could be used to make the solution containing tin ions.

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

1

(c) The following cell produces a higher voltage than the cell above.

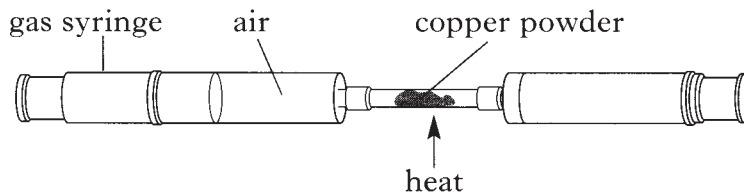


Suggest a name for metal X.

1

(3)

15. The percentage of oxygen in air can be determined by reacting the oxygen with copper. The air is passed backwards and forwards over the heated copper. Marks



Calculation:

$$\text{Percentage of oxygen in air} = \frac{\text{reduction in volume of air}}{\text{volume of air at start of experiment}} \times 100$$

The following is taken from a pupil's lab book.

volume of air at start of experiment = 60.0 cm³
 volume of gas at end of experiment = 47.5 cm³

- (a) Calculate the percentage of oxygen in the sample of air.
Show your working clearly.

Percentage of oxygen in air = _____ %

- (b) Suggest a reason why the air is passed backwards and forwards over the heated copper.

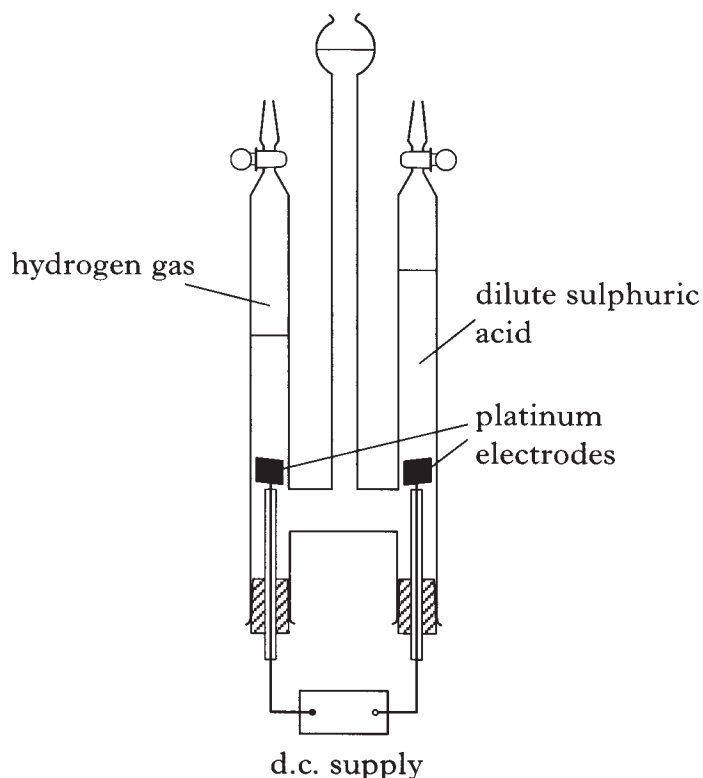
- (c) Suggest a reason why carbon cannot be used in place of the copper.

	KU	PS
1		
1		
1		

Marks

KU PS

16. Acids can be shown to contain $\text{H}^+(\text{aq})$ using a Hoffman voltameter.



- (a) Why must a d.c. supply be used?

1

- (b) The volume of hydrogen gas produced over a period of time was measured during the electrolysis of dilute sulphuric acid.

The results are shown in the table.

Time (min)	0	5	8	12	20
Volume of gas (cm³)	0	8.5	13.5	20.0	33.0

Marks

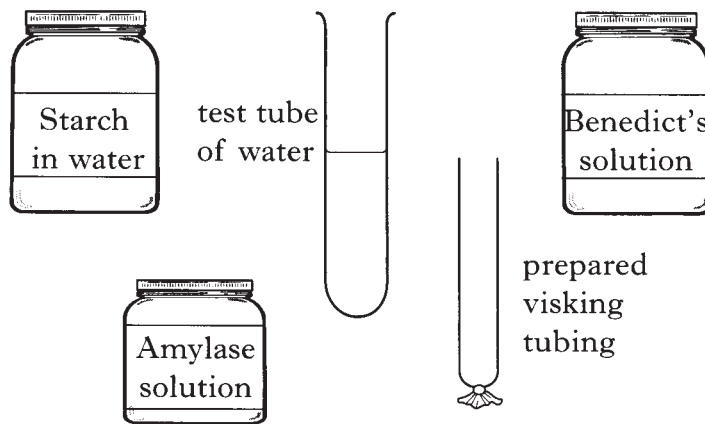
KU	PS
2	
(4)	

19. (b) (continued)

(ii) Using all the chemicals and apparatus below describe the experiment you would carry out to show that hydrolysed starch can pass through the visking tubing. (You may wish to draw a diagram.)

You may use other apparatus if required.

Chemicals and apparatus.



20. (a) Yeast can be used to convert carbohydrates to ethanol.
What name is given to this process?

- (b) Ethanol is the second member of the alkanol family.
The combustion of an alkanol releases heat energy.

Name of alkanol	Heat released when one mole of alkanol is burned (kJ)
methanol	726
ethanol	1367
propanol	2017
butanol	2665

- (i) Make a general statement linking the amount of heat released and the number of carbon atoms in the alkanol molecule.

- (ii) Predict the amount of heat released, when 1 mole of pentanol burns.

_____ kJ

Marks

KU	PS
1	
1	
1	
(3)	

[END OF QUESTION PAPER]