FOR OFFICIAL USE			

C

	KU	PS
Total Marks		

0500/402

NATIONAL QUALIFICATIONS 2000

MONDAY, 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 Scottish candidate number	Number of seat	
1 All questions should be attempted.		
 Necessary data will be found in the Data Booklet pand Intermediate 2. 	provided for Chemistry at Standard Grade	
The questions may be answered in any order I answer book, and must be written clearly and leg		
4 Rough work, if any should be necessary, as well book.	I as the fair copy, is to be written in this	
Rough work should be scored through when the f	air copy has been written.	
5 Additional space for answers and rough work will	be found at the end of the book.	
6 The size of the space provided for an answer sho much to write. It is not necessary to use all the s		
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.

DO NOT WRITE IN THIS MARGIN

KU	PS
	-~

1. The grid shows the symbols for some elements.

A	В	С
Al	Na	P
D	E	F
Mg	О	Ba

You may wish to use page 1 of the data booklet to help you.

(a) Identify the **two** elements which have atoms with the same number of outer electrons.

A	В	С
D	Е	F

(b) Identify the two elements which react to form a covalent compound.

A	В	С
D	E	F

(c) Identify the **two** elements which form an ionic compound with a formula of the type X_2Y , where X is a metal.

A	В	С
D	Е	F

DO NOT WRITE IN THIS MARGIN

The same of the sa	KU	PS
*		

2. Carbohydrates are formed in plants.

A	glucose
В	maltose
С	sucrose
D	starch
Е	fructose

(a) Identify the two carbohydrates with formula $C_{12}H_{22}O_{11}$.

A
В
С
D
Е

(b) Identify the carbohydrate which does **not** react with either iodine solution or Benedict's solution.

A
В
С
D
Е

DO NOT WRITE IN THIS MARGIN

MAR	GIN
KU	PS

3. Hydrocarbon compounds have many uses.

A	В
$CH_3 H$ $C == C$ $H CH_3$	$CH_{3} H$ $H-C-C-H$ $ $
С	D
$CH_{3} H$ $H-C-C-H$ $H CH_{3}$	$CH_3 H$ $C = C$ $H H$ $H H$

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

A	В
С	D

(b) Identify the hydrocarbon which is an isomer of

A	В
С	D

DO NOT WRITE IN THIS

4. A bromide ion is formed when a bromine atom gains one electron. Identify the true statement(s) about this change.

A	The change represents reduction.
В	The atomic number increases by one.
С	The particle becomes negatively charged.
D	The number of electron energy levels increases by one.
Е	The bromide ion has the same electron arrangement as an argon atom.

A \mathbf{B} \mathbf{C} D E

TH MAR	THIS MARGIN		
KU	PS		
	:		
:			

DO NOT WRITE IN THIS MARGIN

MARGIN		
KU	PS	

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	В	С
D	E	F

There are different types of chemical reaction.

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

$$\mathrm{Fe}(s) \qquad + \qquad \mathrm{Cu}^{2+}\mathrm{SO_4}^{2-}(\mathrm{aq}) \qquad \boldsymbol{\rightarrow} \qquad \mathrm{Cu}(s) \qquad + \qquad \mathrm{Fe}^{2+}\mathrm{SO_4}^{2-}(\mathrm{aq})$$

A	В	С
D	E	F

DO NOT

6. A gas pipeline made from iron can be protected by attaching scrap magnesium.

Identify the correct statement(s).

A	The magnesium would be oxidised.
В	The magnesium would not corrode.
С	The iron would corrode faster than the magnesium.
D	The magnesium would provide sacrificial protection.
Е	Electrons would flow from the iron to the magnesium.

A
В
С
D
Е

WRIT TH MAR	TE IN HS
KU	PS

DO NOT WRITE IN THIS MARGIN

MARGIN KU PS

7. The grid below shows pairs of chemicals.

A	В
Mg(s) + HCl(aq)	$NaOH(aq) + H_2SO_4(aq)$
С	D
Cu(s) + H2SO4(aq)	$Zn(s) + AgNO_3(aq)$
Е	F
CuSO ₄ (aq) + Na ₂ CO ₃ (aq)	CaCO ₃ (s) + HCl(aq)

(a) Identify the pair(s) which would react to produce water.

A	В
С	D
Е	F

(b) Identify the pair which would **not** react.

A	В
С	D
E	F

DO NOT WRITE IN THIS MARGIN

KU PS

8.	Hydroch	loric a	acid a	ınd sı	ılphurio	acid	are ty	wo	common	laboratory	acids.

A	Equal numbers of positive and negative ions are present.
В	A precipitate would be produced with barium hydroxide solution.
С	The H ⁺ ion concentration would increase when water was added.
D	Electrolysis would produce hydrogen gas at the negative electrode.
Е	1 mole of sodium hydroxide would be neutralised by 0.5 moles of the acid.

(a) Identify the statement which can be applied to **both** dilute sulphuric acid and dilute hydrochloric acid.

A	
В	
С	
D	
Е	

(b) Identify the statement(s) which can be applied to dilute sulphuric acid but **not** to dilute hydrochloric acid.

A
В
С
D
E

DO NOT WRITE IN THIS MARGIN

Marks

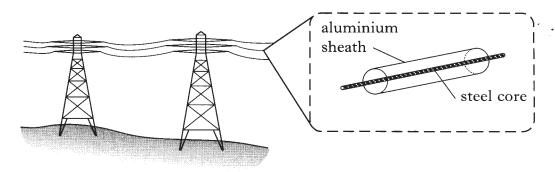
KU PS

PART 2 A total of 40 marks is available in this part of the paper.

9. The uses of metals are related to their properties.

Metal	Density (g/cm³)	Relative strength	Relative electrical conductivity
Aluminium	2.7	1.0	3.8
Steel	7.9	4.0	1.0
Copper	8.9	2.5	5.9

Overhead electricity cables have a steel core surrounded by an aluminium sheath.



Using information from the table, suggest:

(a)	an advantage of	using aluminium	rather than	copper for	the cable;

(b) why the cables have a steel core.

1 (2)

DO NOT WRITE IN THIS MARGIN

PS

KU

Marks

10. There are three different types of silicon atom.

Type of atom	Number of protons	Number of neutrons
²⁸ Si		
²⁹ Si		
³⁰ 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?

1 (3)

1

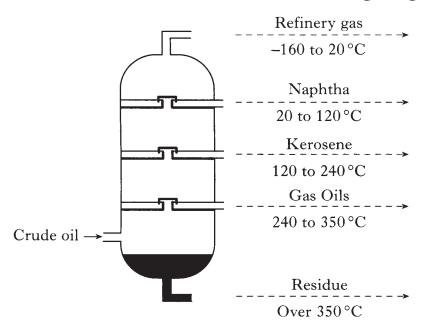
Crude oil arriving at the BP refinery in Grangemouth is separated into Marks11. different fractions.

MARGIN

PS

KU





(a) In which fraction will pentane be found? You may wish to use page 6 of the data booklet to help you.

(b) Why is the gas oils fraction more viscous than the kerosene fraction?

(c) Fractions which are surplus to requirements can be cracked.

(i) Give a reason for cracking fractions.

(ii) A catalyst is used to speed up this process. Suggest another reason for using a catalyst.

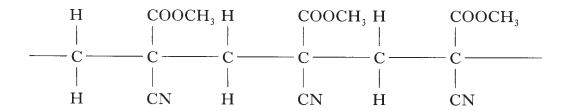
1

DO NOT WRITE IN THIS MARGIN

KU PS

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 (2)

DO NOT WRITE IN THIS MARGIN

KU PS

Marks	
TYLUINS	

1

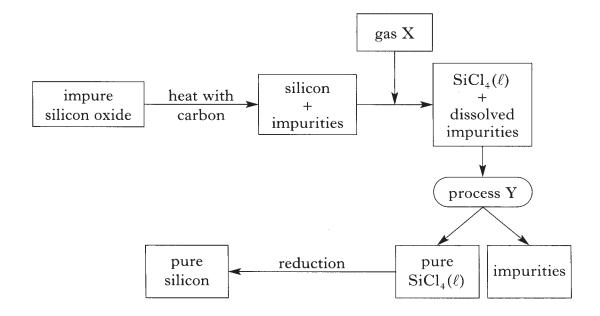
1

1

1

1

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.
- (b) Name gas X.
- (c) Name process Y.
- (d) Draw a diagram to show the **shape** of a SiCl₄ molecule.

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

$$\mathrm{SiCl_4} \quad + \quad \mathrm{H_2} \quad \rightarrow \quad \mathrm{Si} \quad + \quad \mathrm{HCl}$$

Balance this equation.

DO NOT WRITE IN THIS MARGIN

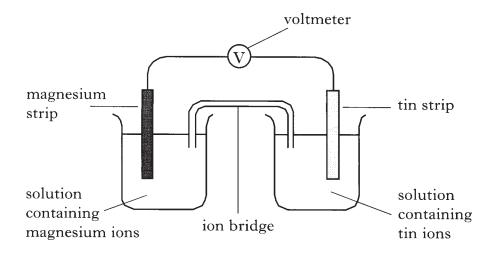
Marks

1

1

KU PS

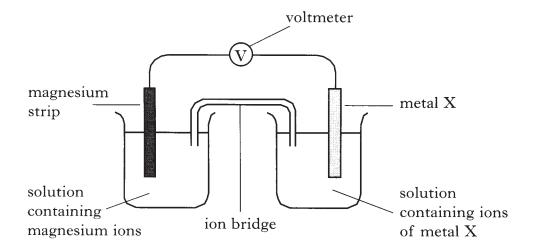
14. The diagram shows a cell which can produce electricity.



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

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

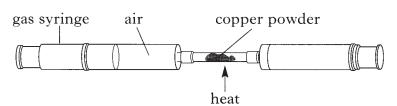


Suggest a name for metal X.

1 **(3)**

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

DO NOT
WRITE IN
THIS
MARGIN



Calculation:

Percentage of oxygen in air = reduction in volume of air volume of air at start of experiment

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

 $60.0 \, \text{cm}^3$ volume of air at start of experiment =

volume of gas at end of experiment = $47.5 \,\mathrm{cm}^3$

(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.

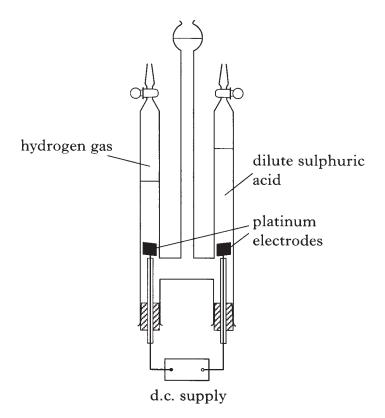
1

DO NOT WRITE IN THIS MARGIN

Ma

arks	KU	PS
irks	KU	PS

Acids can be shown to contain H⁺(aq) using a Hoffman voltameter.



(a) W	hv must	a d.c.	supply	be used?

(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 (cm ³)	0	8.5	13.5	20.0	33.0

DO NOT WRITE IN THIS MARGIN

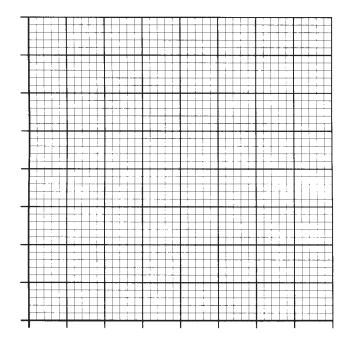
KU PS

Marks

16. (b) (continued)

Draw a line graph of the results.

(Additional graph paper, if required, will be found on page 25.)



(c) Predict the volume of hydrogen gas which would be produced during the first 10 minutes.

(d) Write the ion-electron equation for the formation of hydrogen gas. You may wish to use your data booklet to help you.

[Turn over

2

1

1 (5) World population (billions)

1900

1920

1940

Official SQA Past Papers: Credit Chemistry 2000

DO NOT WRITE IN THIS MARGIN

PS

KU

Marks

(a) Name the industrial process used to manufacture ammonia.

1

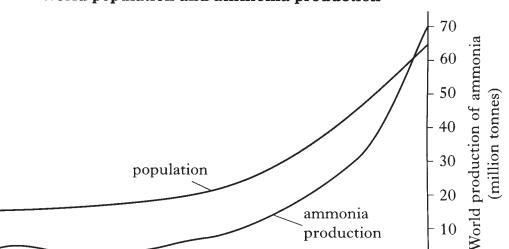
(b) The reaction to produce ammonia is carried out at temperatures between 380 °C and 450 °C.

Why are higher temperatures not used?

(c) The graph shows the relationship between the growth of the human population and the amount of ammonia produced by industry.

1

World population and ammonia production



Why has the increase in world population led to an increase in ammonia production?

1960

Year

1

2000

DO NOT WRITE IN THIS MARGIN

M

18. Camping gas contains propane and butane. Propane and butane are members of the alkane homologous series.



(a) What is meant by the term "homologous series"?

(b) The equation for the burning of propane is

$$C_3H_8(g)$$
 + $5O_2(g)$ \rightarrow $3CO_2(g)$ + $4H_2O(g)$

Calculate the mass of water produced when 22 g of propane burns.

Answer = g

2 **(3)**

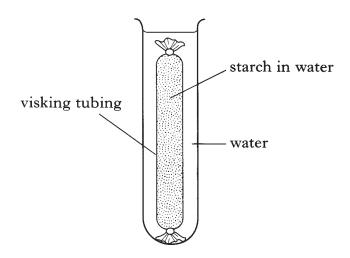
1

DO NOT WRITE IN THIS MARGIN

KU PS

Marks

19. Visking tubing can be used to model the gut wall.



(a) Describe how you would show that starch molecules are too large to pass through the visking tubing.

(b) During digestion starch is hydrolysed by amylase.

(i) What is meant by "hydrolysed"?

1

DO NOT

WRITE	IN
THIS	;
MARG	IN

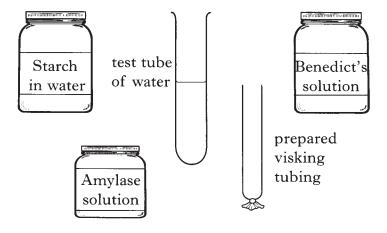
Marks	KU	PS

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.



	.,.	 91°'.	
-		 	
		 . <u></u>	

2 **(4)**

DO NOT
WRITE IN
THIS
MARGIN

			1	
		ber of the alkanol family. nol releases heat energy.		
	Name of alkanol	Heat released when one mole of alkanol is burned (kJ)		
	methanol	726		
	ethanol	1367		
	propanol	2017		
	butanol	2665		
			1	
(ii)	Predict the amount of burns.	of heat released, when 1 mole of pe		
(ii)		of heat released, when 1 mole of po	entanol 1	
(ii)	burns.	kJ	entanol	
(ii)	burns.		entanol 1	
(ii)	burns.	kJ	entanol 1	