FOR OFFICIAL USE	 		
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Total Marks		

## 0500/401

2002

NATIONAL THURSDAY, 16 MAY QUALIFICATIONS 1.00 PM - 2.30 PM

**CHEMISTRY** STANDARD GRADE General Level

Fill in these boxes and read what is printed l	pelow.	
Full name of centre	Town	
Forename(s)	Surname	
Date of birth		
Day Month Year Scottish candidate num	ber Number of seat	
1 All questions should be attempted.		
2 Necessary data will be found in the Data Grade and Intermediate 2.	Booklet provided for Chemistry at Standard	
3 The questions may be answered in any or answer book, and must be written clearly and		
4 Rough work, if any should be necessary, as book.	s well as the fair copy, is to be written in this	
Rough work should be scored through when	the fair 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 much to write. It is not necessary to use all		
7 Before leaving the examination room you m not, you may lose all the marks for this paper		

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1. The periodic table on page 8 of the data booklet shows the names of the elements.

A	В	С
curium	lithium	magnesium
D	Е	F
cobalt	platinum	aluminium

(a) Identify the alkali metal.

А	В	С
D	Е	F

(b) Identify the element made by scientists.

-	А	В	С
	D	E	F

(c) Identify the element which is used as the catalyst in the manufacture of nitric acid (Ostwald Process).

A	В	С
D	Е	F

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2. The formulae of some gases are shown in the grid.

A	В	С
СО	$H_2$	$Cl_2$
D	E	F.
$O_2$	$CO_2$	$NO_2$

(a) Identify the gas produced in the reaction of magnesium with hydrochloric acid.

А	В	С
D	Е	F

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

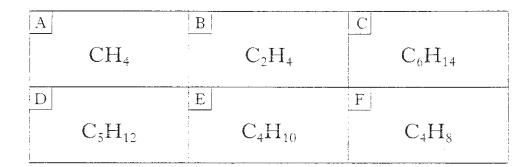
A	В	С
D	E	F

( $\epsilon$ ) Identify the poisonous gas produced by the **incomplete combustion** of hydrocarbons.

А	В	С
D	E	F

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3. The formulae for some hydrocarbons are shown in the grid.



(a) Identify the **two** hydrocarbons which could be produced when propane  $(C_3H_8)$  is cracked.

A	В	С
D	Е	F

(b) Identify the **two** unsaturated hydrocarbons.

A	В	С
D	Е	F

(c) Identify the hydrocarbon with the highest boiling point. You may wish to use page 6 of the data booklet to help you.

А	В	С
D	Е	F

4.	The grid	contains tl	he names	of some	chemical	processes.
i •	THE SIL	COMMITTE C	iic maine	ox comite	on on	procession

В	С
photosynthesis	distillation
E	F
galvanising	cracking
	E

(a) Identify the process that uses light energy.

А	В	С
D	Е	F

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

	А	В	С
į	D	E	F

(c) Identify the **two** processes that provide protection against corrosion.

А	В		С	
D	E	V.	F	

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5.	The names	of some	calcium.	compounds	are shown	in the	orid
-	TILC THURSDAY	Or SOurce	Culciani	Compounds	CIC OILO WII	III CIIC	

A	В	
calcium	calcium	calcium
carbonate	iodide	sulphate
D	E	E
		1
calcium	calcium	calcium

(a) Identify the two compounds which contain oxygen.

A	В	С
D	Е	F

(b) Identify the compound which will neutralise an acid.

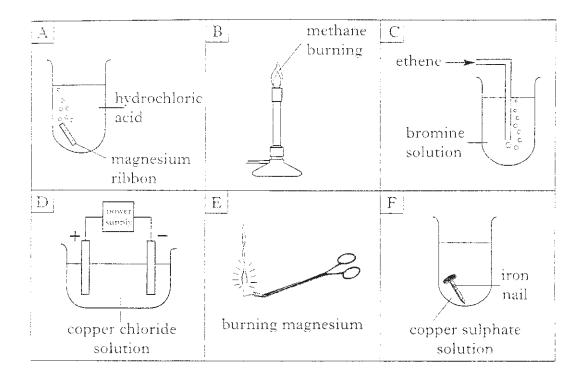
А	В	С
D	E	F

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6. The grid below shows some simple experiments.



(a) Identify the experiment which gives water as a product.

	A		В	:	С	_
!	D	:	E	1	F	

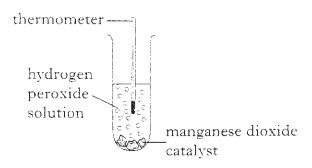
(b) Identify the experiment in which an addition reaction takes place.

	В	С
D	Е	F

7. Manganese dioxide acts as a catalyst in the following reaction:

hydrogen peroxide — → water + oxygen

The diagram shows how the reaction can be carried out.



Several experiments were carried out using the same mass of manganese dioxide and the same volume of hydrogen peroxide solution.

	Concentration of hydrogen peroxide solution (mol/l)	Temperature /°C	Form of manganese dioxide
А	0.5	20	powder
В	1.0	30	lump
С	1.5	20	lump
D	1.5	30	powder
Е	0.5	20	lump
F	2.0	20	powder

(a) Identify the **two** experiments which should be compared to show the effect of particle size on the speed of the reaction.

А
В
С
D
E
F

(b) Identify the experiment with the **slowest** speed of reaction.

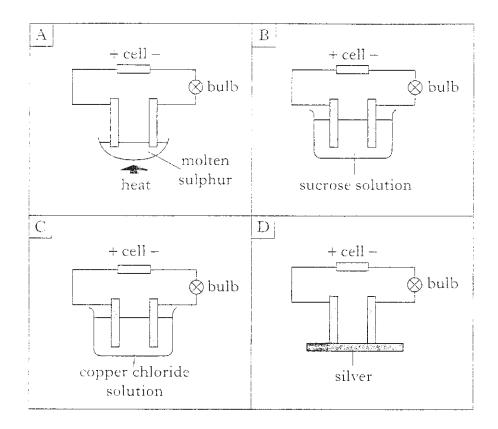
	А
į	В
	С
	D
ĺ	E
	F

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8. Leia was investigating electrical conductivity. She set up four experiments.



Identify the experiment(s) in which the bulb will light.

А	B
С	D

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9.

DO NOT WRITEIN THIS MARGIN Marks KU PS PART 2 A total of 40 marks is available in this part of the paper. polymer handle metal base (a) The handle of the cooking pot is made of a polymer which does not melt when it gets hot. What **term** is used to describe this type of polymer? 1 (b) The metal base of the cooking pot does not melt either. Give another property of the metal which makes it suitable to be used as the base of the pot. 1 **(2)** [Turn over

(a)

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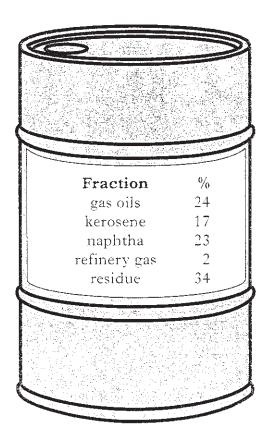
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10. Crude oil is a mixture of hydrocarbons. It is separated into different fractions at the oil refinery.

What is a hydrocarbon?		

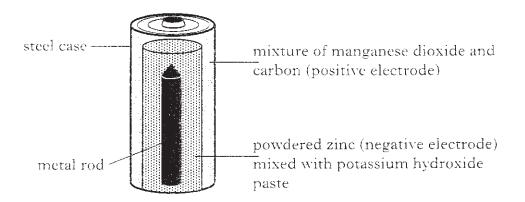
(b) The diagram shows the percentage of each fraction obtained from a barrel of crude oil.



DO NOT WRITE IN THIS MARGIN Marks KU PS 10. (b) (continued) (i) Present this information in the form of a bar graph. Use appropriate scales to fill most of the graph paper. (Additional graph paper, if required, can be found on page 24.) 2 (ii) Bitumen (tar) is used for road surfacing. From which fraction is bitumen obtained? 1 (4) [Turn over

						-	
11.	There	are	many	different	types	of	battery.

ı	(ar)	The	diagram	chouse	a ro	alkaling	-manganese	hattan	٠.
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(i)	After some time, this battery stops producing electricity.
	Why does this happen?

(ii) Suggest why this type of battery is known as an alkaline battery.

(iii) Why is the potassium hydroxide used in the form of a paste and not as a dry powder?

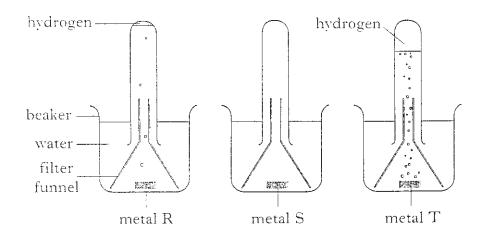
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(continued)			
(b) Car batteries can be recharged.			
outer casing electrolyte lead plates			
What type of electrolyte is used in a car battery?	1		
(c) Give <b>one</b> advantage of using batteries rather than mains electricit	ry.		
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1 (4)	

Wilma investigated the reaction of the metals R, S and T with water.



(a) Place the metals in order of reactivity (most reactive first).

(b) Identify a variable that Wilma would have kept constant.

(c) Why is it unsafe to use potassium metal in this experiment?

(d) How would Wilma test the gas to show that it was hydrogen?

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Th	e non	-metal sulphi	ur reacts with oxy	ygen to produce s	ulphur dioxide.		
			o. 1. h				
OXV	gen _	rannanana.	sulphur	<i>2010000</i>	sulphur dioxide		:
g	_	<u> </u>	The state of the s		gas		
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(a)		e an equation		ols and formula	e, for the reaction	n	
			to balance the ed	quation.)			:
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						1	
(b)	Wha	t type of bon	ding is present in	sulphur dioxide:			
						1	1000
(c)	Suln	bur diavida a	dissolves in water				
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14. Alcoholic drinks contain different percentages of alcohol.

Beers contain 5% but some ciders are stronger at 7:5%. Red wine contains 12%, but fortified wines contain 18%. Whisky is much stronger at 40% alcohol.

(a) Present the above information in a table with suitable headings.

(b) All alcoholic drinks are made using the same process:

- alcohol + carbon dioxide

(i) What type of substance, found in yeast, acts as a catalyst for the reaction?

(ii) What is the correct chemical name for the alcohol found in alcoholic drinks?

(iii) State the test for carbon dioxide.

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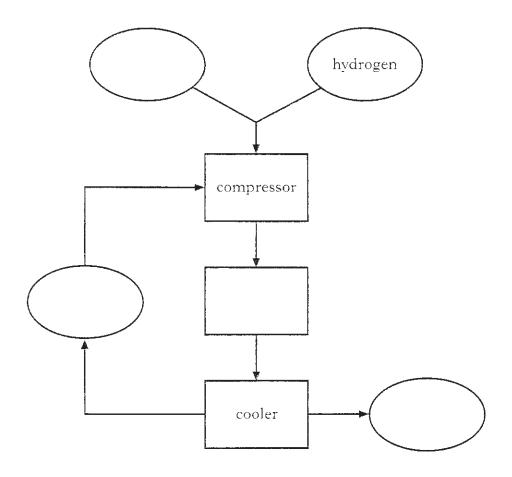
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## The Manufacture of Ammonia

The gases nitrogen and hydrogen are mixed together then compressed before passing into a catalyst chamber. Within the catalyst chamber there is an iron catalyst at  $500\,^{\circ}$ C. In the cooler, the ammonia is separated from the unreacted gases. The unreacted gases are recycled.

(a) Use the above information to complete the flow chart.



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

(c) Suggest a possible source for the nitrogen used in the manufacture of ammonia.

1 (4) [Turn over

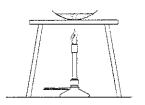
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16. Laurie carried out an experiment to make copper sulphate crystals.

## Preparing Copper Sulphate Crystals

## Instructions:

- 1. Measure 40 cm<sup>3</sup> of dilute sulphuric acid into a clean beaker.
- 2. Carefully add a spatulaful of copper oxide to the beaker and stir with a stirring rod.
- 3. Continue to add the copper oxide until no more reacts.
- 4. Remove the excess copper oxide.
- 5. Boil the solution for 30 seconds then leave it to cool and crystallise.



dilute

sulphuric acid

copper oxide

- (a) Name the type of chemical reaction taking place between the copper oxide and the dilute sulphuric acid.
- (b) How is the excess copper oxide removed in step 4:

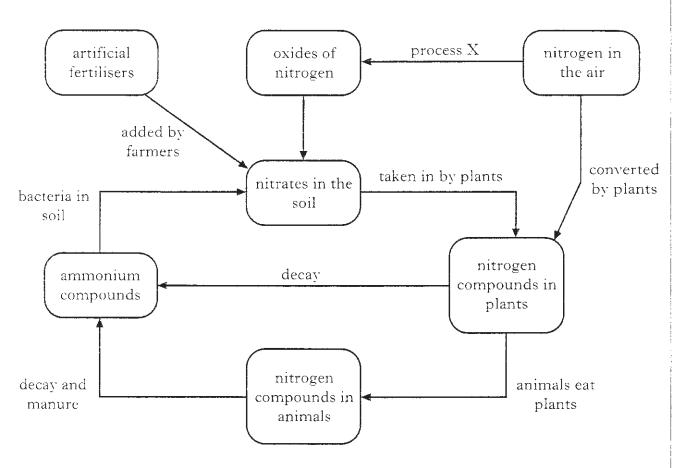
(c) Why would copper sulphate not be made by adding copper metal to dilute sulphuric acid?

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(3)

17. The diagram shows part of the nitrogen cycle.



(a) (i) How are some plants able to convert nitrogen from the air into nitrogen compounds?

(ii) Process X takes place in the air.

What provides the energy for this process?

(b) Plants need phosphorus to grow.

Suggest why calcium phosphate is **not** suitable as a fertiliser.

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

(c) Nitrogen and phosphorus are two of the essential elements supplied by fertilisers. Name the third essential element.

1 (4)

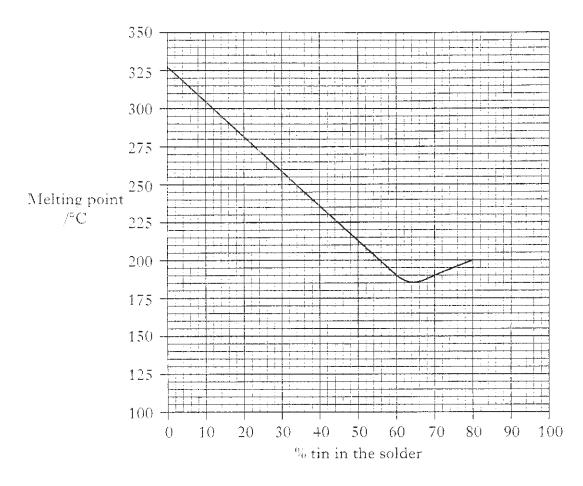
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18. Solders are mixtures of lead (melting point 328 °C) and tin (melting point 232 °C).

The graph shows the melting points of solders containing different percentages of tin.



(a) What name is given to mixtures of metals like solders?

(b) Describe the trend in the melting point of solder as the percentage of tin increases from 20% to 50%.

(c) Use the graph to estimate the melting point of solder containing 90% tin.

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The table contains information about some popular gemstones.

Name	Formula of main chemical	Common colour	Source of colour
diamond	С	colourless	_
amethyst	SiO <sub>2</sub>	purple	iron compounds
sapphire	$Al_2O_3$	blue	titanium and iron compounds
emerald	$\mathrm{Be_{3}Al_{2}Si_{6}O_{18}}$	green	chromium compounds
ruby	$\mathrm{Al_2O_3}$	red	chromium compounds

(a) (i) **Name** the main chemical found in both sapphire and ruby.

(ii) What type of metal element is present in the compounds which cause the colour in the gemstones?

You may wish to use page 8 of the data booklet to help you.

(b) Diamond does not conduct electricity.

Name the form of carbon which conducts electricity.

[END OF QUESTION PAPER]