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Centre Number						Candidate Number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

B641/01

GATEWAY SCIENCE

CHEMISTRY B

Unit 1 Modules C1 C2 C3 (Foundation Tier)

MONDAY 18 JANUARY 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, however additional paper may be used if necessary.**

INFORMATION FOR CANDIDATES

- **The number of marks is given in brackets [] at the end of each question or part question.**
- **The Periodic Table is printed on the back page.**
- **The total number of marks for this paper is 60.**

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Answer ALL the questions.

SECTION A – MODULE C1

1 This question is about fuels.

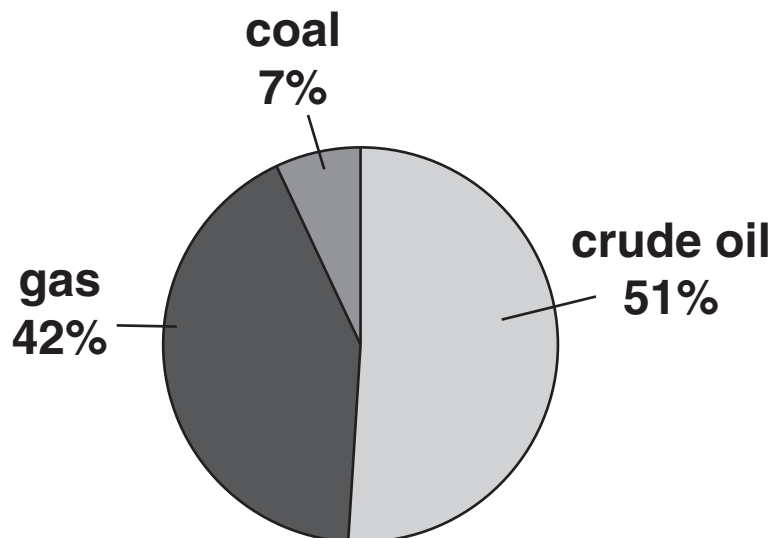
Coal, crude oil and gas are NON-RENEWABLE fuels.

Supplies of these three fossil fuels will eventually run out.

(a) What is meant by a NON-RENEWABLE fuel?

[1]

(b) Look at the information comparing the use of three fossil fuels in one year.



Which of the three fossil fuels was used the MOST?

[1]

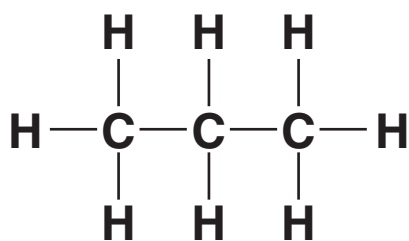
(c) Petrol and diesel are separated from crude oil.

What is the name of the process that separates crude oil into useful fractions?

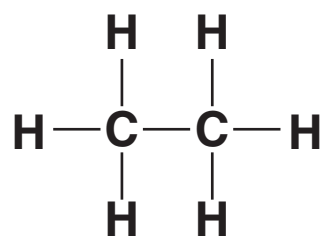
_____ [1]

[Total: 3]

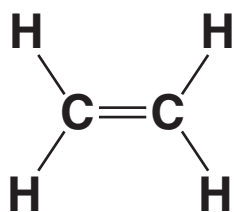
2 Look at the displayed formulas of some compounds of carbon.



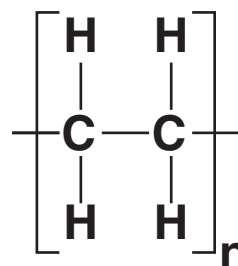
compound A



compound B



compound C



compound D

(a) Which one of the compounds has 8 atoms?

Choose from A, B, C or D.

answer _____ [1]

(b) Which one of the compounds is a POLYMER?

Choose from A, B, C or D.

answer _____ [1]

(c) Which one of the compounds is an ALKENE?

Choose from A, B, C or D.

answer _____ [1]

(d) How many CARBON atoms has compound A?

answer _____ [1]

[Total: 4]

3 This question is about cooking and foods.

Look at the list of some foods provided.

BREAD

CABBAGE

CARROTS

LEMON

MEAT

APPLE

(a) Write down the name of one food that contains a lot of PROTEIN.

Choose from the foods in the list.

_____ [1]

(b) Some of the foods in the list need to be cooked before eating them.

A barbecue is used to cook food at a high temperature.

(i) Write down ONE other way of COOKING food.

_____ [1]

(ii) Write down ONE reason why some foods need to be cooked.

_____ [1]

(iii) Cooking food is an example of a chemical change.

Explain why.

_____ [1]

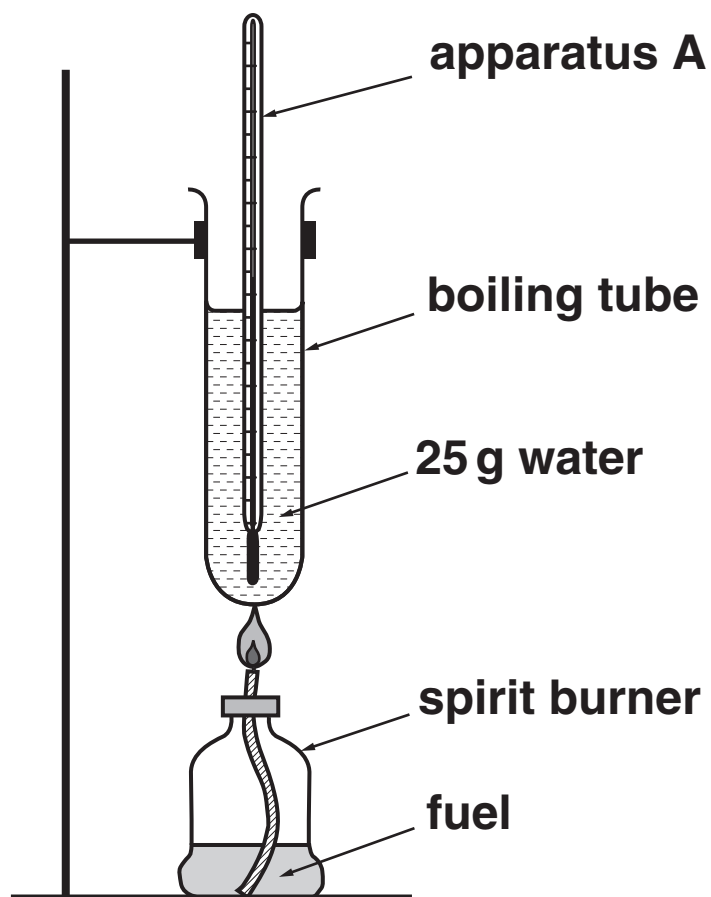
[Total: 4]

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4 Luke and Sophie investigate the energy content of two fuels.

Look at the diagram.

It shows the apparatus they use.



(a) Write down the name of apparatus A.

_____ [1]

(b) They burn 1.0 g of fuel each time.

Look at their table of results.

FUEL	STARTING TEMPERATURE OF WATER IN °C	FINAL TEMPERATURE OF WATER IN °C	TEMPERATURE CHANGE IN °C
ethanol	20	35	15
paraffin	20	50	

(i) What is the temperature change for paraffin?

answer _____ °C [1]

(ii) Burning fuels is an EXOTHERMIC reaction.

What is meant by an exothermic reaction?

_____ [1]

[Total: 3]

5 Look at the label on a jar of mayonnaise.



Ingredients:
Water; oil; egg yolk (an emulsifier);
sugar; flavour enhancers;
food colouring; antioxidants

(a) Which ingredient is present in the SMALLEST amount?

Choose from the food label.

_____ [1]

(b) Egg yolk is one of the ingredients in the mayonnaise.

Egg yolk is an EMULSIFIER.

Describe what an emulsifier does.

_____ [1]

(c) The mayonnaise contains an ANTIOXIDANT.

Antioxidants are added to foods.

Explain why.

[1]

[Total: 3]

**6 This question is about polymers and plastics.
Milk containers and bottles are non-biodegradable.**

(a) What does non-biodegradable mean?

[1]

(b) Write about some ways local councils dispose of these plastic containers.

[2]

[Total: 3]

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SECTION B – MODULE C2

7 Limestone is a rock used to make buildings.

Limestone is obtained from a quarry.

A quarry is a very large hole dug into rocks.

(a) Quarries can cause environmental problems.

One of these problems is that they take up lots of land.

Write about OTHER environmental problems caused by quarrying.

[2]

(b) The chemical name for limestone is calcium carbonate.

When heated strongly calcium carbonate changes into calcium oxide.

calcium carbonate → calcium oxide + carbon dioxide

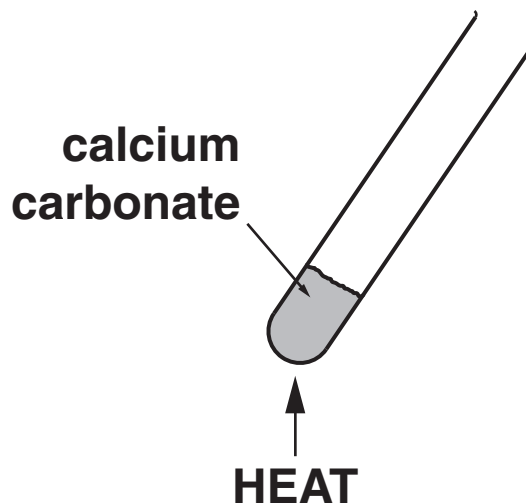
This change is called THERMAL DECOMPOSITION.

What is thermal decomposition?

[1]

(c) Harry investigates the decomposition of calcium carbonate.

Look at the diagram. It shows the apparatus he uses.



Harry measures the mass of the test tube and its contents before and after heating.

Look at his results table.

	MASS IN GRAMS
mass of test tube and contents before heating	17.45
mass of test tube and contents after heating	16.96

- (i) The mass of the test tube and its contents decreases.

Suggest why.

_____ [1]

- (ii) What is the change in mass of the test tube and its contents?

change in mass = _____ g [1]

[Total: 5]

8 Iron reacts very slowly with dilute sulfuric acid.

The reaction makes iron sulfate and hydrogen.

(a) Write down the WORD equation for this reaction.

_____ [1]

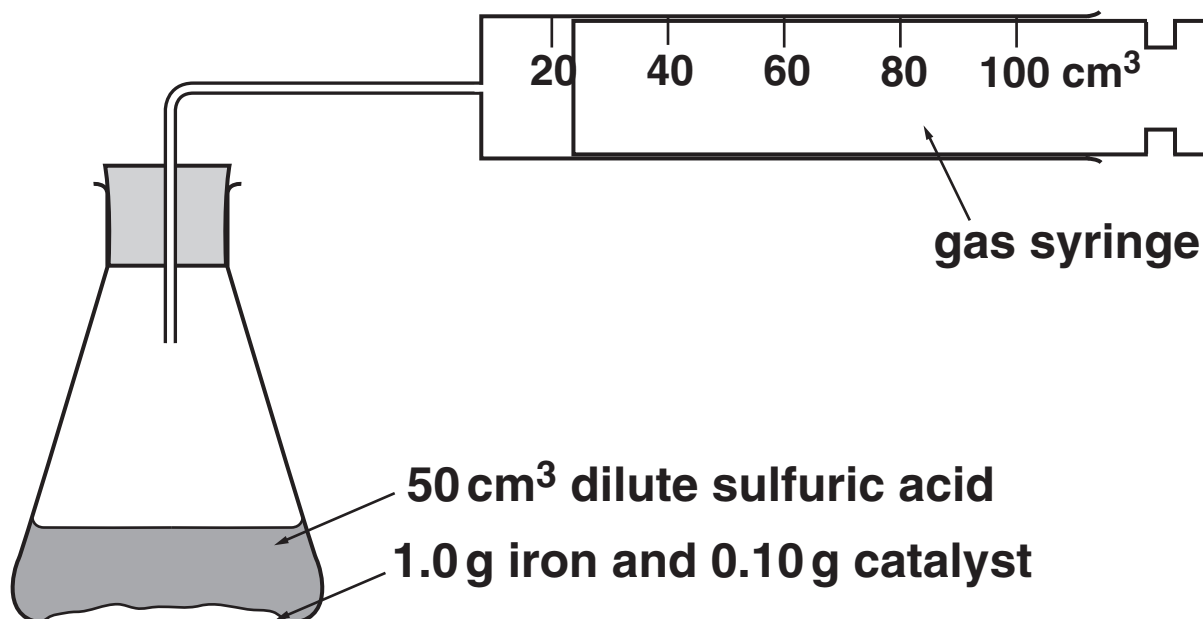
(b) Milly wants to make the reaction faster.

She knows that catalysts make reactions faster.

She tries to find a catalyst for this reaction.

Look at the diagram.

It shows the apparatus she uses.



She measures the time it takes to collect 100 cm³ of hydrogen in the gas syringe.

In experiments 2 to 5 she uses 0.10 g of catalyst each time.

In experiment 1 no catalyst is used.

Look at the results table.

EXPERIMENT NUMBER	NAME OF CATALYST	COLOUR OF CATALYST AT START OF REACTION	COLOUR OF CATALYST AT END OF REACTION	MASS OF CATALYST AT THE START OF REACTION IN GRAMS	MASS OF CATALYST LEFT AT THE END OF REACTION IN GRAMS	TIME TO COLLECT 100 cm³ OF HYDROGEN IN SECONDS
1	no catalyst added					130
2	copper powder	pink	pink	0.10	0.10	20
3	copper sulfate powder	blue	pink	0.10	0.04	15
4	calcium sulfate powder	white	white	0.10	0.10	130
5	zinc powder	silver	silver	0.10	0.05	10

(i) Milly did NOT use a catalyst in experiment 1.

Suggest why.

_____ [1]

(ii) In which experiment was the reaction the FASTEST?

Choose from experiment 1, 2, 3, 4 or 5.

_____ [1]

(iii) Milly thinks that copper powder is a catalyst for this reaction.

Explain how Milly made this conclusion from her results.

_____ [2]

[Total: 5]

9 Steel is an alloy that contains iron and carbon.

Iron rusts much more easily than steel.

(a) Two substances are needed for iron to rust.

Which TWO?

_____ and _____ [2]

(b) Which ONE of the following is an alloy?

Choose from:

LEAD

SOLDER

TIN

ZINC

answer _____ [1]

(c) Fizzy drinks cans are made from metal.

The metal used to make the can must be malleable.

This is a property of the metal.

Write down TWO other properties that the metal used to make fizzy drink cans must have.

1 _____

2 _____ [2]

[Total: 5]

10 This question is about paints.

Look at the table. It shows the ingredients of a paint.

INGREDIENT	PERCENTAGE
binder	47
pigment	21
solvent	27
additives	5

(a) Which ingredient is in the GREATEST amount?

_____ [1]

(b) What is the job of the PIGMENT in a paint?

_____ [1]

(c) What is the job of the SOLVENT in a paint?

_____ [1]

(d) Draw a straight line to join each TYPE OF PAINT to its best DESCRIPTION.

You should only draw three straight lines.

TYPE OF PAINT

DESCRIPTION

oil paint

a paint that changes colour when heated

phosphorescent paint

a paint that glows in the dark

thermochromic paint

a paint that has a pigment dispersed in water

a paint that has a pigment dispersed in oil

[2]

[Total: 5]

SECTION C – MODULE C3

11 This question is about the elements in the Periodic Table.

Look at the diagram. It shows part of the Periodic Table.

		H							He
Li	Be			B	C	N	O	F	Ne
Na	Mg			Al	Si	P	S	Cl	Ar
K	Ca								

Answer the questions.

Choose your answers from the symbols shown on this Periodic Table.

Each symbol can be used ONCE, MORE THAN ONCE or NOT AT ALL.

(a) Write the symbols of TWO elements in the same PERIOD.

_____ and _____ [1]

(b) Write the symbols of TWO elements in the same GROUP.

_____ and _____ [1]

(c) Write the symbol for an element with an atom with SEVEN electrons in its outer shell.

_____ [1]

[Total: 3]

12 Transition elements, such as iron and copper, are metals.

Two of the properties of these metals are that they are malleable and ductile.

(a) Write about some of the OTHER properties of metals.

[3]

(b) Brahim adds a small volume of sodium hydroxide solution to five different solutions.

An insoluble solid called a precipitate is made each time.

Look at the results table. It is not finished.

SOLUTION	FORMULA	COLOUR OF PRECIPITATE MADE
copper chloride	CuCl_2	blue
copper nitrate	$\text{Cu}(\text{NO}_3)_2$	_____
iron(II) chloride	FeCl_2	green
iron(II) sulfate	FeSO_4	green
iron(III) nitrate	$\text{Fe}(\text{NO}_3)_3$	_____

(i) Finish the table. [2]

(ii) Look at the formulas in the table.

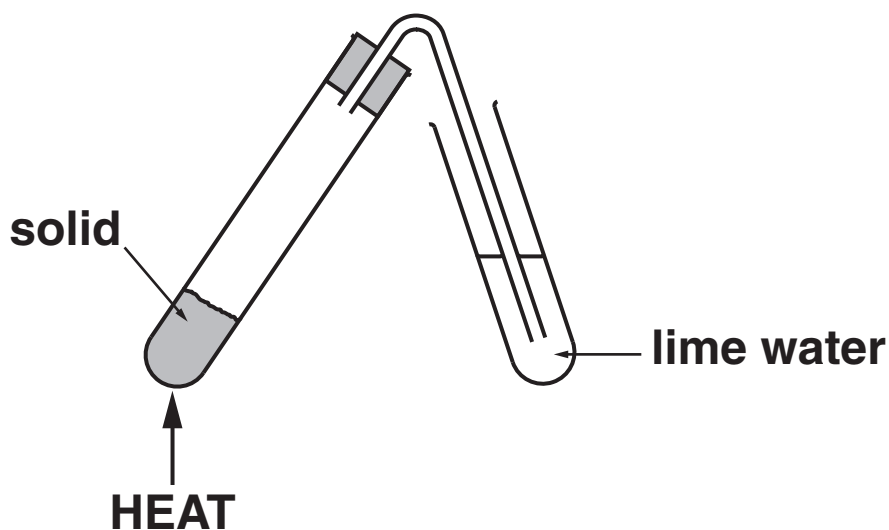
Which formula contains SIX oxygen atoms?

Choose from the table.

_____ [1]

(c) Brahim investigates what happens when he heats some solids.

Look at the apparatus he uses.



Look at the results table.

SOLID	COLOUR CHANGE OF SOLID	EFFECT ON LIME WATER
COPPER CARBONATE	green to black	goes milky
IRON(II) SULFATE	green to brown	stays colourless
POTASSIUM CARBONATE	stays white	stays colourless
ZINC CARBONATE	white to yellow and back to white	goes milky

Two solids make carbon dioxide when heated.

Which two?

_____ and _____ [1]

[Total: 7]

13 This question is about the elements in Group 7.

These elements are called the halogens.

(a) Look at the table. It shows information about some of the halogens.

ELEMENT	ATOMIC NUMBER	DENSITY IN g/dm³	MELTING POINT IN °C	ATOMIC RADIUS IN pm
chlorine	17	1.56	-101	99
bromine	35	2.93	-7	114
iodine	53	4.93	114	133

(i) Write the name of ONE other element that is a halogen.

_____ [1]

(ii) Look at the table.

How does the density change as the atomic number increases?

_____ [1]

(b) Chlorine is used to make pesticides.

Write down one OTHER use of chlorine.

_____ [1]

(c) The reactivity of the halogens changes as the atomic number increases.

Describe how.

_____ [1]

(d) Look at the table. It shows information about two isotopes of chlorine.

	ISOTOPE 1	ISOTOPE 2
atomic number	17	17
mass number	35	37
number of protons	17	17
number of neutrons	18	20

What is an isotope? Use information from the table to help you.

_____ [1]

[Total: 5]

14 This question is about alkali metals and their compounds.

(a) Hannah decides to test some metal compounds.

She uses a flame test.

Look at the diagram on the next page. It shows how Hannah does a flame test.

Look at Hannah's results.

METAL COMPOUND	COLOUR OF FLAME
potassium chloride	lilac
sodium chloride	<hr/>
compound <u>A</u>	red

(i) Sodium chloride contains sodium.

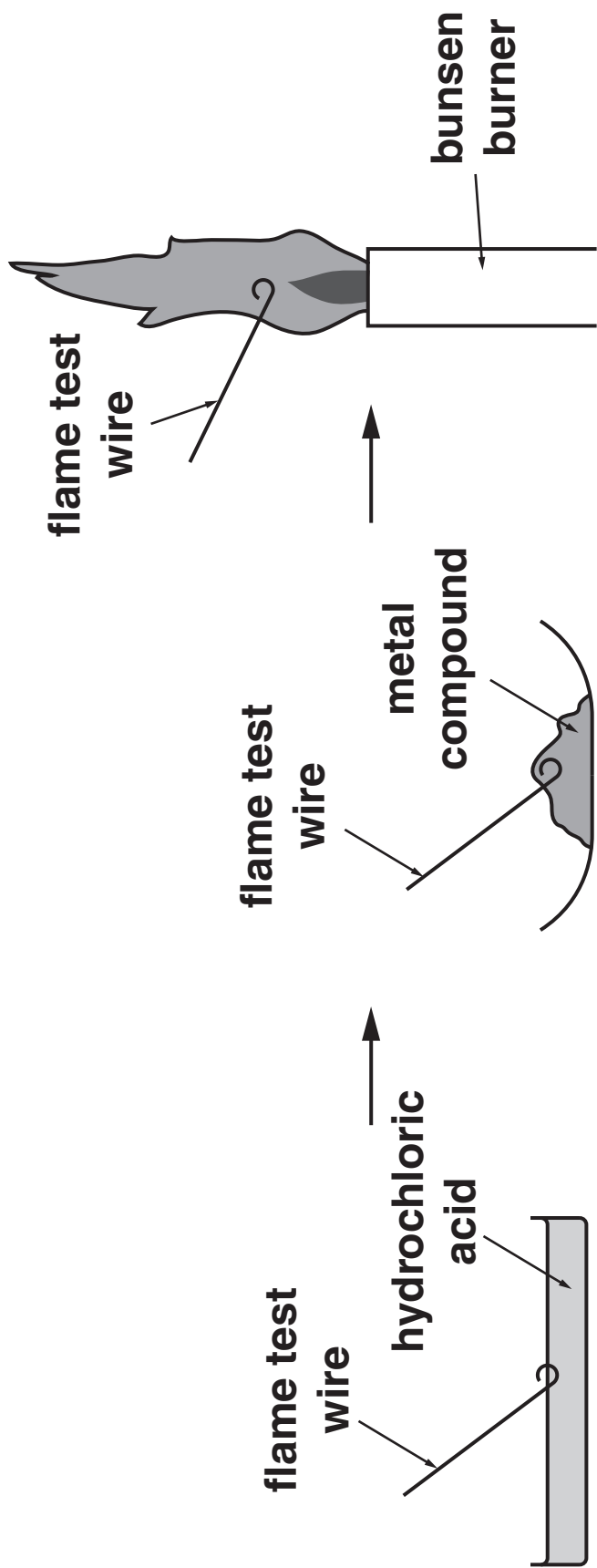
What is the colour of the flame when Hannah tests sodium chloride?

Write your answer in the table. [1]

(ii) Compound A contains a metal.

Which metal?

 [1]



(b) Potassium chloride is made of particles.

One particle has the formula K^+ and the other Cl^- .

Which of these particles is a cation? Explain why.

_____ [1]

(c) Potassium reacts with water to make a colourless gas.

Donna thinks the gas is hydrogen.

Describe how Donna can test this gas to see if it is hydrogen.

test _____

result _____

_____ [2]

[Total: 5]

END OF QUESTION PAPER



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The Periodic Table of the Elements

	1	2	3	4	5	6	7	0										
	7 Li lithium 3	9 Be beryllium 4	11 Na sodium 11	12 Mg magnesium 12	13 Al aluminium 13	14 N nitrogen 7	15 P phosphorus 15	16 O oxygen 8	17 F fluorine 9	18 Ne neon 10								
	19 K potassium 19	20 Ca calcium 20	21 Sc scandium 21	22 Ti titanium 22	23 V vanadium 23	24 Cr chromium 24	25 Mn manganese 25	26 Fe iron 26	27 Co cobalt 27	28 Ni nickel 28	29 Cu copper 29	30 Zn zinc 30	31 Ga gallium 31	32 Ge germanium 32	33 As arsenic 33	34 Se selenium 34	35 Br bromine 35	36 Kr krypton 36
	37 Rb rubidium 37	38 Sr strontium 38	39 Y yttrium 39	40 Zr zirconium 40	41 Nb niobium 41	42 Mo molybdenum 42	43 Tc technetium 43	44 Ru ruthenium 44	45 Rh rhodium 45	46 Pd palladium 46	47 Ag silver 47	48 Cd cadmium 48	49 In indium 49	50 Sn tin 50	51 Sb antimony 51	52 Te tellurium 52	53 I iodine 53	54 Xe xenon 54
	55 Cs caesium 55	56 Ba barium 56	57 La* lanthanum 57	72 Hf hafnium 72	73 Ta tantalum 73	74 W tungsten 74	75 Re rhenium 75	76 Os osmium 76	77 Ir iridium 77	78 Pt platinum 78	79 Au gold 79	80 Hg mercury 80	81 Tl thallium 81	82 Pb lead 82	83 Bi bismuth 83	84 Po polonium 84	85 At astatine 85	86 Rn radon 86
	[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

1	H
	hydrogen
1	

relative atomic mass
atomic symbol
name
atomic (proton) number

* The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.