Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

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

DC (AC/SW) MEP10200 24250/1

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.

BLANK PAGE

Answer ALL the questions.

SECTION A – MODULE C1

1 This question is about fuels.

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

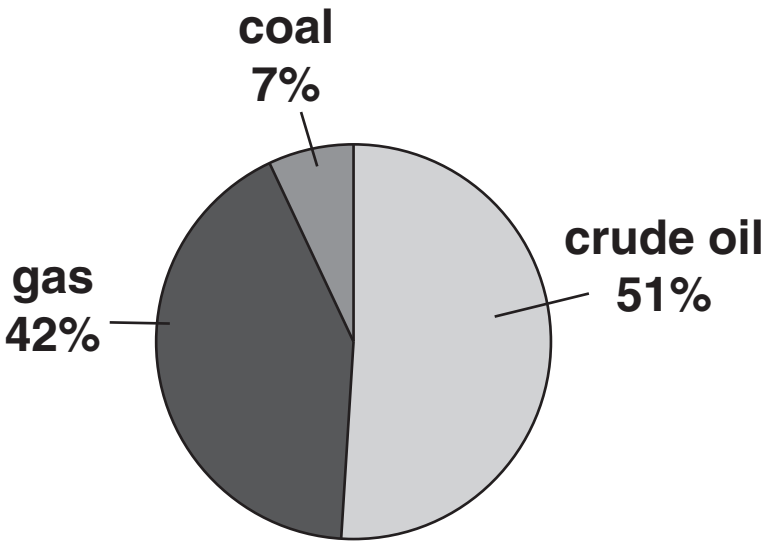
Supplies of these three fossil fuels will eventually run out.

(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]**

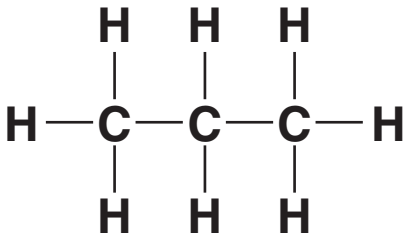
(c) Petrol and diesel are separated from crude oil.

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

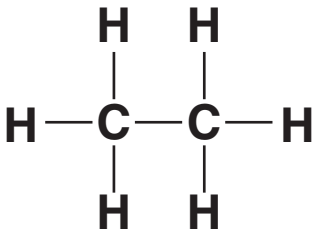
_____ **[1]**

[Total: 3]

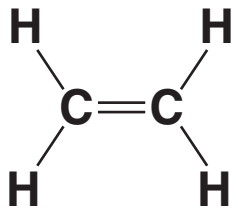
2 **Look at the displayed formulas of some compounds of carbon.**



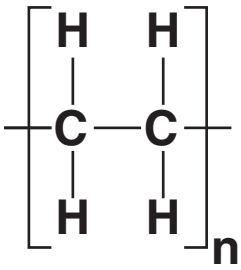
compound A



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 <u>ALKENE</u>?

Choose from A, B, C or D.

answer _____ [1]

(d) How many <u>CARBON</u> 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]

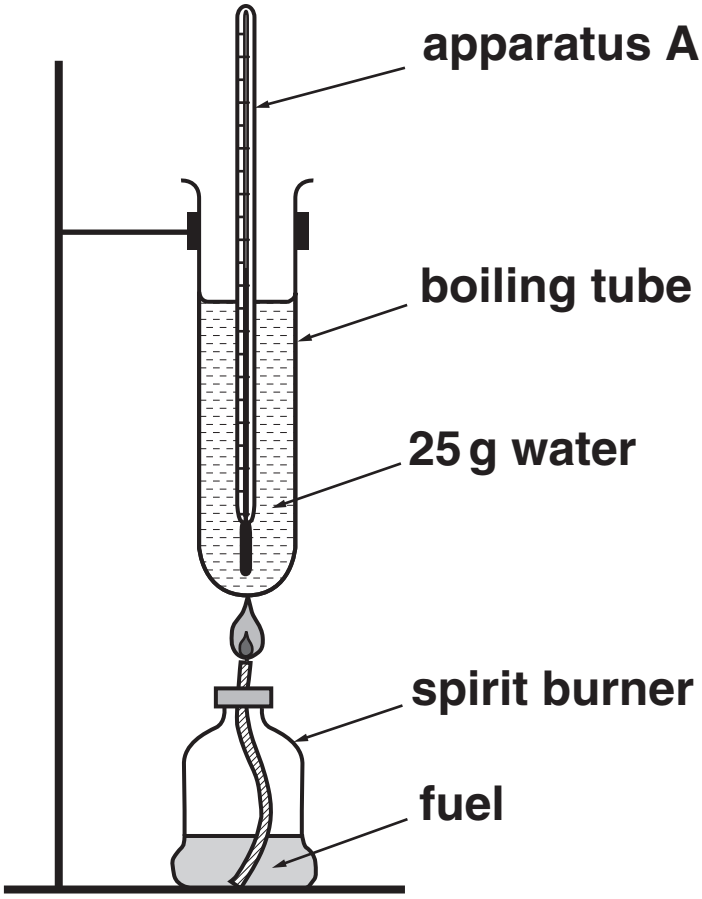
[Total: 4]

BLANK PAGE

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]

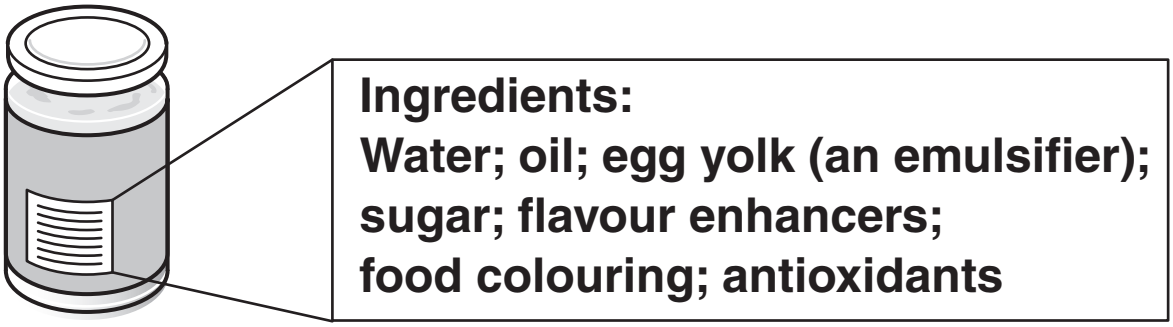
(ii) Burning fuels is an <u>EXOTHERMIC</u> reaction.

What is meant by an exothermic reaction?

_____ [1]

[Total: 3]

5 **Look at the label on a jar of mayonnaise.**



(a) Which ingredient is present in the <u>SMALLEST</u> amount?

Choose from the food label.

_____ **[1]**

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

Egg yolk is an <u>EMULSIFIER</u>.

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]

BLANK PAGE

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 <u>OTHER</u> 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.

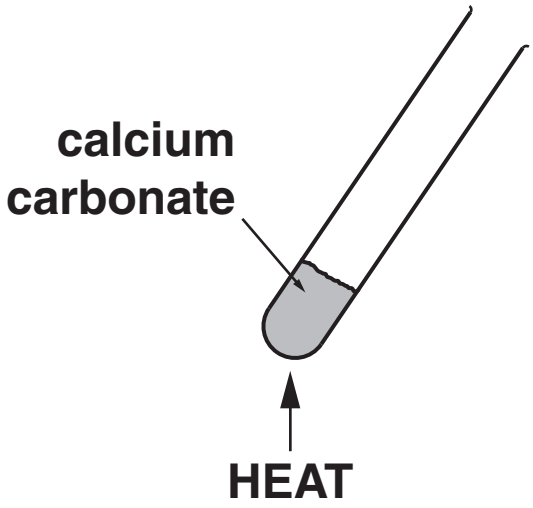
What is thermal decomposition?

_____

_____ **[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]

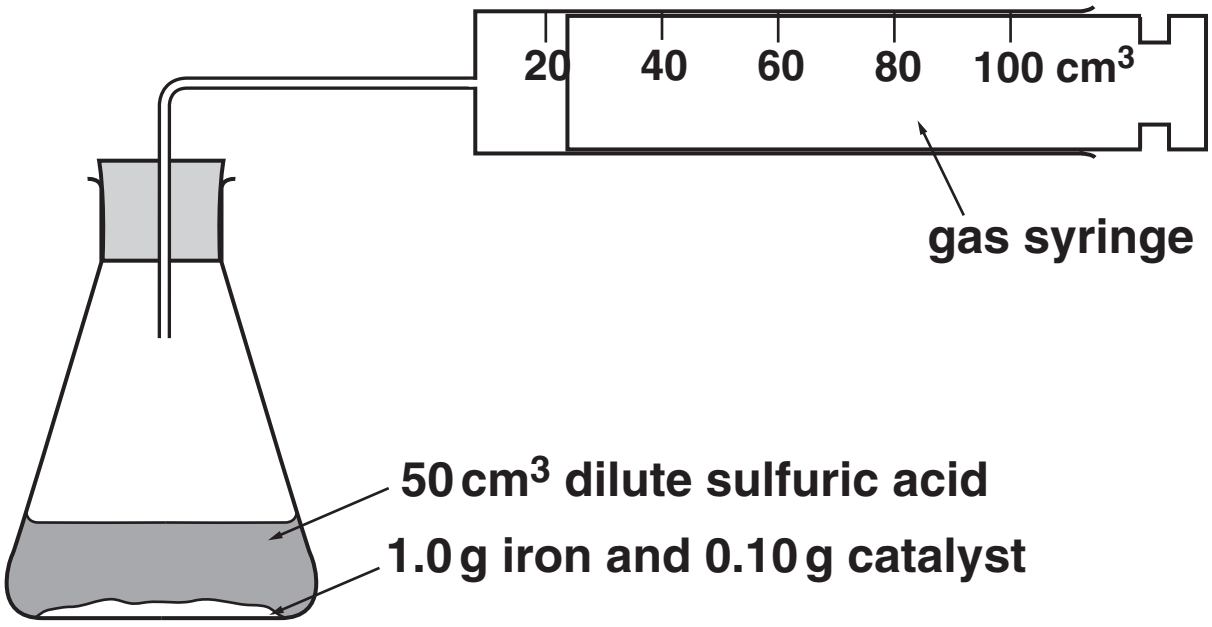
(b) Milly wants to make the reaction faster.

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 cm^3 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 cm^3 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
	a paint that changes colour when heated
oil paint	
	a paint that glows in the dark
phosphorescent paint	
	a paint that has a pigment dispersed in water
thermochromic paint	
	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 <u>OTHER</u> 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	$Cu(NO_3)_2$	_____
iron(II) chloride	$FeCl_2$	green
iron(II) sulfate	$FeSO_4$	green
iron(III) nitrate	$Fe(NO_3)_3$	_____

(i) Finish the table. [2]

(ii) Look at the formulas in the table.

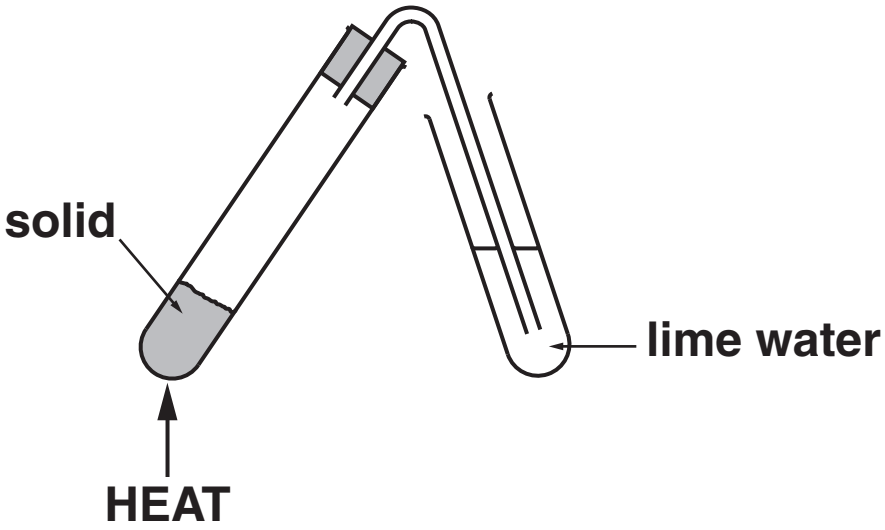
Which formula contains <u>SIX</u> oxygen atoms?

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/dm^3	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 <u>ONE</u> 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 <u>OTHER</u> 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	_____
compound A	red

(i) Sodium chloride contains sodium.

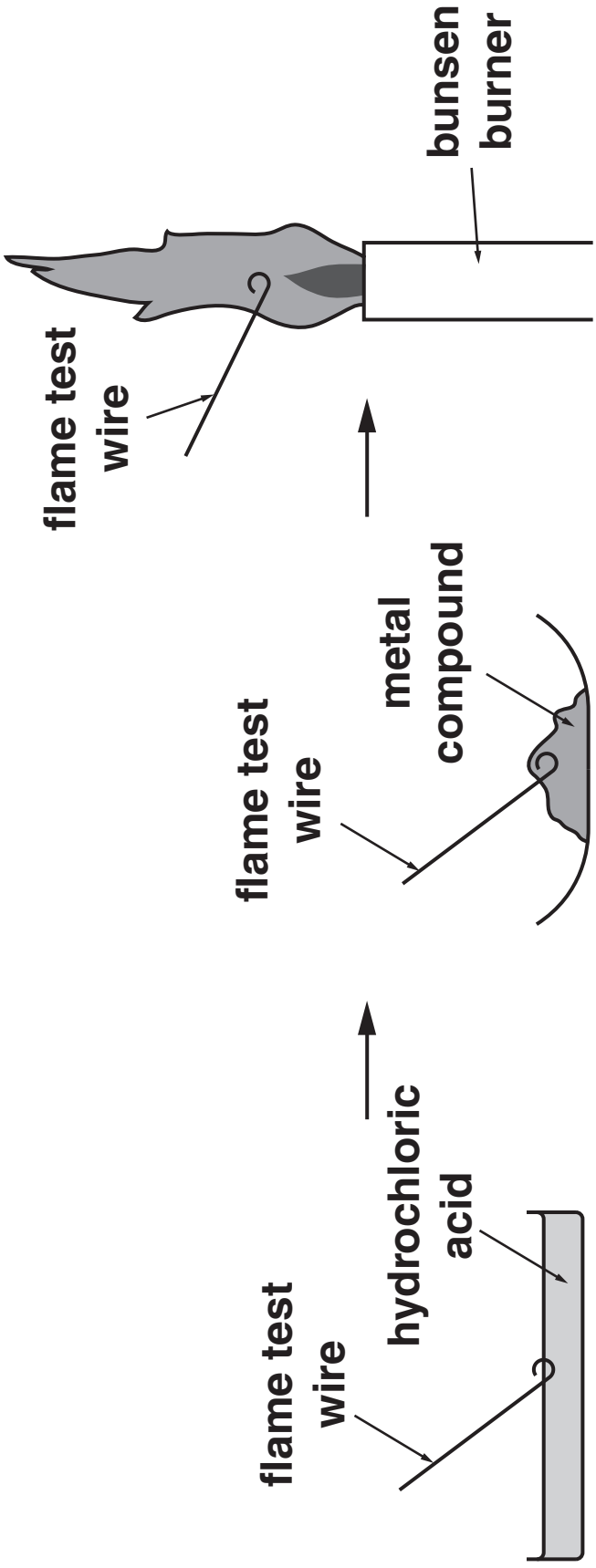
What is the colour of the flame when Hannah tests sodium chloride?

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

The Periodic Table of the Elements

1	2											3	4	5	6	7	0
							1 **H** hydrogen 1										4 **He** helium 2
7 **Li** lithium 3	9 **Be** beryllium 4											11 **B** boron 5	12 **C** carbon 6	14 **N** nitrogen 7	16 **O** oxygen 8	19 **F** fluorine 9	20 **Ne** neon 10
23 **Na** sodium 11	24 **Mg** magnesium 12											27 **Al** aluminium 13	28 **Si** silicon 14	31 **P** phosphorus 15	32 **S** sulfur 16	35.5 **Cl** chlorine 17	40 **Ar** argon 18
39 **K** potassium 19	40 **Ca** calcium 20	45 **Sc** scandium 21	48 **Ti** titanium 22	51 **V** vanadium 23	52 **Cr** chromium 24	55 **Mn** manganese 25	56 **Fe** iron 26	59 **Co** cobalt 27	59 **Ni** nickel 28	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	128 **Te** tellurium 52	127 **I** iodine 53	131 **Xe** xenon 54
133 **Cs** caesium 55	137 **Ba** barium 56	139 **La*** lanthanum 57	178 **Hf** hafnium 72	181 **Ta** tantalum 73	184 **W** tungsten 74	186 **Re** rhenium 75	190 **Os** osmium 76	192 **Ir** iridium 77	195 **Pt** platinum 78	197 **Au** gold 79	201 **Hg** mercury 80	204 **Tl** thallium 81	207 **Pb** lead 82	209 **Bi** bismuth 83	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **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						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

40

**** 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.