



# Aldenham School

## 13+ Sample Paper

### Subject: Chemistry

Name \_\_\_\_\_

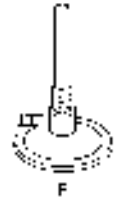
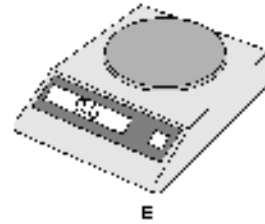
School \_\_\_\_\_

Time allowed: 20 mins (+5 mins Extra Time)

Instructions: *There is a copy of the periodic table at the back of the booklet*

Mark: \_\_\_\_\_ / 35

**Q1.** The diagram shows six pieces of equipment.



(a) Linda investigates how quickly sugar dissolves in water.

(i) Which piece of equipment does she use to weigh 5 g of sugar?  
Tick the correct box.

A	B	C	D	E	F
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1 mark

(ii) Which piece of equipment does she use to measure out 90 cm<sup>3</sup> of water?  
Tick the correct box.

A	B	C	D	E	F
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

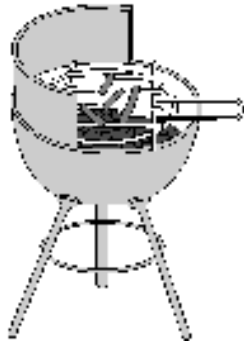
1 mark

(iii) Which piece of equipment shown is used to heat water?  
Tick the correct box.

A	B	C	D	E	F
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1 mark

Q2. Susie cooked sausages on a barbecue.



(a) Fat and water in the sausages changed state.

Draw **one** line from each statement to the correct change of state.  
Draw only **two** lines.

**statement change of state**

	liquid to gas
fat melted	gas to liquid
	liquid to solid
water evaporated	solid to liquid
	solid to gas

2 marks

(b) Susie uses charcoal as the fuel for the barbecue.

(i) Which statement is true about all fuels?

Tick the correct box.

All fuels are sources of energy.

All fuels are black.

All fuels are made from wood.

All fuels are solid.

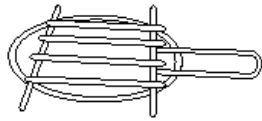
1 mark

(ii) Which gas in the air is needed for fuels to burn?  
Tick the correct box.

water vapour	<input type="checkbox"/>	oxygen	<input type="checkbox"/>
nitrogen	<input type="checkbox"/>	carbon dioxide	<input type="checkbox"/>

1 mark

(c) The metal grill of the barbecue is made of steel.



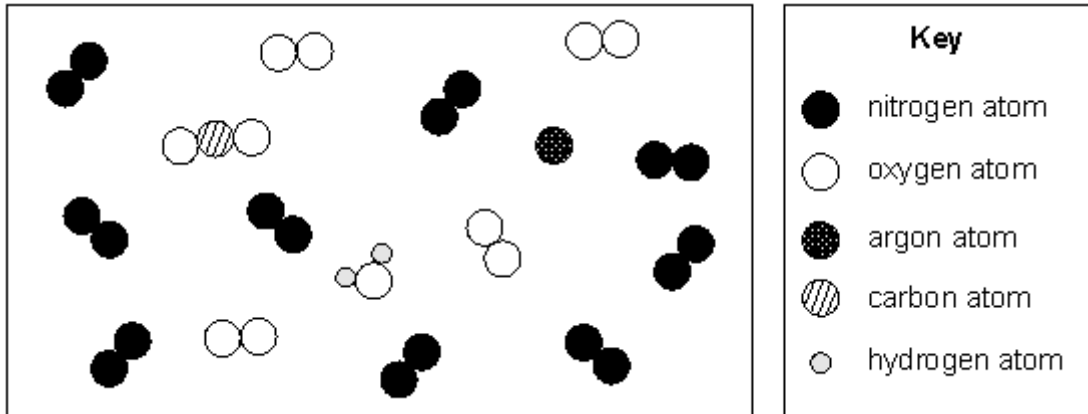
Six properties of steel are given below.

Which properties are needed for the metal grill?  
Tick **two** correct boxes.

It conducts electricity.	<input type="checkbox"/>	It is rigid.	<input type="checkbox"/>
It has a very high melting point.	<input type="checkbox"/>	It is magnetic.	<input type="checkbox"/>
It is shiny.	<input type="checkbox"/>	It rusts.	<input type="checkbox"/>

2 marks

Q3. The diagram below represents the particles found in air.



(a) Complete the following table. Use the diagram and key above to help you.

name	symbol	chemical formula
argon		Ar
nitrogen		
oxygen		O <sub>2</sub>

4 marks

(b) Air is a **gas** at room temperature.  
What evidence in the diagram above shows this?

.....

1 mark

(c) A sample of air in a balloon is cooled.  
Complete the sentences below using words from the box.  
You may use each word more than once.

<b>Increases</b>	<b>decreases</b>	<b>stay the same</b>

When the air is cooled, the volume of the air ..... and  
the mass of the air .....

When the air is cooled, the density of the air .....

3 marks

#### Q4

Galena is an ore of lead. Deposits of galena often contain all of the minerals listed in the table below.

mineral	formula
galena	PbS
calcite	CaCO <sub>3</sub>
fluorite	CaF <sub>2</sub>
zinc blende	ZnS

- (a) Give the **chemical names** of galena and fluorite. Hint: The periodic table attached at the back will help.

Galena .....

fluorite .....

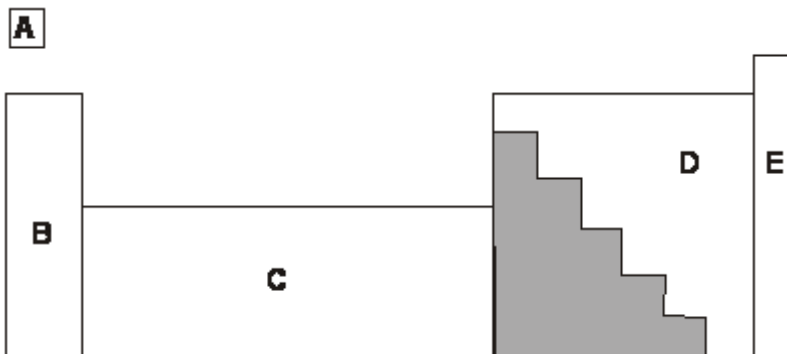
2 marks

- (ii) Lead oxide is heated with carbon in a displacement reaction in furnace.  
Write a **word equation** for the reaction.

.....

2 mark

Q5. (a) The diagram below shows part of the periodic table of elements.



The shaded area contains **only** metal elements.

Two other areas also contain **only** metal elements.

Which areas contain only metal elements?

Tick the **two** correct boxes.

A  B  C  D  E

1 mark

(b) Copper is a metal.

At room temperature copper is a strong solid.

Give **two** other properties of copper that show it is a metal.

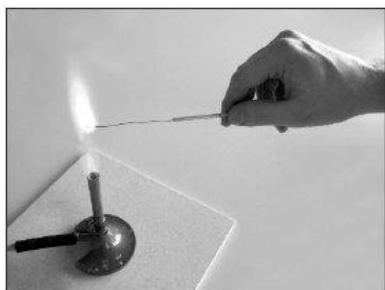
1. ....

1 mark

2. ....

1 mark

(c) When copper metal is heated it reacts with a gas in air.



What is the chemical name of the **product** formed when copper reacts with a gas in air?

.....

1 mark

(d) Which statement below describes what happens in a **chemical change** but **not** in a physical change?

Tick the correct box.

The product is a solid.

The change only happens at a high temperature.

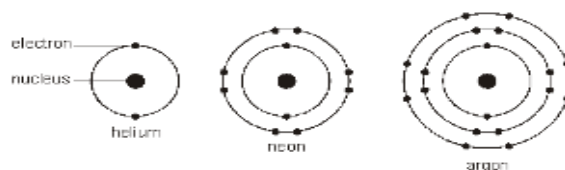
The atoms have combined in a different way to make a new substance.

The types of atoms at the start are the same as in the end product.

1 mark



**Q6.** The diagrams represent three stable atoms with complete outer shells.



Lithium fluoride is formed when lithium reacts with fluorine. Lithium fluoride is made of lithium ions,  $\text{Li}^+$ , and fluoride ions,  $\text{F}^-$ . Its formula is  $\text{LiF}$ .

The arrangement of electrons around  $\text{Li}^+$  is like the arrangement around helium.

The arrangement of electrons around  $\text{F}^-$  is like the arrangement around neon.

- (a) The atomic number of potassium is 19. Potassium fluoride is formed when potassium reacts with fluorine.

Write the symbol for a potassium ion.

.....

1 mark

- (b) Oxygen atoms have six outer electrons.

- (i) Write the symbol for an oxide ion.

.....

1 mark

- (ii) Write the formula for potassium oxide.

.....

1 mark

- (c) Magnesium has two outer electrons.

- (i) Write the formula for magnesium fluoride.

.....

1 mark

- (ii) Write the formula for magnesium oxide.

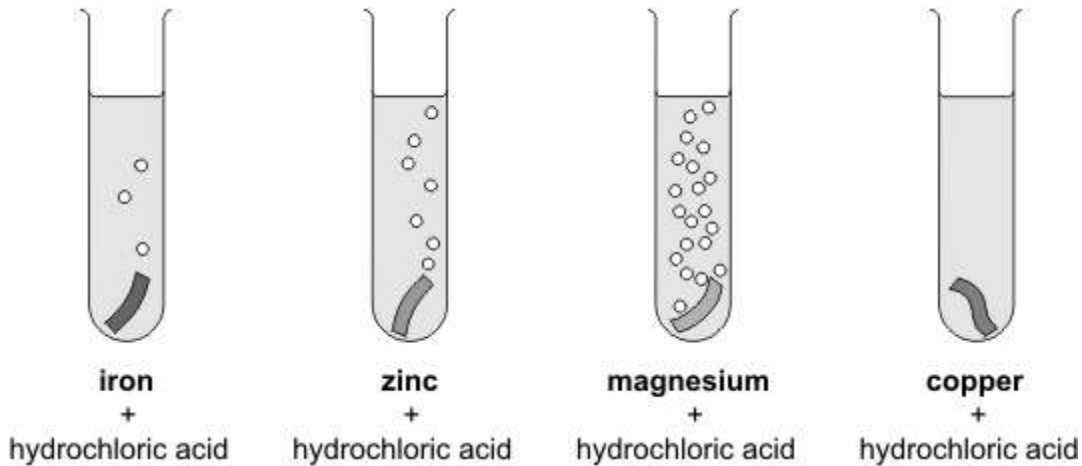
.....

1 mark

**Q7.**

(a) Ruth put a piece of a different metal in each of four test tubes.

She poured 10 cm<sup>3</sup> of hydrochloric acid onto each metal.



Look at the diagrams above.

(i) How do these show if a metal reacts with the acid?

.....

1 mark

(ii) **On the lines below**, put the **four** metals in the order of how strongly they react with the acid.

**most reactive** .....

.....

.....

**least reactive** .....

1 mark

(b) Choose the name of a metal from the box below to answer each question.

<b>copper</b>	<b>iron</b>	<b>magnesium</b>	<b>zinc</b>
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**Question 8 is continued on the next page**

(i) Which metal from the box is used for electrical wires?

.....

1 mark

(ii) Which metal from the box goes rusty?

.....

1 mark



## The Periodic Table of Elements

1	2	3	4	5	6	7	0
7 <b>Li</b> lithium 3	9 <b>Be</b> beryllium 4	23 <b>Na</b> sodium 11	24 <b>Mg</b> magnesium 12	39 <b>K</b> potassium 19	40 <b>Ca</b> calcium 20	88 <b>Sr</b> strontium 38	87 <b>Fr</b> francium 87
45 <b>Sc</b> scandium 21	48 <b>Ti</b> titanium 22	51 <b>V</b> vanadium 23	52 <b>Cr</b> chromium 24	55 <b>Mn</b> manganese 25	56 <b>Fe</b> iron 26	59 <b>Co</b> cobalt 27	65 <b>Zn</b> zinc 30
89 <b>Y</b> yttrium 39	91 <b>Zr</b> zirconium 40	93 <b>Nb</b> niobium 41	96 <b>Mo</b> molybdenum 42	[98] <b>Tc</b> technetium 43	101 <b>Ru</b> ruthenium 44	103 <b>Rh</b> rhodium 45	112 <b>Cd</b> cadmium 48
139 <b>La*</b> lanthanum 57	178 <b>Hf</b> hafnium 72	181 <b>Ta</b> tantalum 73	184 <b>W</b> tungsten 74	186 <b>Re</b> rhenium 75	190 <b>Os</b> osmium 76	192 <b>Ir</b> iridium 77	201 <b>Hg</b> mercury 80
[223] <b>Cs</b> cesium 55	[261] <b>Rf</b> rutherfordium 104	[262] <b>Db</b> dubnium 105	[266] <b>Sg</b> seaborgium 106	[264] <b>Bh</b> bohrium 107	[277] <b>Hs</b> hassium 108	[268] <b>Mt</b> meitnerium 109	[285] <b>Cn</b> copernicium 112
133 <b>Rb</b> rubidium 37	137 <b>Ba</b> barium 56	181 <b>Ta</b> tantalum 73	184 <b>W</b> tungsten 74	186 <b>Re</b> rhenium 75	190 <b>Os</b> osmium 76	192 <b>Ir</b> iridium 77	201 <b>Hg</b> mercury 80
139 <b>La*</b> lanthanum 57	178 <b>Hf</b> hafnium 72	181 <b>Ta</b> tantalum 73	184 <b>W</b> tungsten 74	186 <b>Re</b> rhenium 75	190 <b>Os</b> osmium 76	192 <b>Ir</b> iridium 77	201 <b>Hg</b> mercury 80
[227] <b>Ac*</b> actinium 89	[227] <b>Rf</b> rutherfordium 104	[262] <b>Db</b> dubnium 105	[266] <b>Sg</b> seaborgium 106	[264] <b>Bh</b> bohrium 107	[277] <b>Hs</b> hassium 108	[268] <b>Mt</b> meitnerium 109	[285] <b>Cn</b> copernicium 112
11 <b>B</b> boron 5	12 <b>C</b> carbon 6	27 <b>Al</b> aluminum 13	28 <b>Si</b> silicon 14	31 <b>P</b> phosphorus 15	32 <b>S</b> sulfur 16	35.5 <b>Cl</b> chlorine 17	40 <b>Ar</b> argon 18
11 <b>B</b> boron 5	12 <b>C</b> carbon 6	27 <b>Al</b> aluminum 13	28 <b>Si</b> silicon 14	31 <b>P</b> phosphorus 15	32 <b>S</b> sulfur 16	35.5 <b>Cl</b> chlorine 17	40 <b>Ar</b> argon 18
70 <b>Ga</b> gallium 31	73 <b>Ge</b> germanium 32	75 <b>As</b> arsenic 33	79 <b>Se</b> selenium 34	80 <b>Br</b> bromine 35	84 <b>Kr</b> krypton 36	84 <b>Kr</b> krypton 36	84 <b>Kr</b> krypton 36
115 <b>In</b> indium 49	119 <b>Sn</b> tin 50	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83
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115 <b>In</b> indium 49	119 <b>Sn</b> tin 50	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83
115 <b>In</b> indium 49	119 <b>Sn</b> tin 50	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83
115 <b>In</b> indium 49	119 <b>Sn</b> tin 50	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83
115 <b>In</b> indium 49	119 <b>Sn</b> tin 50	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83
115 <b>In</b> indium 49	119 <b>Sn</b> tin 50	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83
115 <b>In</b> indium 49	119 <b>Sn</b> tin 50	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83
115 <b>In</b> indium 49	119 <b>Sn</b> tin 50	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83	127 <b>Pb</b> lead 82	128 <b>Bi</b> bismuth 83
115 <b>In</b> indium 49	119 <b>Sn</b> tin 50	127 <b>Pb</b> lead 82	128 <b>Bi</b> b				