

THE PERIODIC TABLE

Period 1 2 3 4 5 6 7 0 Group

1	1	2	3	4	5	6	7	0
1	1							
	9							
2	7	9						
	23	24						
3	39	40						
	86	88						
4	39	40	45					
	86	88	89					
5	37	38	39					
	133	137	139					
6	55	56	57					
	223	226	227					
7	87	88	89					

11	12	14	16	19	20
Boron	Carbon	Nitrogen	Oxygen	Fluorine	Neon
5	6	7	8	9	10
27	28	31	32	35.5	40
Aluminium	Silicon	Phosphorus	Sulphur	Chlorine	Argon
13	14	15	16	17	18
70	73	75	79	80	84
Gallium	Germanium	Arsenic	Selenium	Bromine	Krypton
31	32	33	34	35	36
115	119	122	128	127	131
Indium	Tin	Antimony	Tellurium	Iodine	Xenon
49	50	51	52	53	54
204	207	209	210	210	222
Thallium	Lead	Bismuth	Polonium	Astatine	Radon
81	82	83	84	85	86

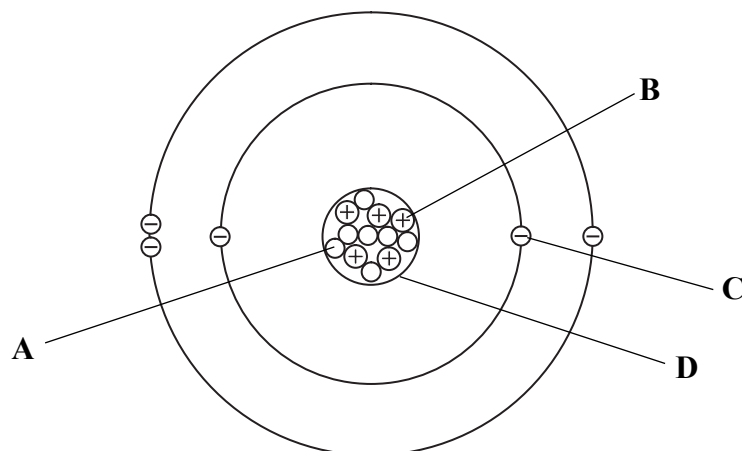
65	63.5	59	59	56	55	52	51	48	45	45	48	45	41	48	45	45	41	39	39	37	37
Zinc	Copper	Nickel	Cobalt	Iron	Manganese	Chromium	Vanadium	Titanium	Scandium	Calcium	Strontium	Yttrium	Niobium	Zirconium	Hafnium	Lanthanum	Barium	Rubidium	Potassium	Sodium	Lithium
30	29	28	27	26	25	24	23	22	21	20	38	39	40	72	73	57	56	19	11	3	3
112	108	106	103	101	99	96	93	91	89	88	86	86	86	86	86	86	86	86	86	86	86
Cadmium	Silver	Palladium	Rhodium	Ruthenium	Technetium	Molybdenum	Niobium	Zirconium	Yttrium	Strontium	Strontium	Yttrium	Niobium	Zirconium	Hafnium	Lanthanum	Barium	Rubidium	Potassium	Sodium	Lithium
48	47	46	45	44	43	42	41	40	39	38	38	39	40	72	73	57	56	19	11	3	3
201	197	195	192	190	186	184	181	179	139	137	137	139	179	179	139	137	137	137	137	137	137
Mercury	Gold	Platinum	Iridium	Osmium	Rhenium	Tungsten	Tantalum	Hafnium	Lanthanum	Barium	Barium	Lanthanum	Hafnium	Hafnium	Lanthanum	Barium	Barium	Barium	Barium	Barium	Barium
80	79	78	77	76	75	74	73	72	57	56	56	57	72	73	57	56	56	56	56	56	56

Key
Relative atomic mass
Symbol
Name
Atomic number



SECTION A

1. The diagram represents the particles present in an atom of an element. Where appropriate, the charges on the particles are shown.



- (a) Give the names of the particles labelled:

A

B

C

(3)

- (b) Name the part of the atom labelled **D**.

.....

(1)

- (c) State the mass number of this atom.

.....

(1)

- (d) State the atomic number of this atom.

.....

(1)

- (e) State the electronic configuration of this atom.

.....

(1)

Q1

(Total 7 marks)



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2. Ammonia is made industrially by the reaction between nitrogen and hydrogen.

(a) Name the raw material from which:

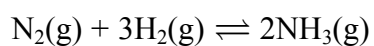
(i) nitrogen is obtained;

..... (1)

(ii) hydrogen is obtained.

..... (1)

(b) The equation for the industrial production of ammonia is



(i) Name the catalyst used in this reaction.

..... (1)

(ii) State the temperature and pressure used in this reaction.

Temperature in °C.....

Pressure in atmospheres

(2)

(iii) Place crosses (☒) in **three** boxes to show how the reaction can be made to go faster.

decrease the concentration of the nitrogen and hydrogen ☒

decrease the temperature ☒

increase the concentration of the nitrogen and hydrogen ☒

increase the surface area of the catalyst ☒

increase the temperature ☒

remove the catalyst ☒

(3)

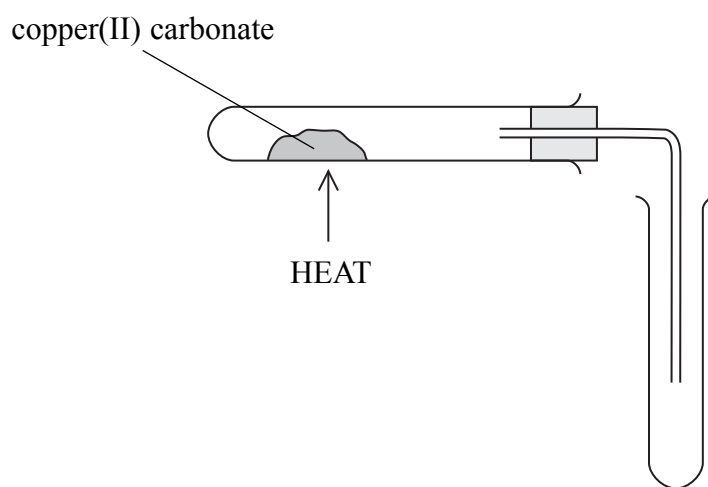
Q2

(Total 8 marks)



3. When copper(II) carbonate is heated it produces carbon dioxide gas and a solid residue of the metal oxide.

The diagram shows a sample of copper(II) carbonate being heated and carbon dioxide gas being collected.



(a) Describe a chemical test, and its result, to show that the gas is carbon dioxide.

Test

Result

(2)

(b) Write a word equation for the reaction that takes place when the copper(II) carbonate is heated.

.....

.....

(1)

(c) What colour change is seen as the copper(II) carbonate is heated?

Colour at start

Colour at end

(2)

(Total 5 marks)

Q3



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4. Barium carbonate is insoluble. It can be formed as a precipitate when two solutions are mixed together.

(a) Solutions of two of the following compounds can be used to prepare barium carbonate in this way.

Place crosses (☒) in **two** boxes to indicate these solutions.

- barium nitrate
- barium sulphate
- calcium chloride
- sodium carbonate
- zinc carbonate

(2)

(b) How could the barium carbonate be separated from the mixture at the end of the reaction?

.....
.....

(1)

(c) The barium carbonate is contaminated with a solution of the soluble substance also made in the reaction.

How could a sample that contains only barium carbonate be obtained from the contaminated barium carbonate?

.....
.....
.....
.....
.....

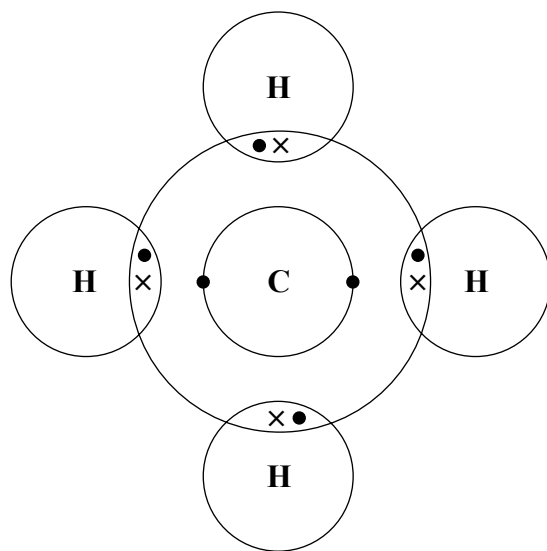
(2)

(Total 5 marks)

Q4



5. (a) The diagram represents a molecule of methane.



Name the type of bond that joins the atoms together in a molecule of methane.

..... (1)

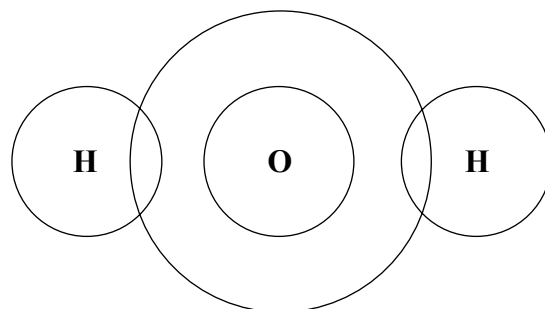
(b) Use words from the box to complete the sentences.
Each word may be used once, more than once or not at all.

atoms	high	low	many
molecules	strong	weak	

Methane has a boiling point.

This is because there are forces between the (3)

(c) Hydrogen has 1 electron.
Oxygen has 8 electrons and its electronic configuration is 2.6
Complete the diagram to show the electrons in a molecule of water.



(2)



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blank

(d) When hydrated copper(II) sulphate is heated there is a colour change and water is given off.

(i) Describe the colour change.

Colour before heating

Colour after heating

(2)

(ii) **Name** the solid formed when hydrated copper(II) sulphate is heated.

.....

(1)

(iii) This reaction is reversible.

What will happen if water is added to the solid formed in (d)(ii)?

.....

.....

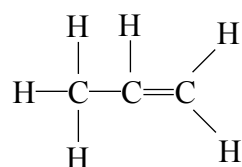
(1)

Q5

(Total 10 marks)



6. (a) The diagram represents an alkene.



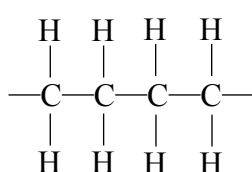
(i) What is the name of this alkene?

..... (1)

(ii) What colour change would be seen when this alkene is bubbled into bromine water?

.....
 (2)

(b) Alkenes form addition polymers.
 Part of an addition polymer made from two monomer units is shown.



(i) Why can this polymer be described as a hydrocarbon?

.....
 (2)

(ii) Why can this polymer be described as saturated?

.....
 (1)



(iii) Draw the structure of the monomer from which this polymer was formed.

Leave
blank

(2)

(c) Poly(chloroethene) is another addition polymer.
Poly(chloroethene) is waterproof, does not conduct electricity and melts when heated.
Place crosses in two boxes to show possible uses of poly(chloroethene).

- insulation on electrical wires
- non-stick coating on pans
- overhead power cables
- railway tracks
- rainwear

(2)

Q6

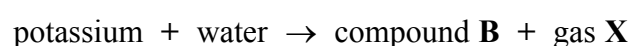
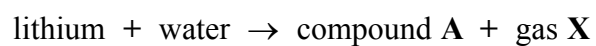
(Total 10 marks)

TOTAL FOR SECTION A: 45 MARKS



SECTION B

7. Lithium and potassium are both reactive metals.
 A small piece of each metal is added to separate troughs of water.
 The metals react with water as shown in these equations:



- (a) (i) State one observation that would be the same during both reactions.

.....

 (1)

- (ii) State one observation that could be made during the reaction between potassium and water, but not during the reaction between lithium and water.

.....

 (1)

- (b) (i) What is the **name** of compound A?

.....
 (1)

- (ii) What is the **formula** of compound B?

.....
 (1)

- (c) Identify gas X and describe a test, and the result, for this gas.

Identity of X

Test

.....
 (2)



Leave
blank

- (d) (i) State the colour of universal indicator in a solution of compound **B**.
Which ion causes universal indicator to turn this colour?

Colour of universal indicator

Ion

(2)

- (ii) What colour does compound **B** give in a flame test?

.....

(1)

Q7

(Total 9 marks)



H 3 6 8 5 0 A 0 1 3 2 0

8. Crude oil is a mixture of many different compounds.

(a) During industrial refining, crude oil is first separated into fractions.

(i) What is the name of the process used to obtain fractions from crude oil?

..... (1)

(ii) Describe how the fractions are obtained.

.....
.....
.....
.....
.....
..... (4)

(b) Four of the fractions obtained from crude oil are:

- bitumen
- diesel
- gasoline
- kerosene

(i) Which of these four fractions is used in making roads?

..... (1)

(ii) Name one other fraction obtained from crude oil.

..... (1)



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blank

(c) Octane is a hydrocarbon in the gasoline fraction.

Write the names of the substances in the word equation for the complete combustion of octane.

octane + → + (3)

(d) Octane belongs to a homologous series called the alkanes.

What is the general formula of the alkanes?

..... (1)

Q8

(Total 11 marks)



9. The reaction between magnesium and chlorine forms the ionic compound magnesium chloride, MgCl_2 .

(a) State the electronic configurations of magnesium and chlorine atoms.

Magnesium

Chlorine

(2)

(b) By reference to electrons, describe how magnesium and chlorine atoms form magnesium chloride.

.....
.....
.....
.....
.....
.....
.....
.....
.....

(3)

(c) Oxidation occurs in this reaction.

Identify the substance that is oxidised in the reaction, giving a reason for your choice.

Substance oxidised

Reason

.....

(2)



Leave
blank

(d) Explain why magnesium chloride has a high melting point.

.....

.....

.....

.....

.....

(3)

Q9

(Total 10 marks)

TOTAL FOR SECTION B: 30 MARKS

TOTAL FOR PAPER: 75 MARKS

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