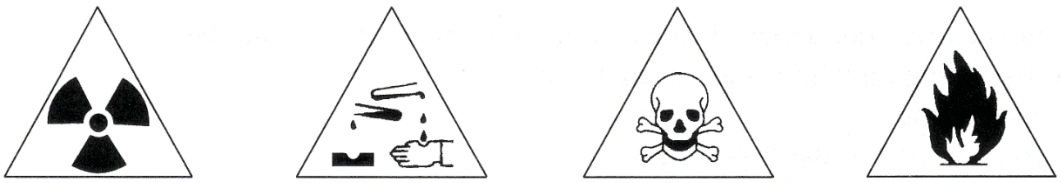
Section A: Multiple Choice Questions [10 marks]

Answer all the questions in the boxes provided.

1		**2**		**3**		**4**		**5**	
6		**7**		**8**		**9**		**10**	

1 An earthquake struck in 2017 resulting in severe damage to the nuclear plants in Bendewich that gave out radiation to the atmosphere.

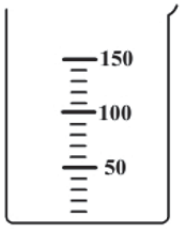
Which hazard symbol should be placed at the nuclear plant area?



A **B** **C** **D**

2 Which apparatus will be most suitable to measure an accurate volume of 25.0 cm^3 of dilute hydrochloric acid?

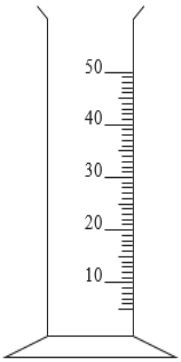
A



B

C

D



[Turn over

3 A petri dish containing a blackish-yellow substance was given in an experiment. When a magnet was placed over the cover of the dish, the black particles were observed to move towards the magnet while the yellow powder remained at the base of the dish.

What can be concluded based on these observations?

A The black particles and yellow powder are not chemically combined.
B The black particles and yellow powder are present in a fixed ratio.
C The black particles and yellow powder are two different compounds.
D The black particles and yellow powder have fixed boiling points.

4 Chlorine is an element in the Periodic Table.

Which statement about chlorine is not true?

A Chlorine is a non-metal.
B Chlorine is in a different period from fluorine.
C Chlorine is in the same group as calcium.
D Chlorine has similar chemical properties to iodine.

5 The table below shows some differences between milo drink and sugar solution.

Which description correctly shows the difference between them?

	milo drink	sugar solution
A	homogenous	not homogenous
B	does not allow light to pass through	allows light to pass through
C	clear	cloudy
D	no particles settle at the bottom	many particles seen at the bottom

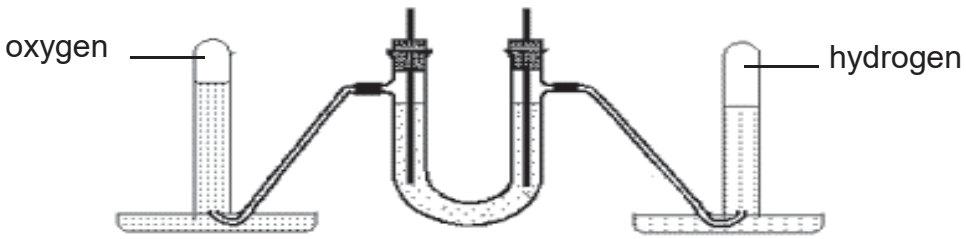
6 The composition of air is shown in the following table.

component	percentage by volume (%)
nitrogen gas	78.0
oxygen gas	20.9
argon	0.9
water vapour	depends on local conditions
other gases	0.2

Which statement best explains why air is a mixture?

A The components of air are not fixed.
B Air contains different types of elements.
C The components of air cannot be separated.
D The components of air react with each other.

7 The diagram below shows the decomposition of water using an electric current. Only oxygen and hydrogen are produced. They are trapped in two separate test tubes as shown below. The unit volume of hydrogen collected is twice that of oxygen.



Which statements below can be concluded based on the experiment described?

I Oxygen and hydrogen are the constituent elements of water.
II Oxygen and hydrogen are combined in a fixed proportion by mass.
III Compounds can be broken down by physical means.
IV Water is a compound.

A I and II only
B II and III only
C I, II and III only
D I, II and IV only

[Turn over

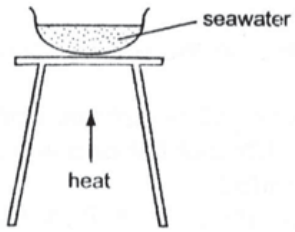
8 A student wants to separate a mixture of X, Y and Z into the three individual substances. The student pours the mixture into a separating funnel. The tap is opened and a mixture of substance X and Y is collected first. Z remains in the separating funnel. The student then uses simple distillation to separate X and Y. X is the distillate and Y is the residue.

Which of the following shows the correct identity of X, Y and Z?

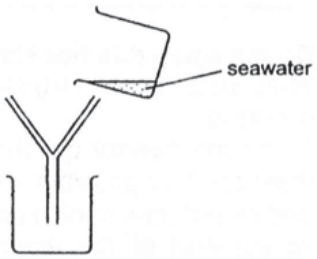
	X	Y	Z
A	water	salt	oil
B	salt	water	oil
C	water	salt	alcohol
D	salt	water	alcohol

9 Which method of separation will not obtain a sample of salt from seawater?

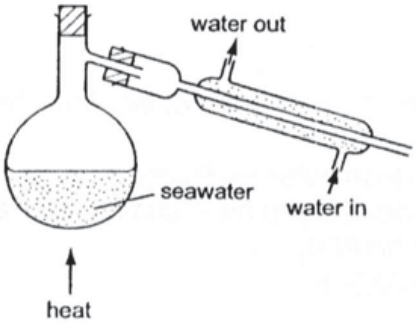
A



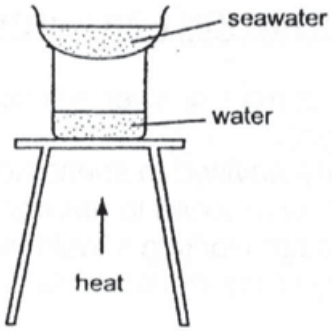
B



C



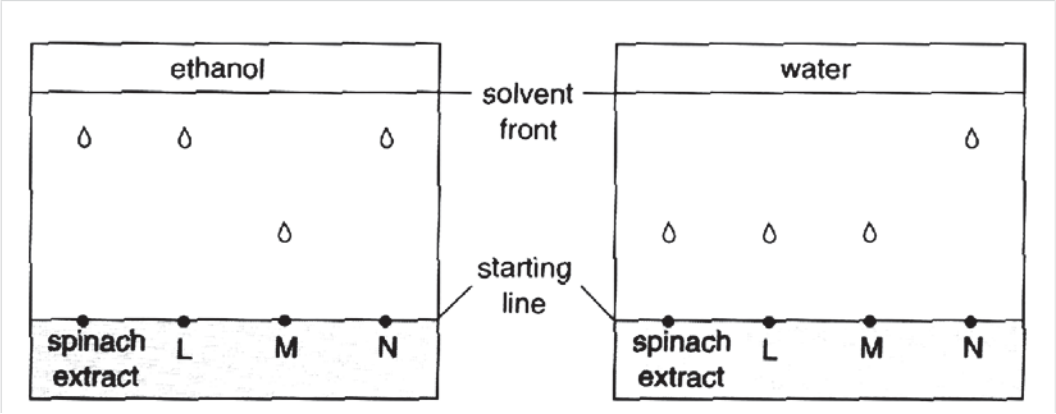
D



[Turn over

10 It is thought that spinach leaves contain one or more of three different pigments L, M and N. Spots of each of these pigments are put on the starting line of two chromatograms along with a spot of spinach extract. The first chromatogram is developed with ethanol, the second with water.

The results are shown below:



Which pigment(s) is/are present in the spinach extract ?

A L only
B L and M only
C L and N only
D L, M and N

[Turn over

Section B: Structured Questions [30marks]

Answer all the questions in the spaces provided.

1 **(a)** May decided to boil two beakers of water, to see which type of flame would boil the water in a shorter time as shown in Fig. 1.1

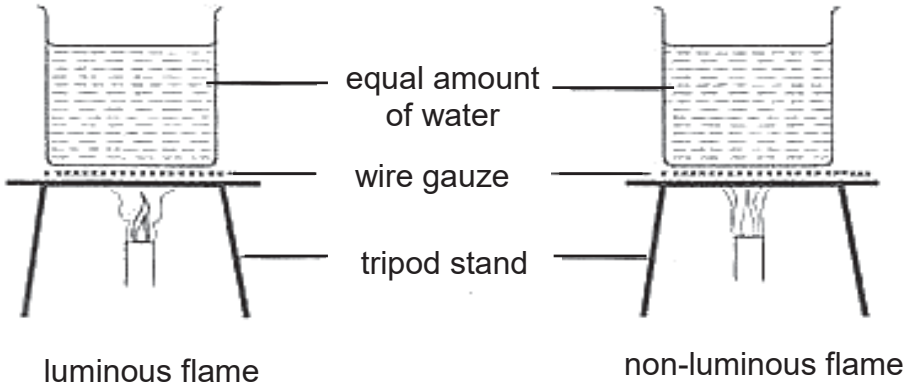


Fig. 1.1

(i) Predict which water sample will boil in a shorter time.

……[1]

(ii) Give a reason to explain your answer in **(a)(i)**.

……

……[1]

(iii) List two other differences between a luminous and non-luminous flame.

……

……

……

……...[2]

[Turn over

(b) Fig. 1.2 shows an experiment in which a substance is being heated.

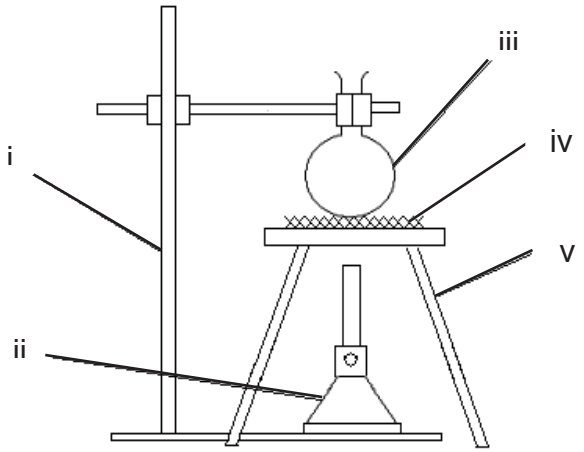


Fig. 1.2

Name the apparatus used in Fig. 1.2.

(i) ……..[1] **(ii)** ……[1]

(iii) ……..[1] **(iv)** ……..[1]

(v) ……..[1]

2 Table 2.1 gives some information about four substances M to P. Use the information to decide whether each of these substances is an element, a mixture or a compound.

Table 2.1

substance	changes on heating	element / mixture / compound
M	A colourless liquid which is split up by electricity into two different gases.	
N	A grey solid which burns in air to form an oxide.	
O	A white solid which does not have a constant composition and melts over a range of temperature.	
P	A colourless liquid which boils off to leave a white residue.	

[4]

[Turn over

3 Fig. 3.1 shows an experimental set-up used to obtain pure water from sea water.

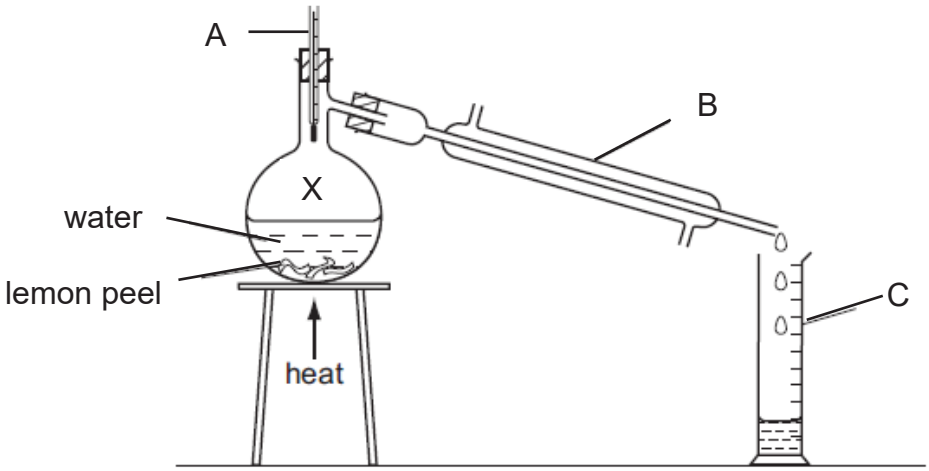


Fig. 3.1

(a) State the method of separation used.

……[1]

(b) Name the apparatus used in Fig. 3.1.

A: ……[1]

B: ……[1]

C: ……[1]

(c) What are the two main physical processes that occur in this method of separation?

……[2]

(d) Indicate on the diagram 'water in' and 'water out'. [2]

(e) State the purpose of boiling chips in the experimental setup.

……[1]

(f) What would be the reading on the thermometer?

……[1]

[Turn over

4 The inks used for making EZ-Link cards are a mixture of different colours. The chromatogram of two such inks, X and Y, is shown in Fig. 4.1.

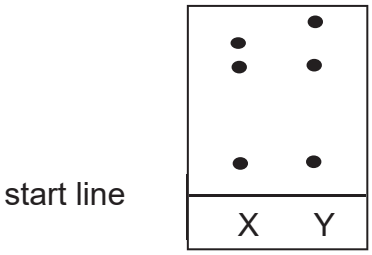


Fig. 4.1

(a) Using information from Fig. 4.1, describe two similarities between inks X and Y.

……..

……[2]

(b) Explain whether inks X and Y are the same ink.

……[1]

(c) The chromatography is repeated for another ink, Z. Ink Z contains only two colours, which are not found in inks X and Y. Draw the chromatogram of ink Z on Fig. 4.2.

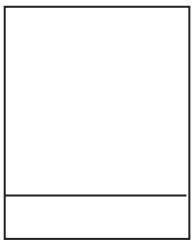


Fig. 4.2

[1]

(d) Explain why the starting line cannot be drawn in pen.

……[2]

(e) Use your knowledge of EZ-Link cards to suggest why water would not be a suitable solvent to use for this chromatography.

……[1]

End of Paper

[Turn over

The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	0
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9		Key: proton (atomic) number, atomic symbol, name, relative atomic mass									5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57 – 71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium –	85 At astatine –	86 Rn radon –
87 Fr francium –	88 Ra radium –	89 – 103 actinoids	104 Rf Rutherfordium –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –		114 Fl flerovium –		116 Lv livermorium –		

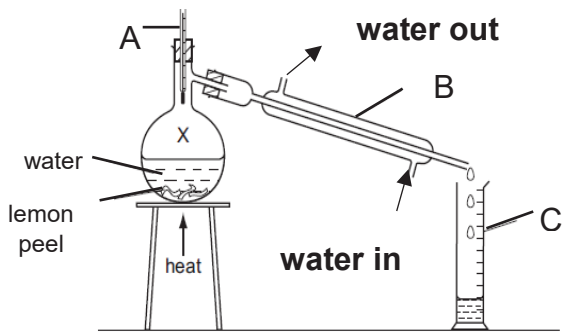
lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium –	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium –	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium –	94 Pu plutonium –	95 Am americium –	96 Cm curium –	97 Bk berkelium –	98 Cf californium –	99 Es einsteinium –	100 Fm fermium –	101 Md mendelevium –	102 No nobelium –	103 Lr lawrencium –

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).

1	**A**	**2**	**B**	**3**	**A**	**4**	**C**	**5**	**B**
6	**A**	**7**	**D**	**8**	**A**	**9**	**B**	**10**	**A**

Section B

Qn	Suggested Answer	Marks
1ai	Non-luminous flame	[1]
ii	Non-luminous flame is hotter than luminous flame so it will boil the water at a shorter time.	[1]
iii	• Luminous flame is orange but non-luminous flame is blue. • Luminous flame can be seen easily but non-luminous flame cannot be seen easily • Luminous flame is unsteady but non-luminous flame is steady • Little soot is produced in non-luminous flame but soot is produced in luminous flame • The air-holes for non-luminous flame is opened but air-holes for luminous flame is closed ***any 2 differences***	[2]
bi	retort stand	[1]
ii	Bunsen burner	[1]
iii	round-bottomed flask	[1]
iv	wire gauze	[1]
v	tripod stand	[1]
2	M- compound N- element O- mixture P- mixture	[1] [1] [1] [1]

3a	simple distillation	[1]
b	A - thermometer B – condenser C – measuring cylinder	[1] [1] [1]
c	boiling and condensation	[2]
d		[2]
e	To smoothen the boiling.	[1]
f	100 °C	[1]
4a	• Both contain 3 components/ dyes/ colours. • Both contain 2 components that are the same. • Both are impure, ****Any 2 similarities***	[2]
b	• No, as they contain one colour/ component that is not the same. • No, as the spot that travelled the furthest/ fastest is not aligned/ not the same. • No, as the spot furthest from the starting line/ nearest to the solvent front are not aligned/ not the same. ***Accept:*** • They each have one colour that are of different solubility. • The third spot of X is not in line with the third spot of Y. • Not all the spots of X are aligned with Y. ****Any 1***	[1]
c	Show on diagram: 2 components, both are not aligned to any components in X and Y.	[1]
d	Pen ink is **soluble in the solvent** and will be separated together with the inks and **interfere with results** of the chromatography.	[2]
e	EZ-Link cards are exposed to moisture and water so the inks used should not be soluble in water.	[1]