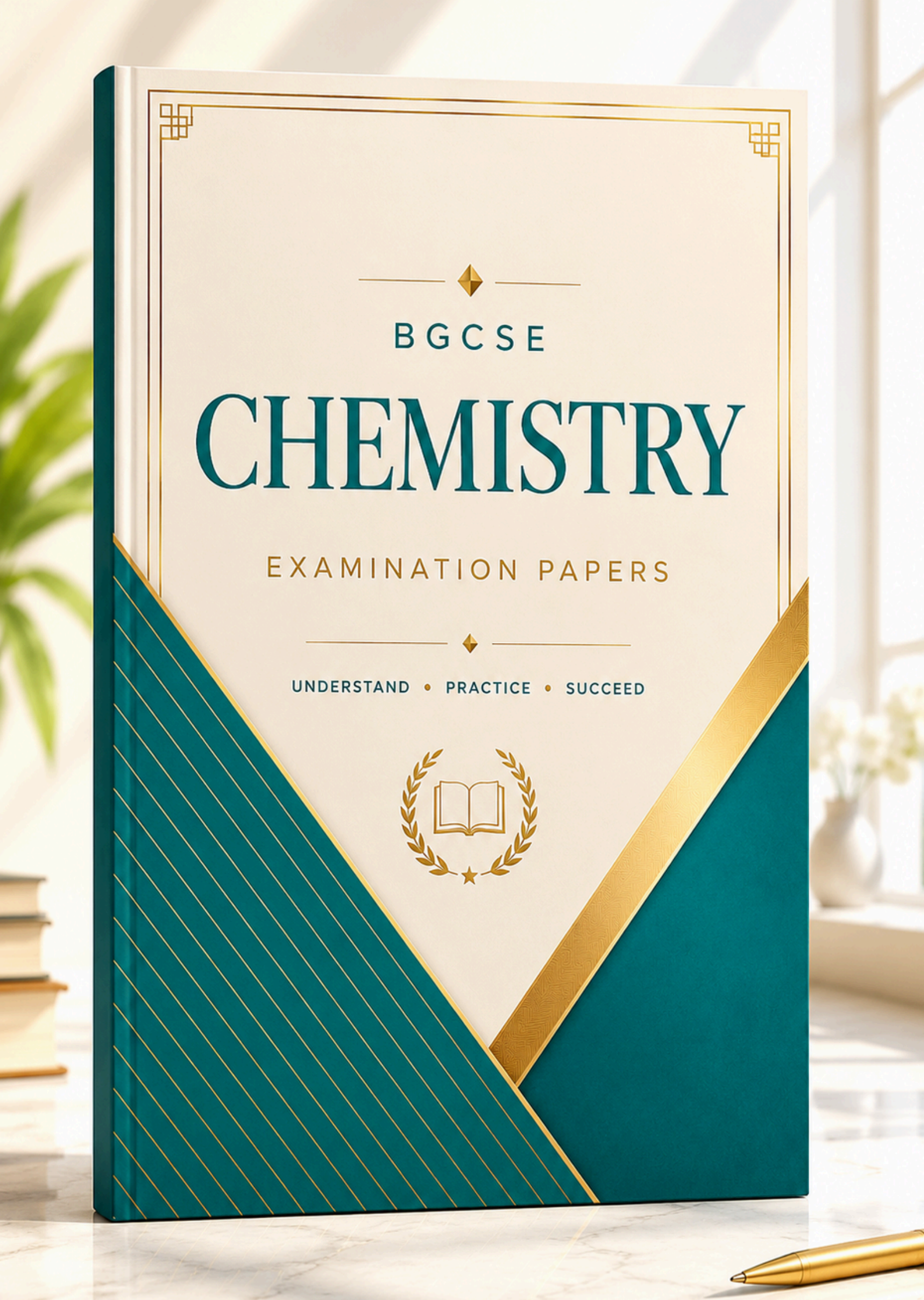
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3051/2 **BGCSE**

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CHEMISTRY

PAPER 2

Tuesday 19 MAY 2020 1:30 P.M.–3:00 P.M.

Additional materials:
None

MINISTRY OF EDUCATION
NATIONAL EXAMINATIONS

BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION

INSTRUCTIONS AND INFORMATION TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your school number, candidate number, surname and initials in the spaces provided above.

Answer **ALL** the questions on this paper.

Read each question carefully and make sure you know what you have been asked to do before starting your answer.

The instruction **NAME** . . . requires an answer in words **NOT** chemical symbols.

Show **ALL** your working when answering numerical questions. Lines are provided on the question paper for your answers. You should write your answers on these lines only.

A copy of the Periodic Table is provided on page 2.

The mark for each part question is given in brackets [ ].

FOR EXAMINER'S USE	
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

This question paper consists of 17 printed pages and 3 blank pages.

[Turn over

The Periodic Table of the Elements

Group																	
I	II										III	IV	V	VI	VII	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 Sulphur 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	64 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	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	Po Polonium 84	At Astatine 85	Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

*58-71 Lanthanoid series
†90-103 Actinoid series

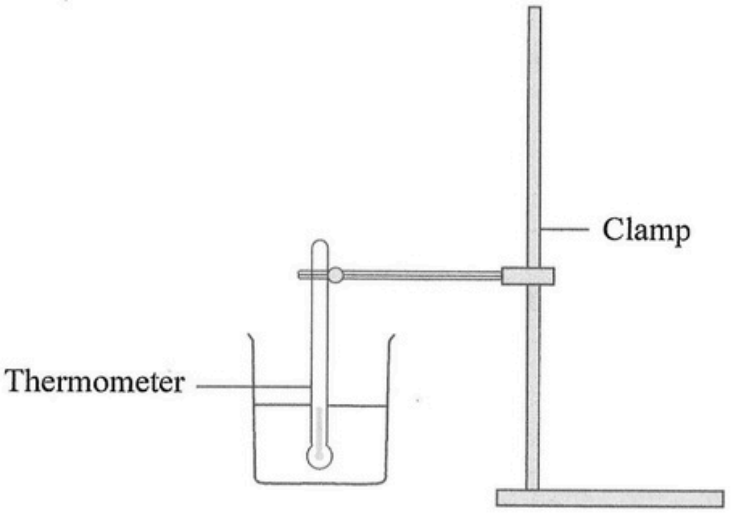
Key

a
X
b

a = relative atomic mass
X = atomic symbol
b = proton (atomic) number

1. (a) Study the diagram and use it to help you answer the following question.

A student adds 20.0 g of ammonium nitrate, NH_4NO_3 to a beaker of water and observes that the beaker feels very cold after several minutes.



(i) Name the solute in this experiment.

_____ [1]

(ii) State the type of reaction occurring in the beaker when ammonium nitrate is dissolved in water.

_____ [1]

(iii) State how this reaction could be used to treat injuries at a track and field event.

_____ [1]

(iv) For every 5.0 g of ammonium nitrate added to water there will be a 5 °C decrease in the temperature of the water. The initial temperature of the water was 30 °C.

Calculate the final temperature for the solution of ammonium nitrate and water. (Use the mass of ammonium nitrate given in (a) at (i))

_____ [1]

(v) Another student said she doubted that an ammonium compound was added to water.

Describe the test and result to prove that an ammonium ion containing compound was dissolved in water.

Test for ammonium ion:

_____

_____

Positive Result:

_____

_____

[2]

(vi) The reaction between ammonium nitrate and water occurs spontaneously.

What is the general name for a substance that can be added to a reaction that is taking too long to occur?

_____ [1]

(b) Another compound is calcium nitrate.

(i) Write the formula for calcium nitrate.

_____ [1]

(ii) Calcium nitrate thermally decomposes when heated.

Write the word equation for this reaction.

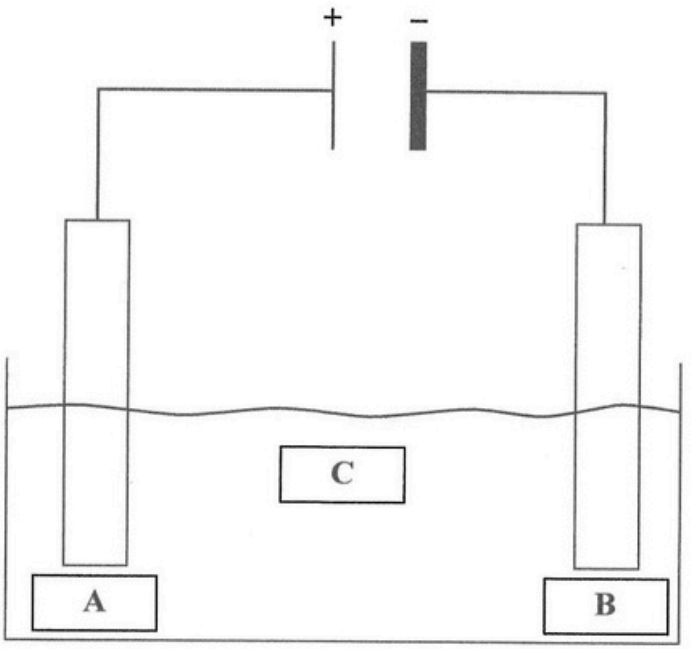
_____ [1]

(iii) Predict whether aqueous calcium nitrate will conduct electricity. Give a reason for your answer.

_____ [1]

TOTAL MARKS [10]

2. (a) The diagram shows the apparatus used in the electrolysis of lead (II) iodide.



(i) Explain the meaning of the term electrolysis.

_____

_____ [2]

(ii) Write the names of the labels, **A**, **B** and **C** on the lines below.

A _____

B _____

C _____ [2]

(iii) State which electrode, **A** or **B**, the lead (II) ions move towards.

_____ [1]

(iv) The reaction at **A** is oxidation.

Explain what this means in terms of electron transfer.

_____ [1]

(v) One of the products of this electrolysis is iodine vapour.

State the colour of iodine vapour.

_____ [1]

(b) No reaction was observed when lead (II) iodide crystals were used in this electrolysis experiment.

Explain why.

_____ [1]

(c) **A** and **B** were made of platinum.

Suggest another **inert metal** that may be used instead of platinum.

_____ [1]

(d) State the apparatus that can be used to demonstrate the flow of electric charge.

_____ [1]

TOTAL MARKS [10]

3. (a) Describe how plasma can be separated from blood cells.

_____

_____ [2]

(b) Describe how a student can determine the purity of a sample of water.

_____

_____

_____ [2]

(c) Three stages in water purification are filtration, sedimentation and chlorination.

State the purpose of each of these stages in water purification.

filtration _____

_____ [1]

sedimentation _____

_____ [1]

chlorination _____

_____ [1]

(d) State the unit of measurement used for a:

(i) stopwatch _____

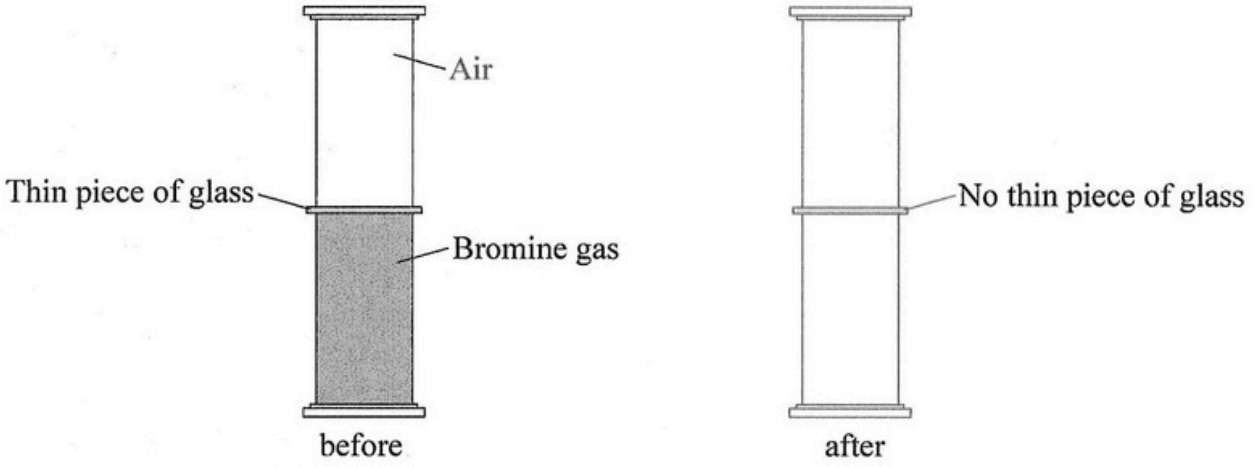
(ii) burette _____

(iii) triple beam balance _____

[3]

TOTAL MARKS [10]

4. (a) Diagram **A** shows two tubes separated by a thin piece of glass. The top tube contains air and lower tube contains bromine gas.



A B (diagram after 15 minutes)

(i) The thin piece of glass is then removed so there is no barrier between the two tubes.

Complete diagram **B** to show how the contents of each tube will look after 15 minutes. [1]

(ii) Complete the paragraph about kinetic theory.

Matter is made up of _____. These are constantly _____ and _____.

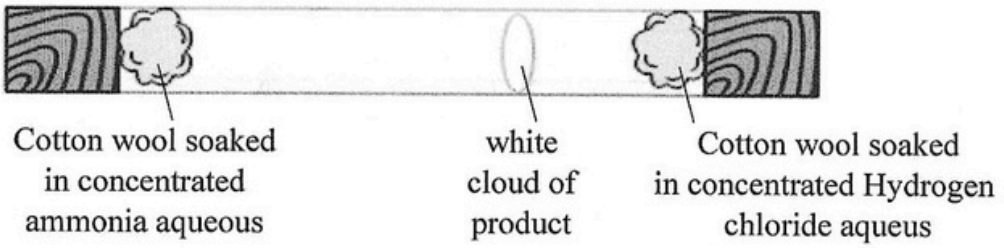
[3]

(b) Complete the table about solids, liquids and gases.

property	solid	liquid	gas
molecular packing		close	
attractive forces			very weak
movement of particles		move around each other	

[3]

(c) The diagram shows the results of an experiment.



(i) Explain why the white cloud of product forms closer to the hydrogen chloride.

_____

_____ [2]

(ii) State the name of the white cloud of product.

_____ [1]

TOTAL MARKS [10]

5. The table gives information on the number of protons, neutrons and electrons in particles **A**, **B**, **C**, **D** and the number of protons in particle **E**.

particle	number of protons	number of neutrons	number of electrons
A	17	18	17
B	11	12	10
C	17	20	17
D	8	8	10
E	13	14	

(a) (i) Particle **E** has no charge. Complete the table to determine the number of electrons in particle **E**. [1]

(ii) State the charge on particle **B**.

_____ [1]

(iii) Particles **A** and **C** are from the same element.

State the term used to describe these particles.

_____ [1]

(iv) State the oxidation number of particle **D**.

_____ [1]

(b) Particle **A** is found in a common acid.

(i) Name this acid. _____ [1]

(ii) Write the symbol of the ion found in all acids. _____ [1]

(iii) What colour will this acid turn in Universal Indicator?

_____ [1]

(iv) Determine the relative molecular mass of this acid.

_____ [1]

(v) Draw a diagram to show how particle **A** forms an ion.

[2]

TOTAL MARKS [10]

6. (a) Use the Periodic Table on page 2 to answer this question.

(i) State the number of periods in the Periodic Table.

_____ [1]

(ii) Calculate the number of neutrons in one atom of bromine.

_____ [1]

(iii) Name the element in Group III Period 4.

_____ [1]

(iv) Aluminium is used in aircraft bodies.

State **one** property of aluminium that makes it suitable for this use.

_____ [1]

(v) Name a suitable use for copper and explain why copper can be used in this way.

Use _____

Reason _____

_____

[2]

(vi) Explain why helium is suitable for use in party balloons.

_____ [1]

(vii) Iron alloys are often used instead of pure iron.

Explain why.

_____ [1]

(b) Strontium chloride, $SrCl_2$ is used to make toothpaste for sensitive teeth.

Use a dot and cross diagram to show the bonding in $SrCl_2$. You need only to show the outer shell electrons.

[2]

TOTAL MARKS [10]

7. Nitrogen and oxygen have many uses in industry.

Their boiling points are –196 °C and –183 °C respectively.

They are extracted from liquid air by distillation.

(a) Oxygen reacts with metals and non-metals to form their oxides.

(i) What type of oxide is:

magnesium oxide _____

carbon dioxide _____

aluminium oxide? _____

[3]

(ii) Use a dot and cross diagram to show the bonding in carbon dioxide, CO_2.

You need only to show the outer shell electrons.

[2]

(b) Nitrogen is used to make fertilisers such as ammonium sulfate, $(NH_4)_2SO_4$ and ammonium nitrate, NH_4NO_3.

(i) Which nitrogenous ion can plants absorb in solution through the root hairs, to make proteins?

_____ [1]

(ii) Why is it more efficient to use a tonne of ammonium nitrate than a tonne of ammonium sulfate as a nitrogenous fertiliser?

_____ [1]

(iii) What would be the **first** effect on water polluted by runoff from a farm that uses too much fertilisers?

_____ [1]

(c) Oxygen and water are the two conditions required for the rusting of iron.

Explain how galvanising can help prevent rusting.

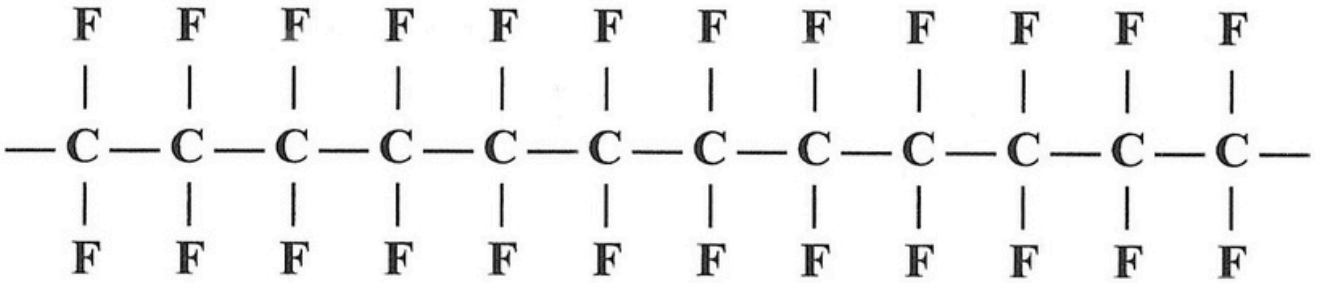
_____

_____ [2]

TOTAL MARKS [10]

8. (a) Teflon is a polymer like **poly(ethene)**. It is used to coat non-stick pans and has a high melting point of 327 °C. This is above the temperature used for cooking.

A section of the polymer Teflon is shown.



(i) Draw the monomer of the polymer Teflon.

[2]

(ii) State **one** difference in the structures between Teflon and poly(ethene).

_____ [1]

(b) Diamond and graphite are both different forms of the same element carbon.

With reference to their structures explain why:

(i) diamond has a high melting point

_____

_____ [2]

(ii) graphite is soft, has a slippery feel and conducts electricity?

_____

_____ [2]

(c) Coal, oil and natural gas are all examples of **fossil fuels**. Fossil fuels contain carbon.

(i) Describe how oil was formed.

_____

_____ [2]

(iii) State why the incomplete combustion of oil is a problem.

_____ [1]

TOTAL MARKS [10]

End]

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