



Rewarding Learning

General Certificate of Secondary Education
2018–2019

Centre Number

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Candidate Number

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Double Award Science: Chemistry

Unit C1
Higher Tier

ML

[GDW22]

THURSDAY 8 NOVEMBER 2018, MORNING

TIME

1 hour, plus your additional time allowance.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.
Answer **all nine** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 70.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in Question **5(a)**.

A Data Leaflet, which includes a Periodic Table of the Elements, is included in this question paper.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	

Total Marks	
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- 1 A representation of part of the Periodic Table developed by Mendeleev is shown below. Mendeleev's Periodic Table did not contain the noble gases as they had not been discovered at that time.

Li	Be	B	C	N	O	F	Fe
Na	Mg	Al	Si	P	S	Cl	Co
K	Ca		Ti	V	Cr	Mn	Ni
Cu	Zn			As	Se	Br	Ru
Rb	Sr	In	Zr	Nb	Mo	I	Rh

- (a) State three differences, other than the absence of the noble gases, between the Periodic Table developed by Mendeleev and the modern Periodic Table.

1. _____

2. _____

3. _____

_____ [3]

- (b) (i) Why were the noble gases more difficult to discover and identify than the other gaseous elements?

_____ [2]

- (ii) What colour is neon gas?

_____ [1]

Examiner Only

Marks Remark

2 Many medicines are often referred to as formulations.

(a) Explain fully the meaning of **formulation**.

[3]

(b) Milk of magnesia is a common medicine. It contains insoluble magnesium hydroxide suspended in water.

Name the most suitable separation technique to separate the magnesium hydroxide from the water.

[1]

(c) When magnesium hydroxide powder is added to dilute nitric acid, a reaction occurs.

Give two observations that can be made during this reaction.

1. _____

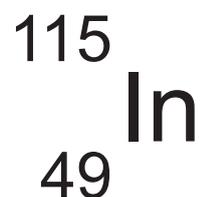
2. _____ [2]

Examiner Only

Marks Remark

- 3 Atoms and ions are made up of the three subatomic particles: protons, electrons and neutrons.

(a) Information about an atom of indium is shown below.



- (i) How many neutrons does this atom of indium contain?

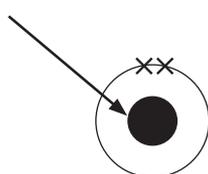
_____ [1]

- (ii) Indium forms an indium(III) ion, In^{3+} . How many electrons would this ion contain?

_____ [1]

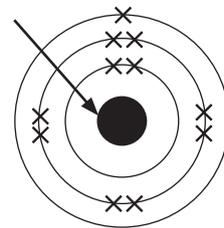
(b) The diagrams below show some atoms and ions of elements in the Periodic Table. They are labelled **Q**, **R**, **S**, **T**, **U** and **V**.

3 protons
4 neutrons



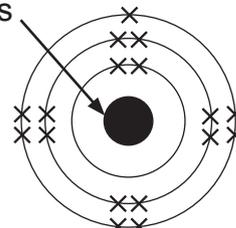
Q

11 protons
12 neutrons



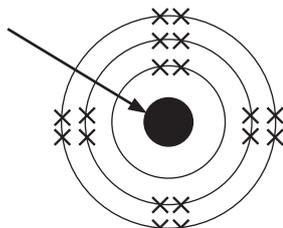
R

17 protons
20 neutrons



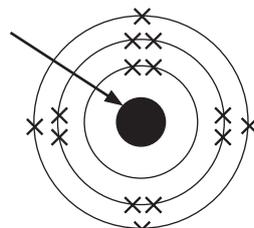
S

19 protons
20 neutrons



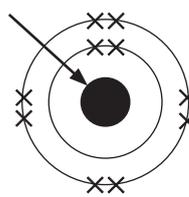
T

14 protons
14 neutrons



U

8 protons
8 neutrons



V

Examiner Only	
Marks	Remark

- (i) Complete the table below about the atoms and ions **Q** to **V**.
Some information has already been filled in.

Atom or Ion	Atomic number	Mass number	Number of electrons	Electronic configuration
Q	3		2	2
R	11	23		2,8,1
S		37		2,8,7
T	19	39	18	
U	14		14	
V		16	10	2,8

[4]

- (ii) Which of the diagrams **Q**, **R**, **S**, **T**, **U** or **V** represent ions?

_____ [2]

- (c) The element thallium has two isotopes, thallium-203 (^{203}Tl) and thallium-205 (^{205}Tl). The percentage abundance of the isotopes are given in the table below.

Isotope	Percentage abundance/%
thallium-203 (^{203}Tl)	30
thallium-205 (^{205}Tl)	70

Use the information in the table to calculate the relative atomic mass of thallium.

Show your working out.

relative atomic mass = _____ [2]

Examiner Only

Marks Remark

- 4 When sodium is added to water it moves on the surface of the water. The sodium fizzes as a gas is produced and heat is released.

(a) Write down two other observations which occur when sodium reacts with water.

1. _____

2. _____ [2]

(b) Write a balanced symbol equation for the reaction of sodium with water.

_____ [3]

(c) The reaction of potassium with water and the reaction of sodium with water are very similar.

(i) State two observations which occur when potassium reacts with water, but which are not observed when sodium reacts with water.

1. _____

2. _____ [2]

(ii) Explain why sodium and potassium have similar chemical properties.

_____ [2]

Examiner Only

Marks Remark

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(Questions continue overleaf)

- 5 (a) Iodine is a halogen which has a molecular covalent structure. If some iodine is placed in a boiling tube and gently heated, the iodine sublimates. The experiment should be carried out in a fume cupboard.

Demonstrate your understanding of the above paragraph.

You should:

- Describe what is observed in the boiling tube when iodine sublimates
- Explain why the experiment should be carried out in a fume cupboard
- Explain, in terms of having a molecular covalent structure, why iodine sublimates

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

Describe what is observed in the boiling tube when iodine sublimates.

Explain why the experiment should be carried out in a fume cupboard.

Explain, in terms of having a molecular covalent structure, why iodine sublimates.

[6]

Examiner Only

Marks Remark

- (b) Describe the test for chlorine gas. What is the result if the gas is chlorine?

Test: _____

Result: _____

_____ [3]

- (c) When chlorine reacts with potassium bromide solution a displacement reaction occurs.
Write a balanced symbol equation for this reaction.

_____ [3]

Examiner Only	
Marks	Remark

7 Non-metallic elements and compounds contain covalent bonds.

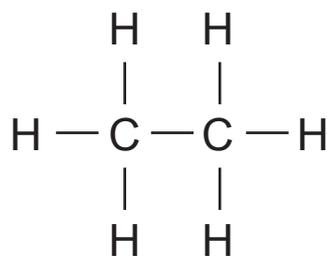
(a) What is meant by **single covalent bond**?

_____ [1]

(b) Use a dot and cross diagram to show **all** the electrons in a molecule of nitrogen, N_2 .

[3]

(c) Ethane is a chemical found in natural gas and has the formula C_2H_6 . The diagram below represents a molecule of ethane.



How many covalent bonds are shown in the diagram above?

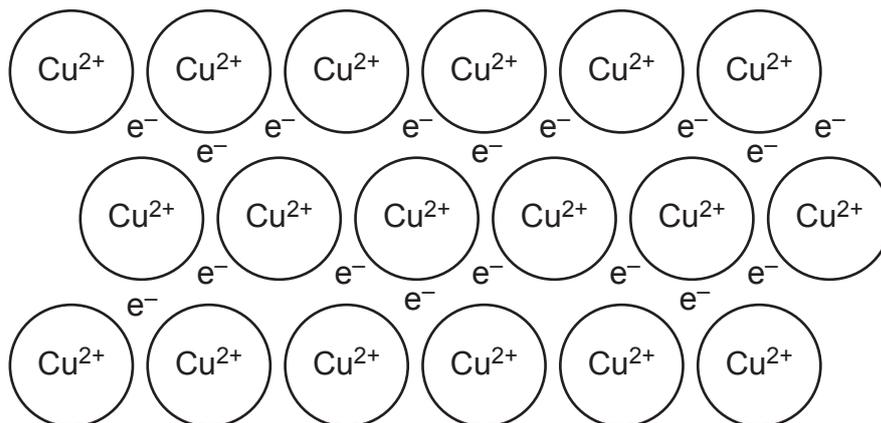
_____ [1]

Examiner Only

Marks

Remark

8 The diagram below shows the structure and bonding in copper metal.



(a) What is represented in the diagram by e^- ?

_____ [2]

(b) Explain the bonding in copper metal.

 _____ [2]

(c) Explain why copper conducts electricity.

 _____ [2]

(d) Explain why copper is ductile.

 _____ [3]

Examiner Only

Marks Remark

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