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**BEDOK SOUTH SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2022**

4NA

CANDIDATE
NAME

CLASS

REGISTER
NUMBER

SCIENCE (CHEMISTRY)

Paper 3 Multiple Choice

5105/03

23 Aug 2022

Paper 3 and 4: 1 hour 15 minutes

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, class and register number on the Answer Sheet in the spaces provided unless this has been done for you.

There are **twenty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Answers to Paper 3 and Paper 4 must be handed in separately.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

You are advised to spend no more than **30 minutes** on **Paper 3**.

You may proceed to answer Paper 4 as soon as you have completed Paper 3.

Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 8.

The use of an approved scientific calculator is expected, where appropriate.

Setter: Mr Hubert Song

Answer **all** the questions in the separate answer sheet provided.

- 1 The table below shows the melting and boiling points of four pure substances. Which substance is a liquid at room temperature?

	melting point / °C	boiling point / °C
A	-210	-195.8
B	-7.2	58.8
C	180.5	1330
D	302	337

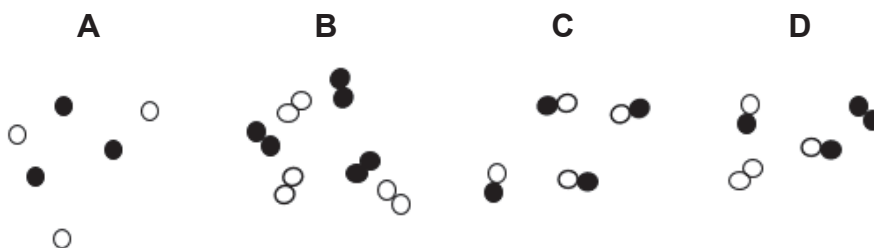
- 2 A student wishes to add exactly 22.5 cm³ of acid to 25.0 cm³ of an alkali. Which apparatus should the student use to measure these volumes?

	acid	alkali
A	burette	measuring cylinder
B	burette	pipette
C	measuring cylinder	pipette
D	pipette	burette

- 3 Which row represents a positively charged ion?

	number of protons	number of neutrons	number of electrons
A	2	2	2
B	9	10	10
C	11	12	11
D	20	20	18

- 4 Which diagram represents a mixture of nitrogen and oxygen gas?

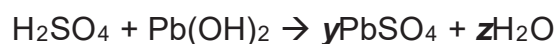


- 5 The electronic structures of two atoms, X and Y are 2.8.1 and 2.6 respectively. X reacts with Y to form a compound.

What is the type of bonding present in this compound and the chemical formula of this compound?

	type of bonding	chemical formula
A	covalent	X ₂ Y
B	covalent	XY ₂
C	ionic	XY ₂
D	ionic	X ₂ Y

- 6 Sulfuric acid reacts with lead(II) hydroxide in the following equation.



What are the values of **y** and **z**?

	y	z
A	1	1
B	1	2
C	2	2
D	2	4

- 7 Solid R reacts with both dilute hydrochloric acid and aqueous sodium hydroxide to form salts.

Which could be solid R?

- A** calcium oxide
- B** magnesium oxide
- C** lead(II) oxide
- D** sulfur oxide

- 8 The graph shows how the pH changes when different volumes of sodium hydroxide solution are added to 20.0 cm³ of dilute hydrochloric acid.

Volume of sodium hydroxide (cm³)

What is the volume of sodium hydroxide solution needed to neutralise 20.0 cm³ of dilute hydrochloric acid?

- | | |
|-------------------------------|-------------------------------|
| A 10.0 cm ³ | B 25.0 cm ³ |
| C 20.0 cm ³ | D 30.0 cm ³ |

- 9 Which substance is used to decrease the acidity in soil?

- | | |
|----------------------------|-----------------------------|
| A ammonium nitrate | B magnesium sulfate |
| C calcium hydroxide | D potassium chloride |

- 10 Which substance will not react with sulfuric acid to form copper(II) sulfate?

- A** copper
- B** copper(II) carbonate
- C** copper(II) hydroxide
- D** copper(II) oxide

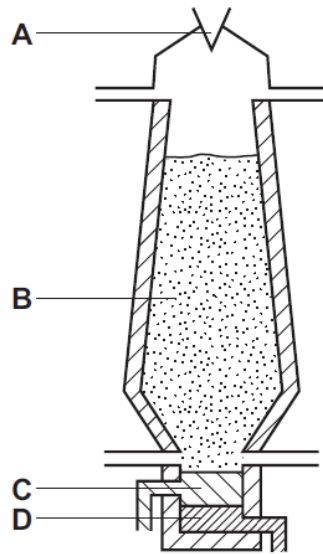
- 11 Which statement explains why the chemical properties of sodium and potassium are similar?
- A They are in the same group of the Periodic Table.
 - B They are in the same period of the Periodic Table.
 - C They are soft and can be cut with a knife.
 - D They have similar melting points.

- 12 Several properties of metals can be explained because layers of metal atoms can slide over each other.

Which property cannot be explained by this reason?

- A Metals are ductile.
 - B Metals are malleable.
 - C Metals can conduct electricity.
 - D Pure metals are softer than alloys.
- 13 Which metal reacts readily with hydrochloric acid but does not react with cold water to produce hydrogen gas?
- A calcium
 - B copper
 - C magnesium
 - D zinc
- 14 Which statement explains why recycling ensures that metals will be available in future?
- A There are only limited amounts of metals on Earth's surfaces.
 - B Disposal of metals in landfills are unsightly.
 - C Recycling costs less than obtaining metals from their ores.
 - D Recycling avoids the environmental damage caused by opening new mines.

- 15 The diagram shows a blast furnace.
In which part is iron ore changed into iron?



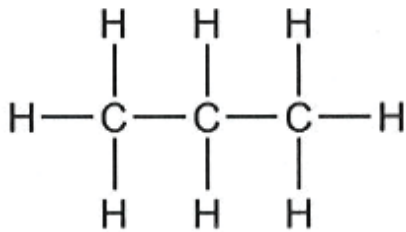
- 16 Air is a mixture of gases.
Which gas is present in the least amount in air?
- A** carbon dioxide **B** nitrogen
C hydrogen **D** oxygen
- 17 Which pollutant gas is produced by both lightning activity and internal combustion engines?
- A** carbon monoxide **B** ozone
C nitrogen monoxide **D** sulfur dioxide
- 18 Which petroleum fraction is used as a fuel for aircraft engine?
- A** kerosene **B** petrol
C diesel **D** bitumen

19 Octene is an alkene containing eight carbon atoms per molecule.
What is its molecular formula?

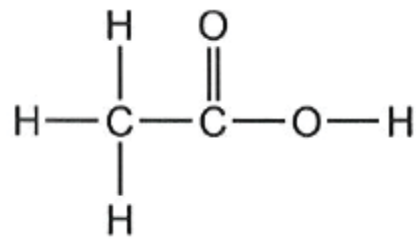


20 Which diagram shows an unsaturated hydrocarbon?

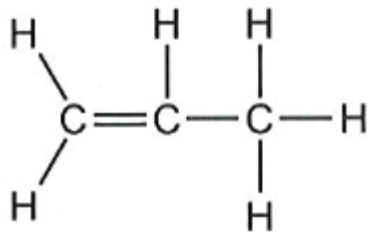
A



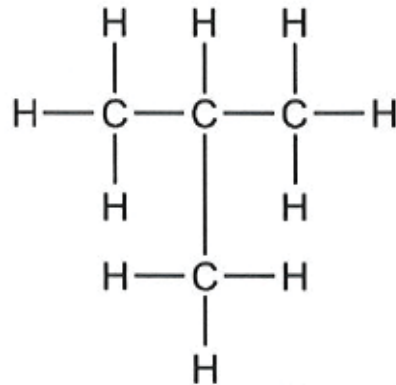
B



C



D



--- End of Paper 3 ---

The Periodic Table of Elements

		Group																																																																									
I	II	III	IV	V	VI	VII	0																																																																				
3 Li lithium 7	4 Be beryllium 9	11 Na sodium 23	12 Mg magnesium 24	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 -	113 Nh nihonium -	114 Fl flerovium -	115 Lv livermorium -	116 Og oganeson -	117 Ts tennessine -	118 Ug unbinilium -

1
H
hydrogen
1

Key
proton (atomic) number
atomic symbol
name
relative atomic mass

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
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 -

lanthanoids

actinoids

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).



**BEDOK SOUTH SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2022**

4NA

CANDIDATE
NAME

CLASS

REGISTER
NUMBER

SCIENCE (CHEMISTRY)

Paper 4 Chemistry

5105/04

23 August 2022

Paper 3 and 4: 1 hour 15 minutes

Candidates answer on the Question Paper.
No additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your class, index number and name on the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions in Section A and any **two** questions in Section B.
The use of an approved scientific calculator is expected, when appropriate.
In calculations, you should show all the steps in your working, giving your answer in each stage.
You are advised to spend no longer than 30 minutes in Paper 3.
You may proceed to answer Paper 4 as soon as you have completed Paper 3.
A copy of the periodic table is printed on page 9.

At the end of the examination hand in your answers to Paper 3 and Paper 4 separately.
The number of marks in given in brackets [] at the end of each question or part question.





Setter: Mr. Hubert Song

For Examiner's Use	
Section A	
Section B	
Total	

Section A (14 marks)

Answer **all** questions in the spaces provided.

1 Dilute sulfuric acid is added to the following test-tubes.

P	Q	R	S
			
magnesium ribbon	sodium hydroxide solution	barium nitrate solution	copper metal

(a) Upon addition of dilute sulfuric acid, in which of the above test-tube(s) does the following take place?

(i) bubbles produced [1]

(ii) precipitation [1]

(b) Write the ionic equation of a neutralisation reaction. Include the state symbols.

..... [1]

(c) Write a balanced chemical equation of the reaction in test-tube P when dilute sulfuric acid was added.

..... [2]

2 In the extraction of iron in the blast furnace, waste gases are released.

(a) Identify one gas released that is harmful.

..... [1]

(b) State its harmful effect.

.....
 [1]

3 The details of 5 atoms, **V**, **W**, **X**, **Y** and **Z** are shown in the table below.

atom	relative mass	number of neutrons	number of electrons	number of protons
V	7			3
W	9		4	
X		3		3
Y		12	12	
Z	27			13

(a) Fill in the blanks with the appropriate information. [3]

(b) State two different atoms that belong to period 3 of the Periodic Table.

..... [1]

(c) (i) Define the term isotopes.

.....
 [1]

(ii) Which of the above atoms are isotopes?

..... [1]

(iii) Explain why isotopes have the same chemical properties.

..... [1]

Section B (16 marks)

Answer any **two** questions from this section in the spaces provided.

- 4 Bromine is an element found in Group VII. The table below shows some properties of compounds containing the element bromine.

name of compound	chemical formula	melting point /°C	electrical conductivity
bromomethane	CH ₃ Br	- 93.7	non-conductive
magnesium bromide	MgBr ₂	711.0	conducts electricity in molten and aqueous state

- (a) Identify the type of chemical bond present in the above compounds.

bromomethane

magnesium bromide [1]

- (b) Explain why bromomethane cannot conduct electricity.

.....

..... [1]

- (c) Explain why magnesium bromide has a high melting point.

.....

.....

..... [2]

- (d) Draw a 'dot and cross' diagram of magnesium bromide. Show only the outer electrons.

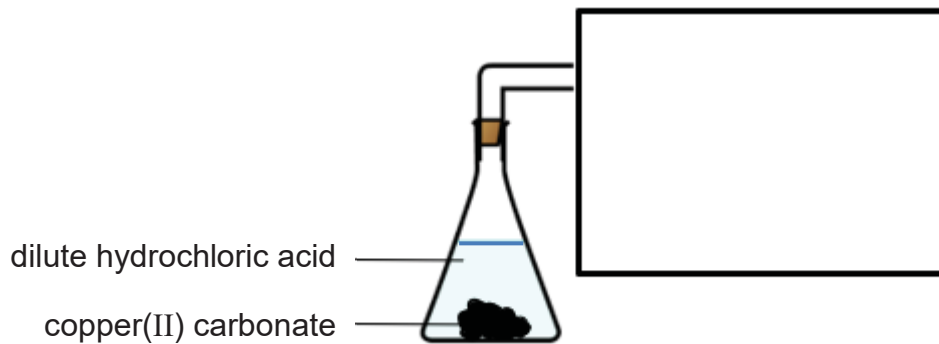
[2]

- (e) Aqueous chlorine was added to a beaker containing aqueous magnesium bromide. It was observed that the reaction mixture turned reddish brown. Explain the given observation.

.....

[2]

- 5 The diagram below shows the setup to prepare copper(II) chloride. Excess copper(II) carbonate was added to a conical flask containing dilute hydrochloric acid.



- (a) In the box above, draw a suitable apparatus or additional setup to collect the gas evolved from the reaction.

[1]

- (b) Identify the gas evolved and describe a positive test for the gas identified.

gas evolved

[1]

test

.....

[1]

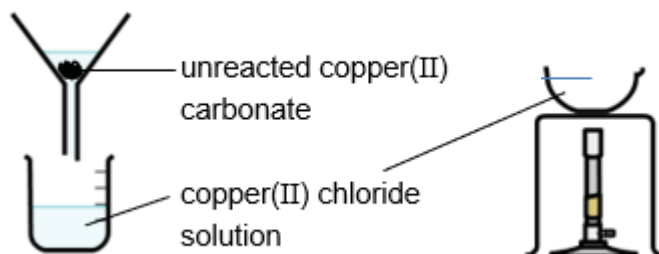
- (c) 15.2 g of copper(II) carbonate was added to the flask in the beginning of the experiment.

Calculate the amount of copper(II) carbonate present in moles.

amount of copper(II) carbonate = mols

[2]

- (d) After the reaction is completed, the mixture in the conical flask is filtered to obtain copper(II) chloride solution. The solution is then heated as shown in the diagram below.



- (i) Describe the steps to be carried out after heating in order to obtain dry copper(II) chloride crystals.

.....

[2]

- (ii) Besides copper(II) carbonate, name another possible substance that can be reacted with dilute hydrochloric acid to form copper(II) chloride.

.....

[1]

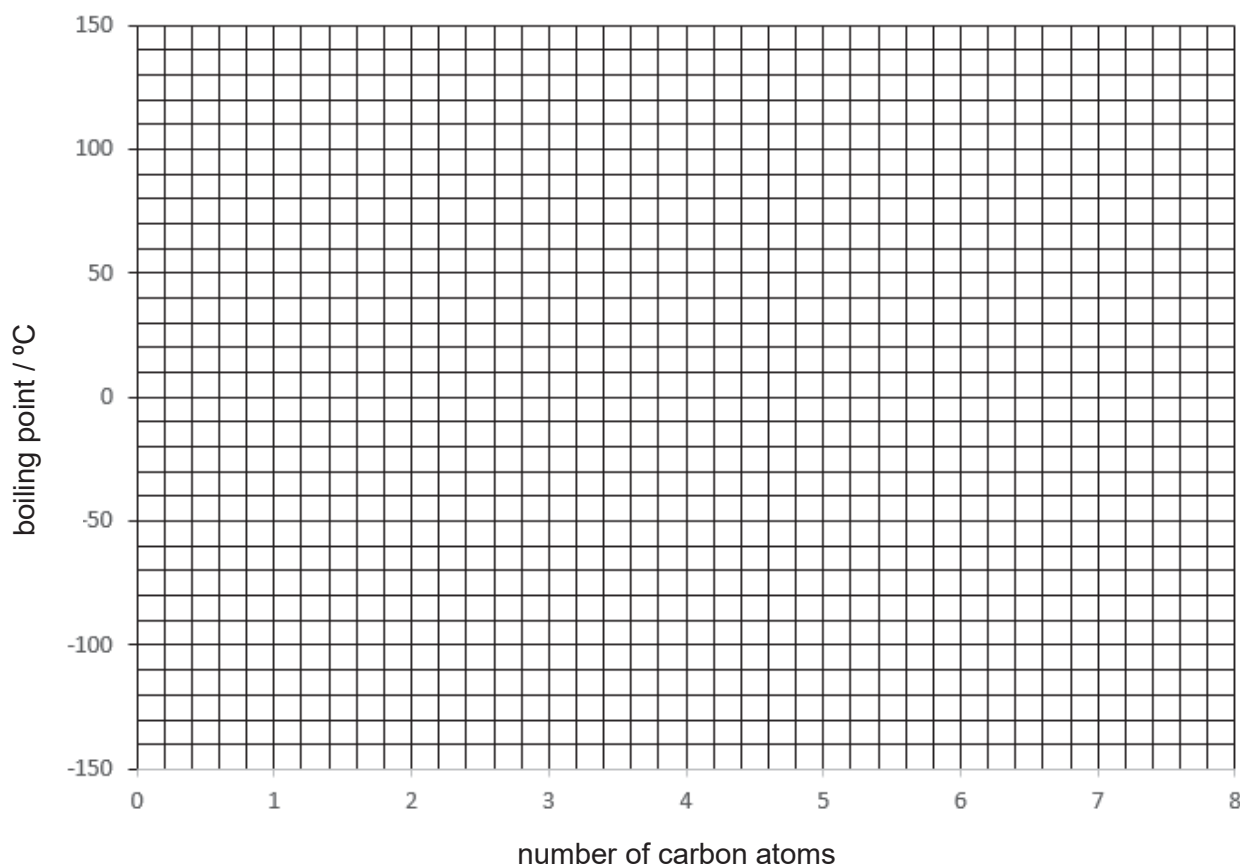
6 Alkenes is a homologous series consisting of unsaturated hydrocarbons.

The table below shows the boiling points of different alkenes.

alkene	number of carbon atoms	boiling point /°C
ethene	2	- 102
propene	3	- 48
butene	4	- 6
pentene	5	30
hexene	6	
heptene	7	93

(a) Plot a graph of the boiling points, marking each point with a cross (×).

Draw a curved line of best fit.



[2]

(b) Using your graph, determine the boiling point of hexene.

boiling point of hexene [1]

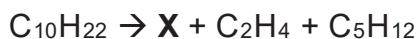
(c) Explain the term unsaturated.

.....
..... [1]


(d) Describe a test to distinguish a saturated hydrocarbon from an unsaturated hydrocarbon.

.....
.....
..... [2]

(e) An equation of a cracking reaction is given below.



(i) Draw the full structural formula for X in the box below.



[1]

(ii) State the conditions required for catalytic cracking.

..... [1]

END OF PAPER

The Periodic Table of Elements

		Group																																																																																	
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1	H hydrogen 1	1
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Key

proton (atomic) number
atomic symbol
name
relative atomic mass

lanthanoids

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actinoids

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

For Answer please email :

LAPOOPOO555@GMAIL.COM

to share with you.