Name: ……………………………………………….. ( ) **Class:** ……...

ASSUMPTION ENGLISH SCHOOL
PRELIMINARY EXAMINATION 2023

SCIENCE (CHEMISTRY)
5105 / 03
5107 / 03

LEVEL:	Sec 4 Normal (Academic)	**DATE :**	3 Aug 2023
CLASSES:	Sec 4/4, 4/5 and 4/6 SBB	**DURATION:**	1 hour 15 minutes *(Papers 3 & 4)*

Additional Materials provided: 1 sheet of OAS paper

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

Write your NAME, INDEX NUMBER and CLASS at the top of this page and on the OAS paper. **Shade your index number on the OAS paper.**

There are 20 questions in this paper. Answer **ALL** questions. For each question, there are four possible answers A, B, C and D. Choose the correct answer and record your choice in soft or 2B pencil on the OAS paper provided. **DO NOT fold or bend the OAS paper.**

At the end of the examination, hand in your OAS paper and Question Papers separately.

INFORMATION FOR CANDIDATES
You are advised to spend no longer than 30 minutes on 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 the last page of Paper 4.

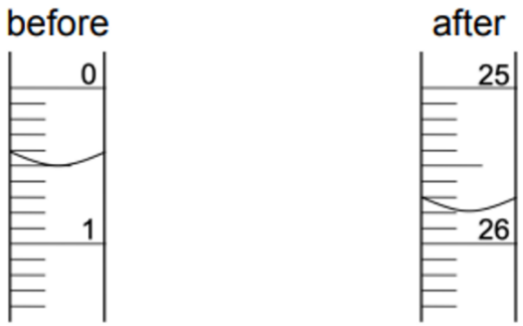
This question paper consists of 9 printed pages including this page.

[Turn over

Section A - Multiple Choice Questions (20 marks)

There are **twenty** questions in this section. 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 on the OAS in soft pencil.

1 The diagram below shows part of a burette containing dilute hydrochloric acid before and after an experiment.

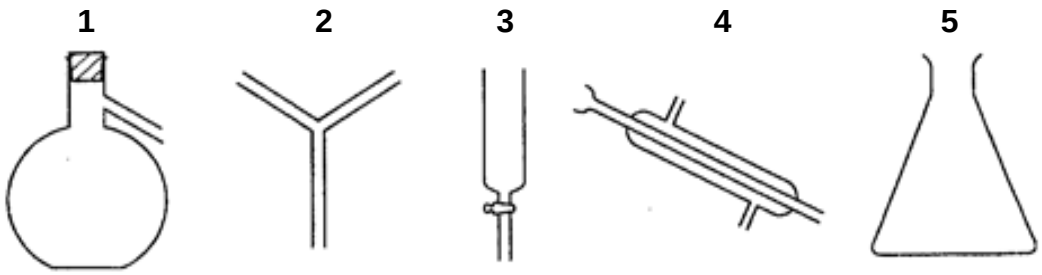


What is the volume of dilute hydrochloric acid used in the experiment?

A 24.70 cm^3 **B** 25.30 cm^3

C 25.80 cm^3 **D** 26.20 cm^3

2 The diagram shows five laboratory apparatus.



solution?

A **2** and **5** only

B **2**, **3** and **5** only

C **1**, **4** and **5** only

D **1**, **2**, **4** and **5** only

3 The table below contains descriptions of 4 different substances **E**, **F**, **G** and **H**.

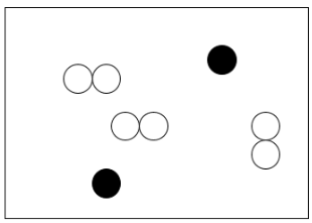
substance	description
E	a solid which melts on heating to form a liquid and cannot be made into a simpler substance
F	a pure solid which burns in air to produce water and carbon dioxide
G	a white solid that can be separated into two different substances by adding water and filtering
H	a red substance that has a constant composition and decomposes into two elements when heated

What is the correct classification of the four substances?

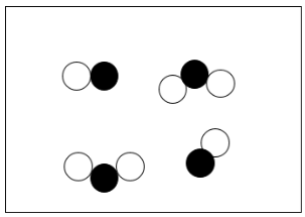
	element	compound	mixture
A	**E**	**H**	**F**, **G**
B	**E**	**F**, **H**	**G**
C	**H**	**E**	**F**, **G**
D	-	**E, F**	**G**, **H**

4 Which diagram represents a mixture of two compounds?

A



B



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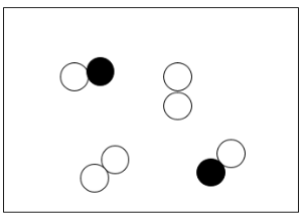
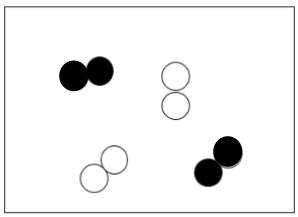


D

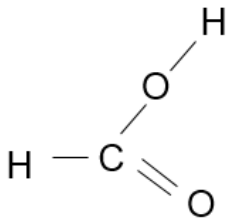


5 An atom of element **Y** has 5 neutrons and 4 protons.

Which row shows the details of another isotope of this atom of element **Y**?

	nucleon number	proton number
A	9	4
B	9	5
C	10	4
D	11	5

6 The diagram shows the structure of a molecule.



How many electrons are used for bonding in this molecule?

A 4 **B** 5

C 8 **D** 10

7 The chemical formula of particle $\mathbf{Z}^{2+}$ is shown below.

$$^{24}_{12}\mathbf{Z}^{2+}$$

Which row shows the correct number of protons, neutrons and electrons in one particle of $\mathbf{Z}^{2+}$?

	protons	neutrons	electrons
A	12	12	14
B	14	12	12
C	12	12	10
D	12	10	12

8 A metal **M**, reacts with a non-metal **Q** to form a compound with formula $\mathbf{M}_2\mathbf{Q}$.

Which statement is true?

A Each **M** atom gains two electrons in the reaction.

B Each **M** atom loses two electrons in the reaction.

C Each **Q** atom gains two electrons in the reaction.

D Each **Q** atom shares two electrons in the reaction.

9 The following equation shows the reaction of sulfur dioxide and hydrogen sulfide.

$$\mathbf{w}\ SO_2 + \mathbf{x}\ H_2S \rightarrow \mathbf{y}\ S + \mathbf{z}\ H_2O$$

What are the values of **w**, **x**, **y** and **z** needed to balance this equation?

	w	**x**	**y**	**z**
A	1	3	2	2
B	2	1	3	2
C	1	2	3	2
D	2	1	2	3

10 The relative atomic mass, A_r, is defined by comparing the mass of one atom with the mass of another atom **X**.

What is **X**?

A ^{1}H **B** ^{12}C

C ^{16}O **D** ^{24}Mg

11 Ammonium nitrate was mixed with solution **X**. When the mixture was warmed, a gas that turned damp, red litmus paper blue was given off.

What can solution **X** be?

A magnesium carbonate

B nitric acid

C potassium hydroxide

D sodium chloride

12 Lead(II) sulfate, an insoluble salt, can be produced by the precipitation method.

The following table shows the solubilities of a few salts.

salt	solubility
lead(II) nitrate	soluble
lead(II) carbonate	insoluble
barium sulfate	insoluble
potassium sulfate	soluble

Which salts can be used to produce lead(II) sulfate?

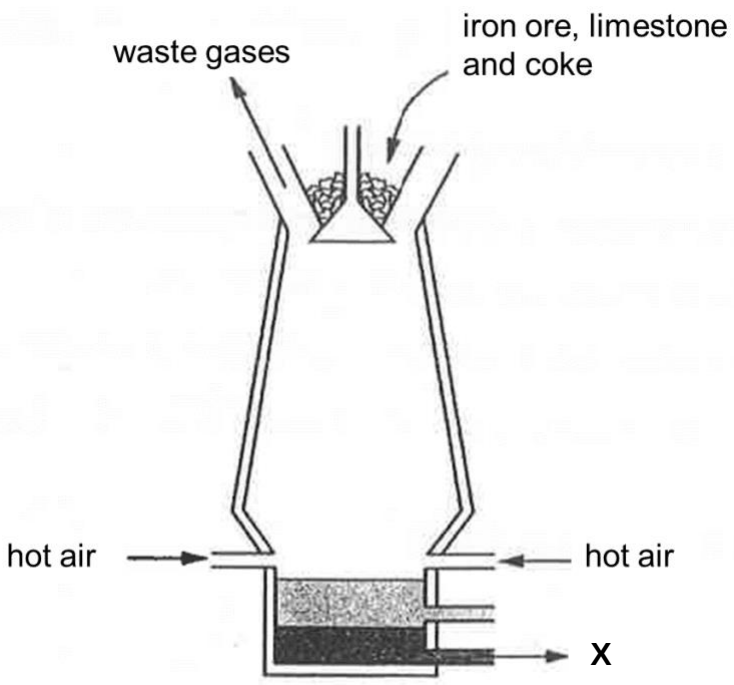
A lead(II) nitrate and barium sulfate

B lead(II) nitrate and potassium sulfate

C lead(II) carbonate and barium sulfate

D lead(II) carbonate and potassium sulfate

13 The diagram below shows a blast furnace.



What is substance **X**?

A molten iron

B molten slag

C nitrogen gas

D oxygen gas

14 Which statements about the reasons for recycling metals are correct?

1 It is cheaper to recycle metals than to extract them from their ores.

2 The demand for metals is always increasing.

3 There is only a finite amount of metal ores.

4 Recycling metals requires more energy than the extraction of metals from their ores.

A 1 and 2 only

B 1 and 3 only

C 1, 2 and 3 only

D 1, 2 and 4 only

15 In each of three experiments, a halogen was added to separate solutions containing ions of one of the other two halogens.

The table below shows the results.

experiment	halogen added	halide solution		
		X^-	Y^-	Z^-
1	X_2	-	Y_2 displaced	Z_2 displaced
2	Y_2	No reaction	-	No reaction
3	Z_2	No reaction	Y_2 displaced	-

What were the halogens **X**, **Y** and **Z**?

	X	Y	Z
A	Br	C*l*	I
B	Br	I	C*l*
C	C*l*	Br	I
D	C*l*	I	Br

16 What is the volume of nitrogen, N_2, in 50 cm^3 of air?

A 10.5 cm^3 **B** 21 cm^3

C 28 cm^3 **D** 39 cm^3

17 The table gives the relative concentrations of polluting gases in the air in four different industrialised cities, **A**, **B**, **C** and **D**.

In which city are limestone buildings most threatened by pollution?

	carbon monoxide	nitrogen dioxide	sulfur dioxide
A	20	14	45
B	40	31	32
C	65	37	17
D	35	43	38

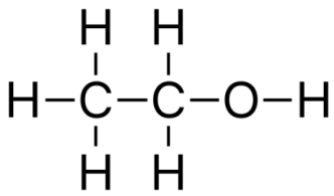
18 The following shows some physical properties of alkanes.

1 density
2 flammability
3 viscosity

Which physical property increases as the number of carbon atoms in the alkane increases?

A 1 and 2 only
B 1 and 3 only
C 2 and 3 only
D all of the above

19 The structure of compound **Z** is shown.



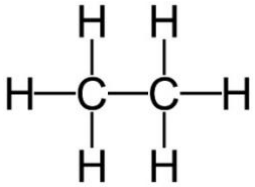
Which row describes **Z**?

	Is **Z** saturated?	Is **Z** a hydrocarbon?
A	no	no
B	no	yes
C	yes	no
D	yes	yes

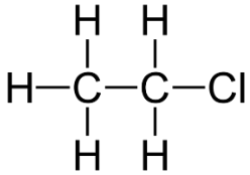
20 Ethane reacts with chlorine in the presence of light.

Which product is not formed during this reaction?

A



B



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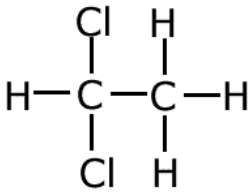
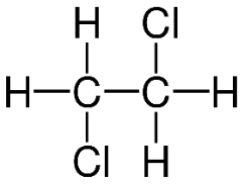


D



- End of Paper 3 -