NAMIBIA SENIOR SECONDARY CERTIFICATE

CHEMISTRY ORDINARY LEVEL 6117/1

PAPER 1 Multiple Choice 45 minutes

Marks 40 **2022**

Additional Materials: Multiple choice answer sheet
Non-programmable calculator
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS AND INFORMATION TO CANDIDATES

- Write in soft pencil.
- Make sure that you receive the multiple choice answer sheet with **your examination number** on it.

- There are **forty** 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.
- If you want to change an answer, thoroughly erase the one you wish to delete.
- The Periodic Table is printed on page 13.

- **Read the instructions on the answer sheet carefully.**

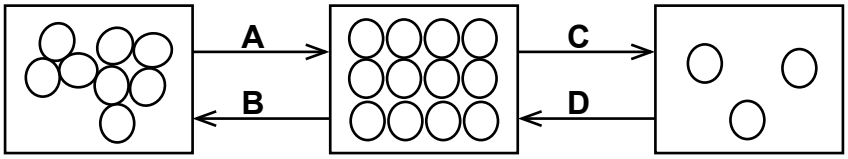
- Each correct answer will score one mark.
- Any rough working should be done in this booklet.
- You may use a non-programmable calculator.

This document consists of **13** printed pages and **3** blank pages.

Republic of Namibia

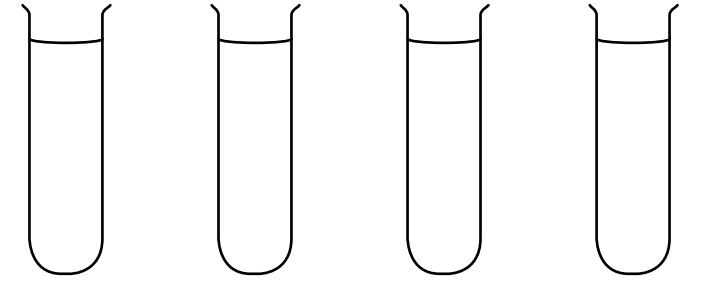
MINISTRY OF EDUCATION, ARTS AND CULTURE

1 The diagrams show changes of the state of a substance.



Which change of state represents sublimation?

2 The diagram shows four test-tubes containing different mixtures of substances.



Which row shows a suitable method of purification for all the mixtures?

	S	T	U	V
A	chromatography	evaporation	fractional distillation	filtration
B	filtration	chromatography	evaporation	fractional distillation
C	chromatography	filtration	fractional distillation	evaporation
D	filtration	fractional distillation	evaporation	chromatography

3 Which statement is true about pure substances?

A They boil over a range of temperatures.

B They have distinctive boiling points.

C Their boiling points increase.

D Their boiling points decrease.

4 Which of the following is different for isotopes of the same element?

A number of atoms

B number of electrons

C number of neutrons

D number of protons

5 Which Period 3 element is a non-metal in the Periodic Table?

A boron

B gallium

C sodium

D sulfur

6 Which row describes the properties of potassium bromide, KBr?.

	type of bonding	solid conducts electricity	aqueous solution conducts electricity
A	covalent	yes	no
B	covalent	no	yes
C	ionic	yes	no
D	ionic	no	yes

7 Which of the following substances forms a molecular lattice?

A iodine

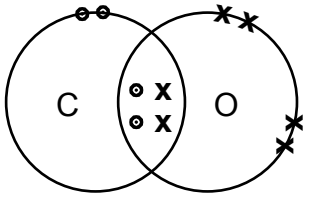
B sodium

C silicon(IV) oxide

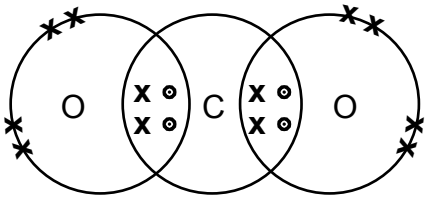
D sodium chloride

8 Which diagram shows the correct bonding between carbon and oxygen to form a carbon dioxide molecule?

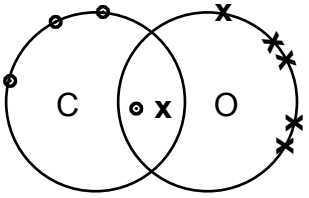
A



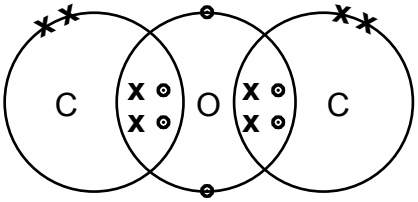
B



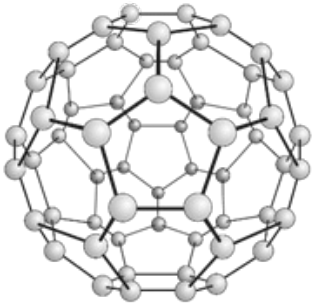
C



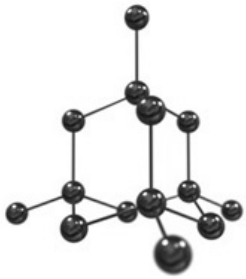
D



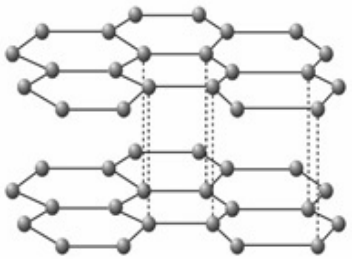
9 The diagrams show the common allotropes of carbon.



X



Y

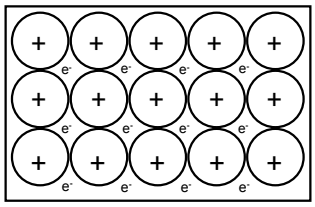


Z

Which row shows the identity of **X**, **Y** and **Z**?

	X	Y	Z
A	diamond	graphite	Buckministerfullerene
B	graphite	Buckministerfullerene	diamond
C	Buckministerfullerene	diamond	graphite
D	diamond	Buckministerfullerene	graphite

10 The diagram shows a metallic lattice.



In terms of it's structure, which statement describes why metals are malleable?

A It has a sea of delocalised electrons.

B It has free moving electrons that carry charge.

C It has positive ions closely packed together.

D It has regularly arranged ions that slide past each other.

11 What is the chemical formula of calcium hydroxide?

A CaOH

B $Ca(OH)_2$

C Ca_2OH

D $CaOH_2$

12 When propane undergoes complete combustion, carbon dioxide and water are produced.

The chemical equation is shown below.

$$\mathbf{w}C_3H_8 + \mathbf{x}O_2 \rightarrow \mathbf{y}CO_2 + \mathbf{z}H_2O$$

Which row shows the values of **w**, **x**, **y** and **z**?

	w	**x**	**y**	**z**
A	1	2	1	2
B	1	3	3	1
C	1	4	3	4
D	1	5	3	4

13 Thatch is used to make roofs.

Which property makes it suitable for this use?

A good insulator

B hard

C high compressive strength

D transparent

14 Which statement describes biodegradable waste?

A can be decomposed

B does not decay

C a product of synthetic materials

D can be broken down using chemicals

15 The equation for the fermentation of glucose is shown.

$$C_6H_{12}O_6 \xrightarrow{\text{yeast}} 2C_2H_5OH + 2CO_2$$

What volume of carbon dioxide, at room temperature and pressure, is formed when 0.2 moles of glucose reacts with yeast during fermentation?

A 2.4 dm^3

B 4.8 dm^3

C 8.8 dm^3

D 9.6 dm^3

16 Which row shows the electrode products during the electrolysis of aqueous copper(II) sulfate using copper electrodes?

	cathode	**anode**
A	copper	oxygen
B	oxygen	copper
C	copper(II) ions	copper
D	copper	copper(II) ions

17 Which process involves a physical change?

A burning paper

B melting an ice cube

C reacting acid with base

D rusting of Iron

18 Hydrogen gas and iodine gas react to form hydrogen iodide.

The equation is shown below.

$$H_2 + I_2 \rightarrow 2HI$$

bond	bond energy/kJmol^{-1}
H - H	436
I - I	151
H - I	299

What is the energy change for this reaction?

A +11 kJmol^{-1}

B -11 kJmol^{-1}

C +288 kJmol^{-1}

D -288 kJmol^{-1}

19 Which fuel is reacted with oxygen to generate electricity in a fuel cell?

A hydrogen

B methane

C petrol

D uranium

20 Which arrangement of elements shows the change from metallic to non-metallic character across a period of the Periodic Table?

A sodium → magnesium → aluminium

B carbon → nitrogen → oxygen

C magnesium → aluminium → sulfur

D potassium → sodium → lithium

21 Sulfur dioxide reacts with oxygen to give sulfur trioxide. The reaction reaches dynamic equilibrium.

$$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$$

Which row shows what happens to the rate of reaction and the position of equilibrium when pressure of the system is increased?

	rate of reaction	position of the equilibrium
A	decreases	will move to the left
B	decreases	will move to the right
C	increases	will move to the left
D	increases	will move to the right

22 Zinc is extracted from its ore, zinc blende, by first roasting in air, to convert it to zinc oxide. Then zinc oxide is heated with coke to give zinc as shown in the equation.

$$ZnO(s) + C(s) \rightarrow Zn(s) + CO(g)$$

What is the role of coke in the formation of zinc?

A It acts as an oxidising agent.

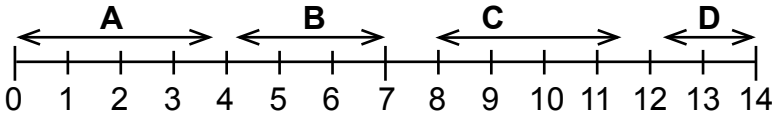
B It acts as a reducing agent.

C it removes impurities from the furnace.

D It lowers the melting point of zinc oxide.

23 The diagram shows a pH scale.

Which range represents the pH of soap water?



24 Which type of oxide is aluminium oxide, Al_2O_3?

A acidic

B amphoteric

C basic

D neutral

25 What are the products of the reaction between magnesium carbonate and hydrochloric acid?

A magnesium chloride, carbon dioxide

B magnesium chloride, carbon dioxide and water

C magnesium chloride, carbon and water

D magnesium chloride and hydrogen carbonate

26 Which metal occurs native?

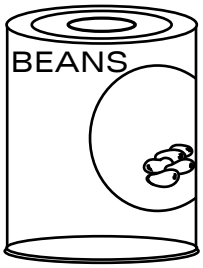
A sodium

B lithium

C potassium

D platinum

27 The diagram shows a can of baked beans.



Which method is most suitable to prevent the can from rusting easily?

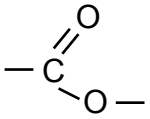
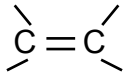
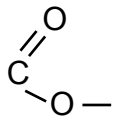
A galvanising

B greasing

C painting

D plating

28 Which row shows the structure of a functional group and its homologous series?

	functional group	**homologous series**
A		esters
B	— C — OH	alkenes
C		carboxylic acids
D		alcohols

29 Methane is reacted with chlorine in the presence of UV light as shown in the equation.

$$CH_4 + Cl_2 \rightarrow \text{ product } \mathbf{X} + HCl$$

What is **X**?

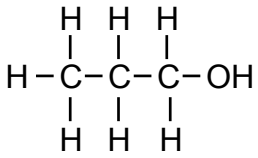
A CCl_4

B $CHCl_3$

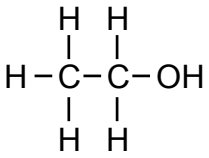
C CH_3Cl

D CH_4Cl_2

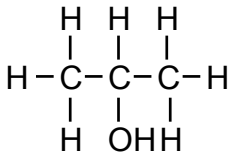
30 The diagrams shows structures of four compounds.



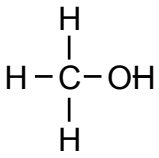
1



2



3



4

Which pair of compound are isomers of each other?

A **1** and **2**

B **1** and **3**

C **1** and **4**

D **2** and **4**

31 Which of the following organic compounds is used as a fuel?

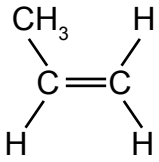
A ethene

B chloroethane

C ethanoic acid

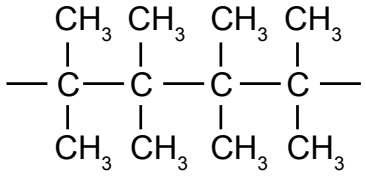
D ethanol

32 The diagram shows the structure of a monomer.

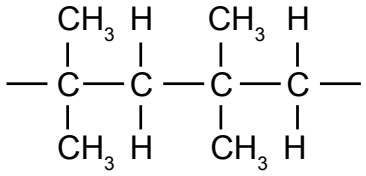


Which structure shows the part of the polymer product formed when these monomers link together?

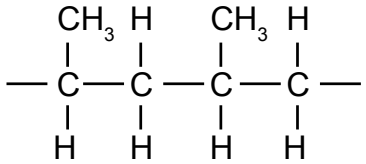
A



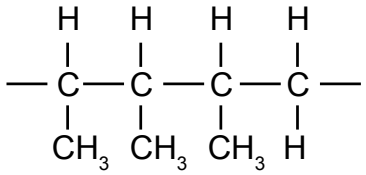
B



C



D



33 Which of the following is a physical test for pure water?

A A colourless liquid at room temperature.

B Boils at 100°C at sea level.

C Turns white anhydrous copper(II) sulfate blue.

D Turns blue anhydrous cobalt(II) chloride pink.

34 A student suggest three disadvantages of hard water.

1. Forms lather with soap.
2. Forms scum with soap.
3 Forms scale in hot water pipes.

Which suggestions are correct?

A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1,2 and 3

35 When fertilisers are washed into water resources by rain water, a process called eutrophication occurs.

Some of the stages of eutrophication are described below:

x - water plants in the water resource beds die due to lack of sunlight.

y - overgrowth of algae takes place.

z - too much bacteria causes a deficiency in oxygen.

In which order do these stages occur?

A x → y → z

B x → z → y

C y → x → z

D y → z → x

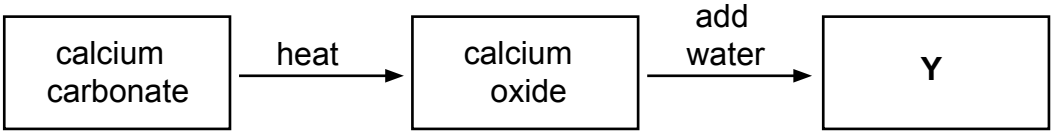
36 Which row shows the uses of carbon dioxide and of oxygen?

	use of carbon dioxide	use of oxygen
A	welding	baking soda
B	dry ice	welding
C	steel production	fire extinguisher
D	baking soda	dry ice

37 Which information about carbon dioxide, methane and nitrogen is correct?

	carbon dioxide	methane	nitrogen
A	greenhouse gas	generally inert	produce during respiration
B	greenhouse gas	produced during respiration	generally inert
C	produced during respiration	greenhouse gas	generally inert
D	produced during respiration	generally inert	greenhouse gas

38 The diagram shows a flow chart of the manufacture of lime (calcium oxide) from limestone (calcium carbonate).



Which row identifies substance **Y** and a use of calcium carbonate?

	substance Y	use of calcium carbonate
A	calcium hydrogen carbonate	neutralise industrial acidic waste
B	calcium hydrogen carbonate	manufacture of cement
C	calcium hydroxide	neutralise industrial acidic waste
D	calcium hydroxide	manufacture of cement

39 Which row shows the sources of hydrogen and nitrogen for use in the Haber process?

	source of hydrogen	source of nitrogen
A	air	hydrocarbons
B	hydrocarbons	air
C	air	steam
D	steam	hydrocarbons

40 Which substance is used in the manufacture of food preservatives?

A ammonia

B sulfur

C sulfur dioxide

D sulfuric acid

DATA SHEET
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 Sulfur 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

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

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