Name: …… ( ) Class: Sec ……..

St. Gabriel's Secondary School

2024 'N' Preliminary Examination

Subject : Science (Chemistry)
Paper No. : 5105/03
Level/Stream : Sec 4 Normal (Academic)
Duration : 1 hour 15 minutes (for Papers 3 and 4)
Date : 7 August 2024

Additional Material: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write your name, register number and class clearly in the spaces above.
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.

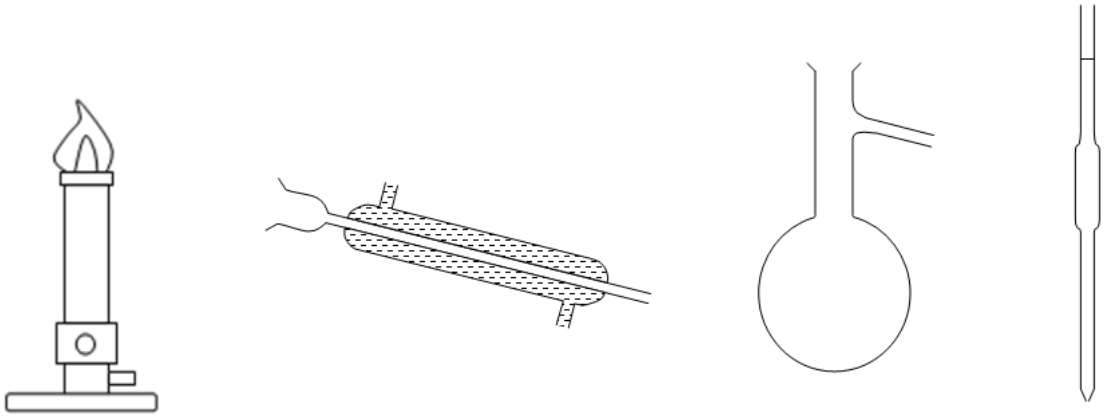
There are **twenty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

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 complete Paper 3.
Any rough working should be done in this question paper.
A copy of the Periodic Table is printed on page **8**.
The use of an approved scientific calculator is expected, where appropriate.

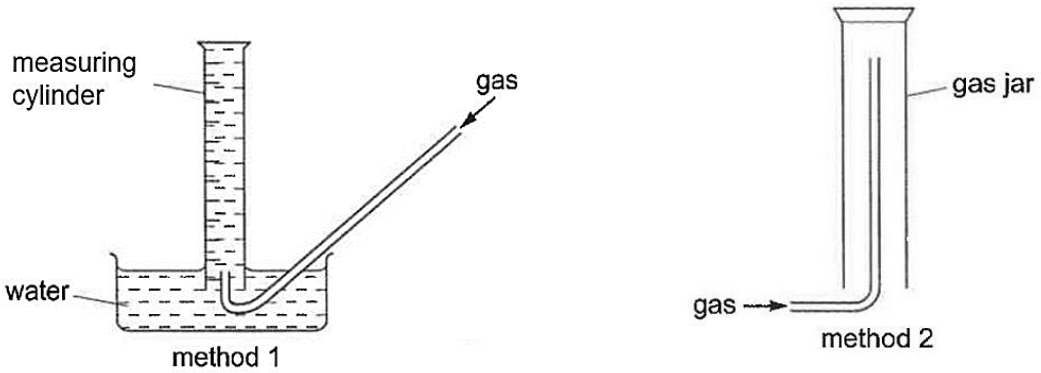
At the end of the examination hand in your answers to Paper 3 and Paper 4 separately.

1 Which apparatus is **not** needed to purify a sample of river water?



A **B** **C** **D**

2 The diagrams below show two methods of collecting gases.



Which row gives the properties of a gas which can be collected by both methods?

	property 1	property 2
A	insoluble in water	denser than air
B	insoluble in water	less dense than air
C	soluble in water	denser than air
D	soluble in water	less dense than air

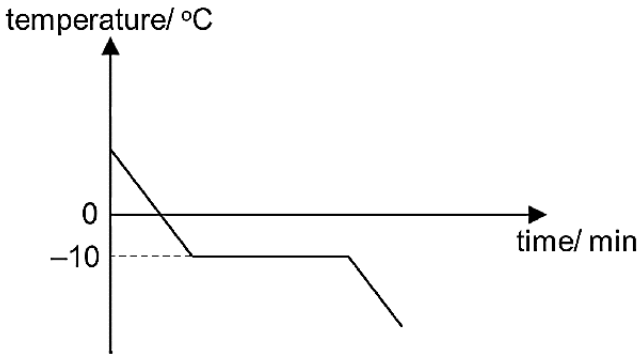
3 The table shows the boiling points of some of the elements present in air.

element	boiling point / °C
argon	-186
helium	-269
neon	-246
nitrogen	-196
oxygen	-183

Which elements are liquid at -200 °C?

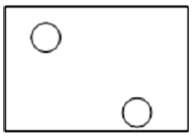
A argon, helium and neon
B argon, nitrogen and oxygen
C helium and neon only
D nitrogen and oxygen only

4 The graph shows a cooling curve of liquid Z.

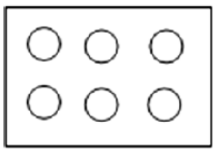


Which diagram correctly shows the arrangement of particles in Z at –5°C?

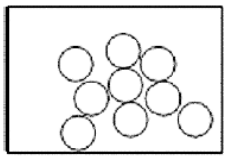
A



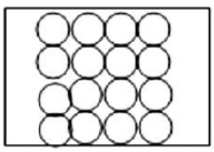
B



C



D



5 A student claims that liquid P is pure bromine.

Which is the best method for him to test the purity of liquid P?

A determine its boiling point
B filter the liquid
C see the colour of the liquid
D test the pH of the liquid

6 ^{85}Z and ^{87}Z are isotopes of an element Z.

How is the ion formed by ^{85}Z different from the ion formed by ^{87}Z?

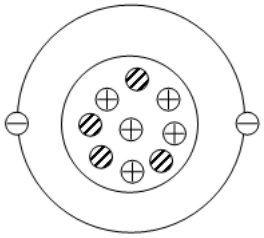
A It has 2 less neutrons and 2 less electrons.
B It has 2 less neutrons and same number of electrons.
C It has 2 less protons and 2 less electrons.
D It has 2 less protons and same number of electrons.

7 A sodium atom is represented as $^{23}_{11}Na$.

How many electrons does one atom of sodium contain?

A 11
B 12
C 23
D 34

8 The diagram shows the arrangement of electrons, neutrons and protons in a particle of substance Q.

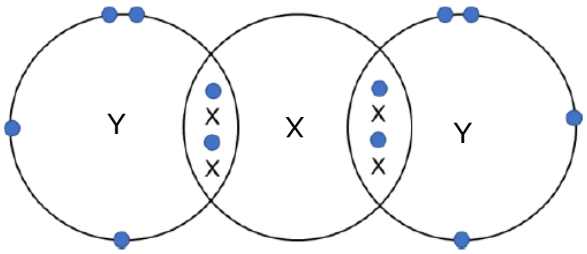


⊖ electron
▨ neutron
⊕ proton

What is the overall charge present in particle Q?

A 3–
B 0
C 3+
D 9+

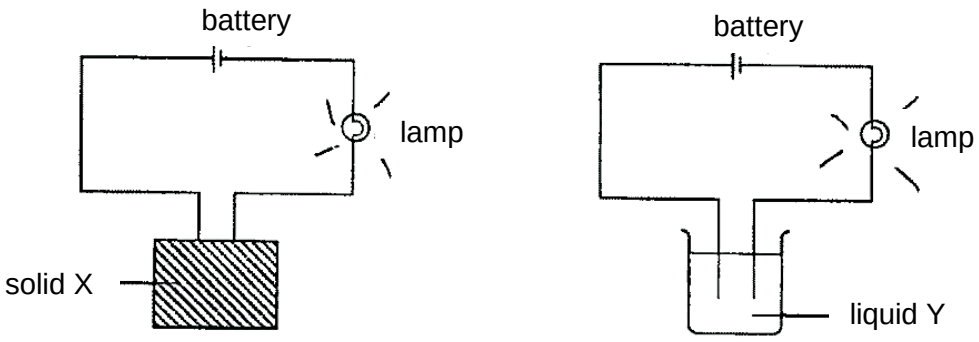
9 The 'dot and cross' diagram shows a molecule formed between atoms X and Y.



Which statement is incorrect?

A Atom X shares two of its valence electrons with each atom Y.
B Atom X forms two covalent bonds with each atom Y.
C The structural formula of the molecule is Y=X=Y.
D This compound has high melting and boiling point.

10 The diagram shows two electrical circuits.



Which could be X and Y?

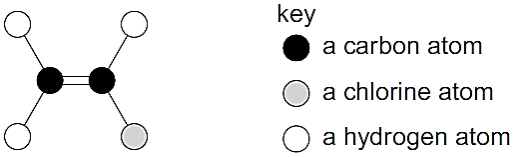
	X	Y
A	aluminium	bromine solution
B	calcium oxide	mercury
C	lead	molten sodium chloride
D	sulfur	water

11 The chemical formulae of copper(I) sulfide and hydrogen phosphate are Cu_2S and H_3PO_4 respectively.

What is the likely chemical formula of copper(I) phosphate?

A $CuPO_4$
B Cu_2PO_4
C Cu_3PO_4
D Cu_4PO

12 The diagram shows a molecule of vinyl chloride.



What is the formula of vinyl chloride?

A C_2H_3Cl
B C_2HCl_3
C CH_3Cl_2
D CH_2Cl_3

13 The properties of an element and its compounds can be predicted from its position in the Periodic Table.

Which property cannot be predicted in this way?

A The acidic or basic nature of the oxide.
B The charge on its ion.
C The formula of its oxide.
D The number of isotopes it has.

14 Which statement about the ions of the Group 17 elements is correct?

A All the ions contain an odd number of electrons.
B All the ions contain more electrons than protons.
C All the ions contain more protons than neutrons.
D All the ions have seven valence electrons.

15 One type of fossil fuels contains carbon, hydrogen, oxygen, sulfur and nitrogen.

Which pollutant from the burning of this fossil fuel will result in damage to buildings made of limestone?

A ammonia
B carbon dioxide
C methane
D sulfur dioxide

16 Gas A produces a white precipitate when bubbled into limewater.

1 It can react with aqueous sodium hydroxide.
2 It can react with hydrochloric acid.
3 It can turn damp blue litmus paper red.

Which statements are true of gas A?

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

17 The two statements are about the fractional distillation of crude oil.

Statement 1: Fractional distillation is used to separate crude oil into useful fractions.

Statement 2: The useful fractions with lower boiling points are found at the top of the fractionating column.

Which best explains the above statements?

A Both statements are correct and statement 2 explains 1.
B Both statements are correct but statement 2 does not explain statement 1.
C Statement 1 is correct but statement 2 is incorrect.
D Statement 1 is incorrect but statement 2 is correct.

18 Which of the following equations does not represent an addition reaction?

A $C_6H_6 + 3H_2 \rightarrow C_6H_{12}$
B $C_2H_4 + Br_2 \rightarrow C_2H_4Br_2$
C $C_2H_6 + Cl_2 \rightarrow C_2H_5Cl + HCl$
D $C_2H_4 + H_2 \rightarrow C_2H_6$

19 Some information about poly(ethene) is given.

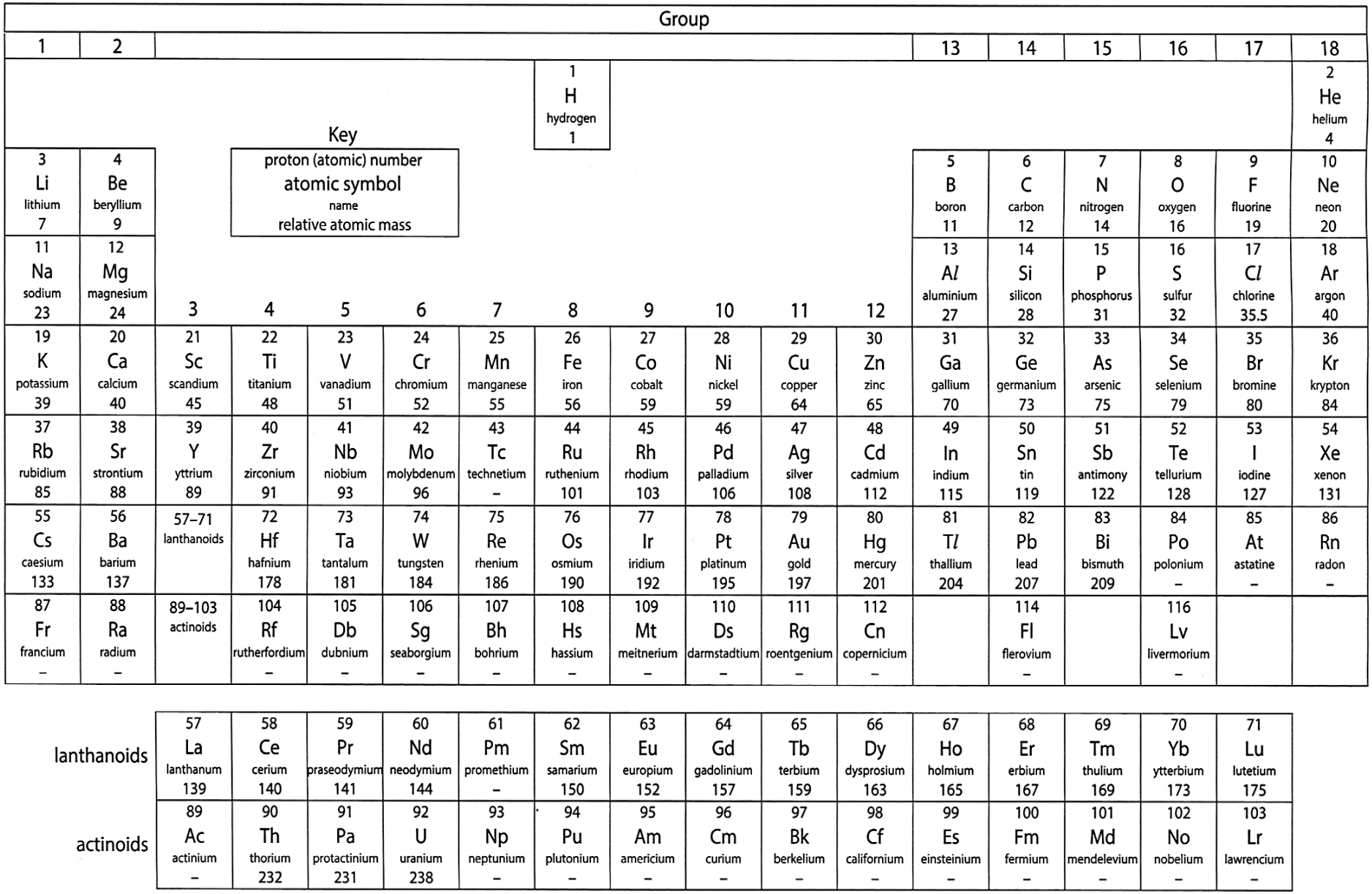
- Poly(ethene) is used to make plastic bags.
- Poly(ethene) plastic bags in landfill sites do not readily decompose.
- Poly(ethene) molecules contain only carbon and hydrogen atoms.

Which statement about poly(ethene) is correct?

A It is biodegradable.
B It is combustible.
C It is unsaturated.
D It reacts with water.

20 Which is the main source of biofuel?

A crude oil
B natural gas
C plastic
D sugar cane


Group
1
2
13
14
15
16
17
18
Key
proton (atomic) number
atomic symbol
name
relative atomic mass
1 H hydrogen 1
2 He helium 4
3 Li lithium 7
4 Be beryllium 9
5 B boron 11
6 C carbon 12
7 N nitrogen 14
8 O oxygen 16
9 F fluorine 19
10 Ne neon 20
11 Na sodium 23
12 Mg magnesium 24
13 Al aluminium 27
14 Si silicon 28
15 P phosphorus 31
16 S sulfur 32
17 Cl chlorine 35.5
18 Ar argon 40
3
4
5
6
7
8
9
10
11
12
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 –
114 Fl flerovium –
116 Lv livermorium –
lanthanoids
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
actinoids
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 –