education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT

GRADE 10

TECHNICAL SCIENCES P2

NOVEMBER 2024

MARKS: 75

TIME: 1½ hours

This question paper consists of 8 pages and 1 data sheet.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of FIVE questions. Answer ALL the questions in the ANSWER BOOK.
2. Start EACH question on a NEW page in the ANSWER BOOK.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Leave ONE line between two sub questions, for example between QUESTION 2.1 and QUESTION 2.2.
5. You may use a non-programmable calculator.
6. You may use appropriate mathematical instruments.
7. You are advised to use the attached DATA SHEET.
8. Show ALL formulae and substitutions in ALL calculations.
9. Round off your final numerical answers to a minimum of TWO decimal places.
10. Give brief motivations, discussions, etc. where required.
11. Write neatly and legibly.

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1 to 1.7) in the ANSWER BOOK, e.g. 1.8 D.

1.1 Which ONE of the following substances is NOT a compound?

A Water

B Graphite

C Sugar

D Steel (2)

1.2 The CORRECT chemical formula for potassium nitrate is …

A K_3N

B PNO_3

C KNO_3

D $P(NO_3)_3$ (2)

1.3 The elements on the Periodic Table are arranged in order of increasing atomic number in horizontal rows, are called …

A columns.

B groups.

C periods.

D structures. (2)

1.4 The number of atoms found in ONE table salt molecule, is:

A 1

B 3

C 5

D 2 (2)

1.5 1 K is equal to …

A 0 ºC

B 273 ºC

C 237 ºC

D -273 ºC (2)

1.6 The more heat is released, the …

A less energy is transferred.

B more energy will be absorbed.

C more energy is transferred.

D none of the above. (2)

1.7 An isolated system is a system that:

A Allows energy exchange.

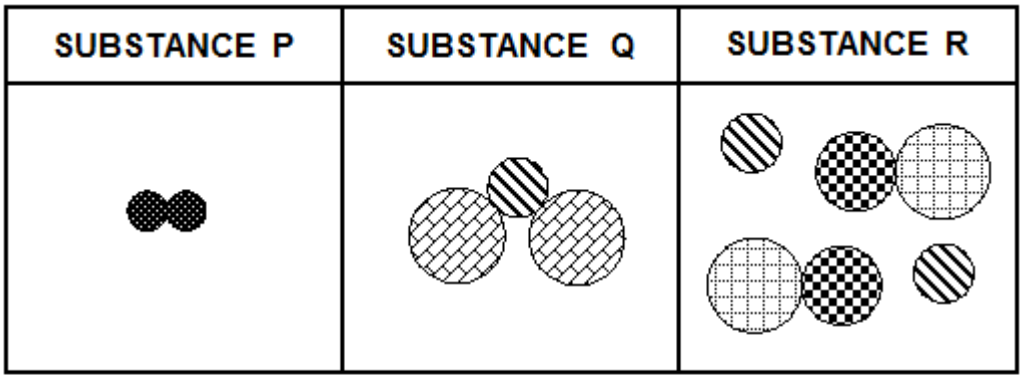
B Allows matter exchange.

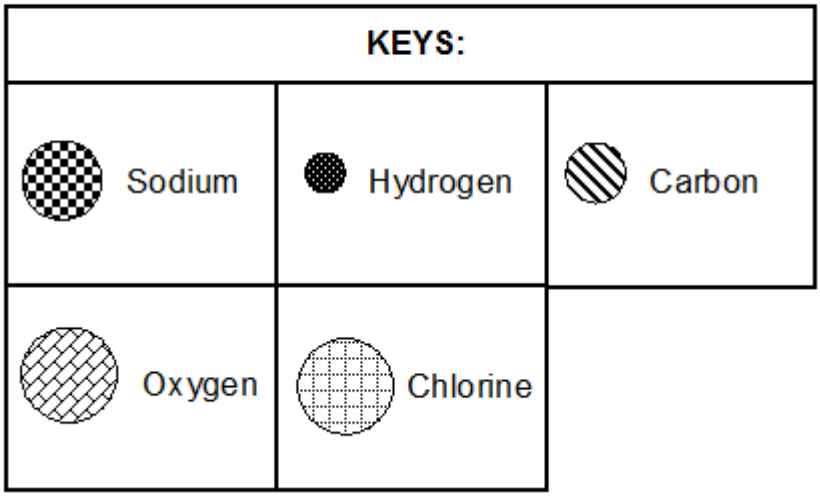
C Does not allow energy nor matter exchange.

D Only allows heat exchange. (2)
[14]

QUESTION 2 (Start on a new page.)

The diagram below shows three different substances, **P**, **Q** and **R.**





2.1 Distinguish between an element and a compound. (4)

Use the diagram and keys above to answer the questions that follow.

2.2 Write the LETTER that represents the following:

2.2.1 Element (2)

2.2.2 Compound (2)

2.2.3 Mixture (2)

2.3 Give the MOLECULAR FORMULA for substance:

2.3.1 **P** (2)

2.3.2 **Q** (2)

2.4 How many protons can be found in ONE molecule of substance **Q**? (2)

[16]

QUESTION 3 (Start on n new page.)

Study the table below of different **UNKNOWN** elements/ions and answer the questions that follow.

Element/ion	Number of protons	Number of neutrons	Number of electrons
X	11	12	11
Y	14	16	14
Z	19	16	18

3.1 Define the term *atomic mass.* (2)

3.2 Write the:

3.2.1 ATOMIC NUMBER of element **X** (2)

3.2.2 RELATIVE ATOMIC MASS of element **Y** (2)

3.3 Use the provided Periodic Table to identify and give the:

3.3.1 CHEMICAL SYMBOL of element **X** (2)

3.3.2 NAME of element **Y** (2)

3.4 Draw the Aufbau diagram for the ION of element **Z** to indicate the number of electrons. (3)
[13]

QUESTION 4 (Start on n new page.)

4.1 Methane (CH_4) reacts with oxygen during an oxidation reaction to form water and carbon dioxide.

4.1.1 Define the term *pure substance*. (2)

4.1.2 Write the balanced chemical equation of the reaction above. (3)

4.1.3 Give the NAME of the element in the compound water that will be found on the Periodic Table in group VI. (2)

4.2 Magnesium and chlorine react with each other to form a new compound.

4.2.1 Give the NAME of the new compound that will form. (2)

4.2.2 Write the NAME of the group to which magnesium belongs. (1)

4.2.3 Give the valency of the chlorine atom. (1)

4.3 A learner is comparing the properties of two elements, **X** and **Z**, to understand the properties of metals and non-metals better. Study the table below and answer the questions that follow.

	Element X	**Element Z**
Conduct electricity	Yes	No
Conduct heat	Yes	No
Magnetic	Yes	No
Brittle	No	Yes

4.3.1 Which ONE of the two elements will most likely be a metal? (1)

4.3.2 Write ONE other property of metals that are not listed in the table above. (1)

4.3.3 Give the possible SYMBOL for element **X**. (1)
[14]

QUESTION 5 (Start on n new page.)

5.1 In thermodynamics, heat and temperature are concepts with various similarities but each with a specific definition.

5.1.1 Distinguish between heat and temperature. (4)

Give the SI-unit for:

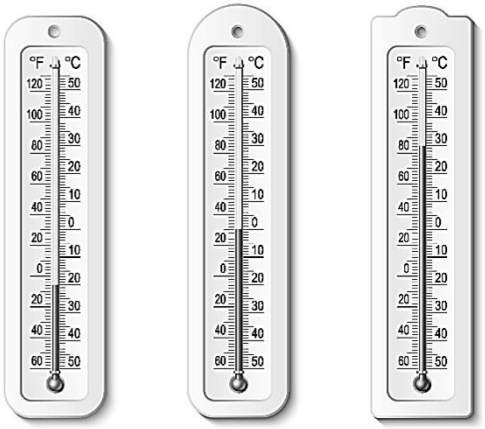
5.1.2 Heat (2)

5.1.3 Temperature (2)

5.2 A thermometer is a device that measures temperature and has two important aspects:

- a temperature sensor in which changes occurs with a change in temperature; and
- a conversion to give the change a numerical value.

Thermometers are commonly used in technology.



Write:

5.2.1 TWO advantages of an alcohol thermometer. (2)

5.2.2 TWO disadvantages of a mercury thermometer. (2)

5.2.3 ONE other thermometer that can be used in technology other than alcohol and mercury thermometers. (1)

5.2.4 TWO uses of thermometers in technology. (2)

5.3 The temperature at which candle wax will melt differs depending on the type of wax you're using. Beeswax melts at 62 °C.

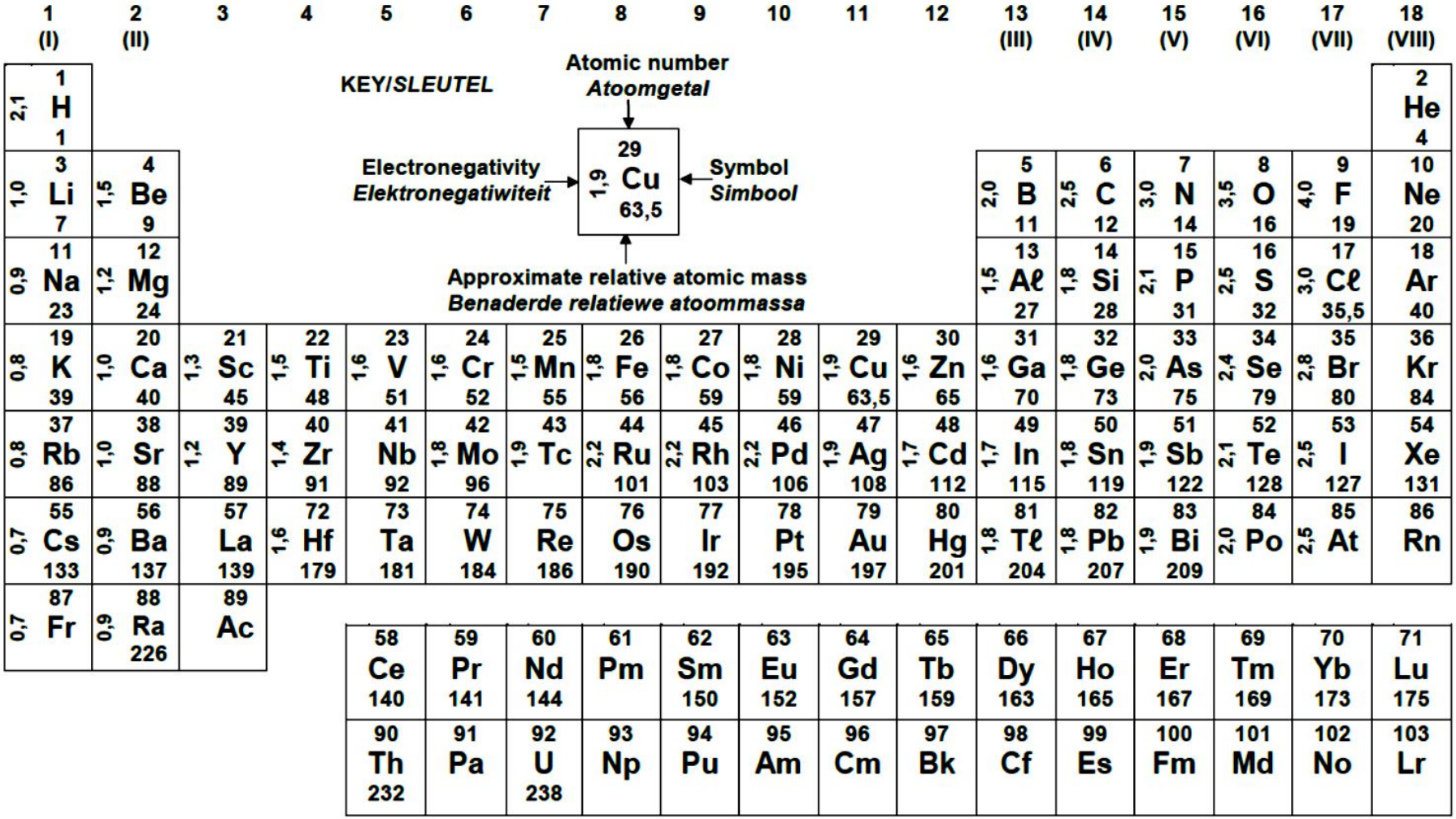
5.3.1 Calculate the melting point of beeswax in Kelvin.

$T = t + 273$ (3)

[18]

TOTAL: 75

TABLE 1: THE PERIODIC TABLE OF ELEMENTS



1 (I)	2 (II)	3	4	5	6	7	8	9	10	11	12	13 (III)	14 (IV)	15 (V)	16 (VI)	17 (VII)	18 (VIII)
2,1 H 1																	2 He 4
1,0 Li 7	1,5 Be 9											2,0 B 11	2,5 C 12	3,0 N 14	3,5 O 16	4,0 F 19	10 Ne 20
0,9 Na 23	1,2 Mg 24											1,5 Aℓ 27	1,8 Si 28	2,1 P 31	2,5 S 32	3,0 Cℓ 35,5	18 Ar 40
0,8 K 39	1,0 Ca 40	1,3 Sc 45	1,5 Ti 48	1,6 V 51	1,6 Cr 52	1,5 Mn 55	1,8 Fe 56	1,8 Co 59	1,8 Ni 59	1,9 Cu 63,5	1,6 Zn 65	1,6 Ga 70	1,8 Ge 73	2,0 As 75	2,4 Se 79	2,8 Br 80	36 Kr 84
0,8 Rb 86	1,0 Sr 88	1,2 Y 89	1,4 Zr 91	Nb 92	1,8 Mo 96	1,9 Tc	2,2 Ru 101	2,2 Rh 103	2,2 Pd 106	1,9 Ag 108	1,7 Cd 112	1,7 In 115	1,8 Sn 119	1,9 Sb 122	2,1 Te 128	2,5 I 127	54 Xe 131
0,7 Cs 133	0,9 Ba 137	La 139	1,6 Hf 179	Ta 181	W 184	Re 186	Os 190	Ir 192	Pt 195	Au 197	Hg 201	1,8 Tℓ 204	1,8 Pb 207	1,9 Bi 209	2,0 Po	2,5 At	86 Rn
0,7 Fr	0,9 Ra 226	Ac															

58 Ce 140	59 Pr 141	60 Nd 144	61 Pm	62 Sm 150	63 Eu 152	64 Gd 157	65 Tb 159	66 Dy 163	67 Ho 165	68 Er 167	69 Tm 169	70 Yb 173	71 Lu 175
90 Th 232	91 Pa	92 U 238	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr