LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

# NATIONAL SENIOR CERTIFICATE

## GRADE 10

## PHYSICAL SCIENCES: CHEMISTRY (P2)

JUNE 2026

Stanmorephysics.com

**MARKS: 100**

**DURATION: 2 HOURS**

**This question paper consists of 12 pages including cover page and 2 data sheets**

Copyright reserved

**INSTRUCTIONS AND INFORMATION**

1. Write your name on the answer book provided.
2. This question paper consists of 7 questions. Answer ALL the questions in the ANSWER BOOK.
3. Show ALL formulae and substitutions in ALL calculations.
4. Round off your FINAL numerical answers to MINIMUM of TWO decimal places.
5. Give brief motivations, discussions, et cetera where required.
6. You may use a non-programmable calculator.
7. You may use appropriate mathematical instruments.
8. YOU ARE ADVISED TO USE THE ATTACHED DATA SHEETS.
9. Number the answers correctly according to the numbering system used in this question paper.
10. Write neatly and legibly.

Stanmorephysics.com

**QUESTION 1**

Four possible options are provided as answers to the following questions. Each question has only ONE correct answer. Choose the correct answer and write ONLY a letter next to the appropriate question number (1.1 − 1.8) on the ANSWER SHEET. E.g. 1.9 D

1.1 Which one of the following is NOT a physical property of material?

A. Ductile

B. Density

C. Brittle

D. Kelvin (2)




1.2 Mixture of metals are:

A. Ampholytes

B. Anions

C. Anode

D. Alloys (2)

1.3 Brownian motion refers to …

A. The movement of atoms or molecules from an area of higher concentration to an area of lower concentration.

B. The random movement of microscopic particles suspended in a liquid or gas, caused by collisions between these particles and the molecules of the liquid or gas. stanmorephysics.com

C. The movement of atoms or molecules from an area of lower concentration to an area of higher concentration.

D. The random movement of microscopic particles in any direction suspended in a solid, caused by collisions between these particles and the molecules. (2)

Copyright reserved 

1.4 Theory that describes a solid, a liquid, and a gas in terms of particles of matter, consisting of small particles that are in constant motion with forces of attraction between the particles that collide and exert pressure, is well known to be…

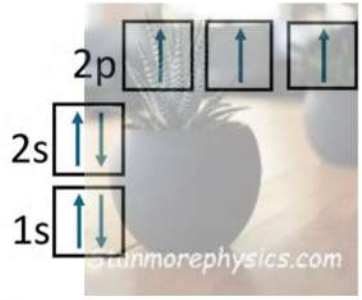
A. Lowry-Bronsted theory

B. Lewis's theory

C. Kinetic theory

D. Kinetic molecular theory (2)

1.5 The Aufbau diagram of element **X** is written as




Element **X** is likely to be

A. Oxygen

B. Sodium

C. Nickel

D. Nitrogen (2)

1.6 The correct chemical formula for magnesium carbonate is

A. $MgCO_3$

B. $MgCO_2$

C. $MgCO_4$

D. $Mg(CO_3)_2$ (2)

Stanmorephysics.com

1.7 Which one of the following, is a metal and good thermal conductor but poor electrical conductor?

A. Copper

B. Hydrogen

C. Aluminium

D. Tin (2)

1.8 A substance that undergoes a _____ change, as a change in which no new substances are formed, mass number of atoms and molecules are conserved.

A. chemical

B. physical

C. decomposition

D. synthesis (2)




**[16]**

**QUESTION 2 (Start on a new page)**

2.1 Define the term *malleable*. (2)

2.2 A learner mixes sand and salt together.

Describe how the learner can separate the two substances (write them in bullet form and the steps in the correct order). (3)

2.3 Two samples are given to a scientist:

**Sample A**: melts at exactly 0°C

**Sample B**: melts between 0°C and 5°C

2.3.1 Which sample is most likely a pure substance? (1)

2.3.2 Explain your answer in 2.3.1 (2)

2.3.3 Explain why mixtures melts over a range of temperatures? (2)

2.4 A company wants to choose a material for making electrical wires. They can choose from the following

| Glass | Copper | Aluminium | Plastic |
|---|---|---|---|

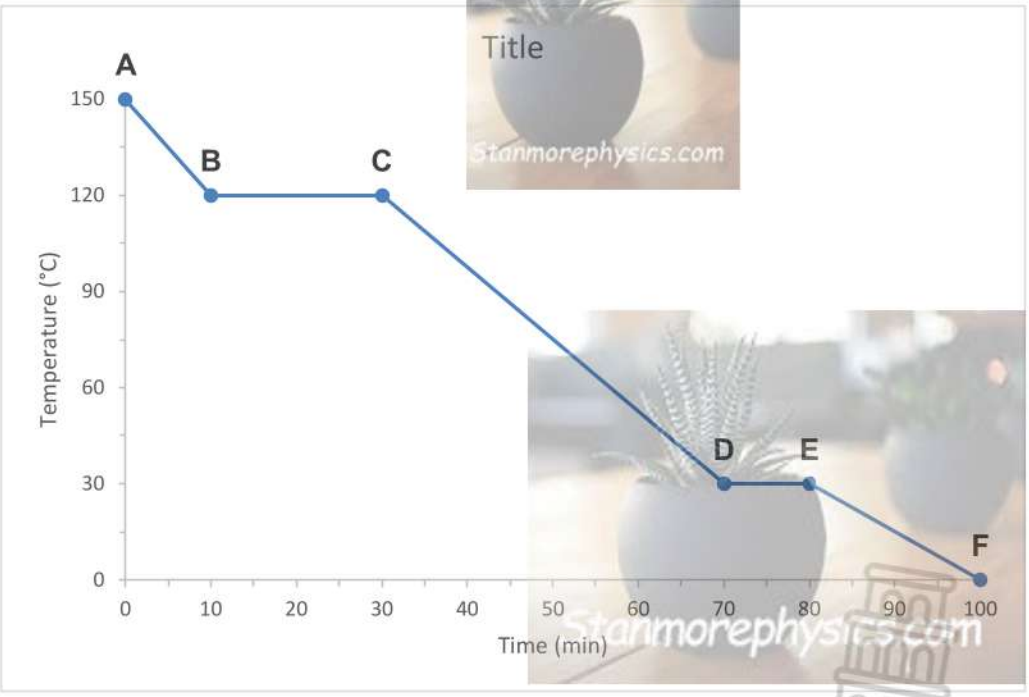
2.4.1 Which material will be the best choice? (1)

2.4.2 Give two reasons based on physical properties (2)

**[13]**

**QUESTION 3 (Start on a new page)**

The graph of phase changes of an unknown pure substance is represented below.




3.1 Write the correct suitable TITLE of the graph represented above? (1)

3.2 Define the term *melting point. stanmorephysics.com* (2)

3.3 Write the phase of this pure substance at 45°C (1)

3.4 At which pair of points (e.g. write **A-B** or **C-D** etc) are the following statement applicable?

3.4.1 The forces between the particles are strongest of them all. (1)

3.4.2 The spaces between the particles are largest of them all. (1)

3.4.3 The spaces between the particles remain constant. (1)

3.4.4 The particles are likely to vibrate at fixed position. (1)

South Africans experience winter in May - July, resulting in most fuel stations having a high demand of air pressure refilling on car tyres during this season.

3.5 Explain, using **kinetic molecular theory,** why cars experience flat tyres in winter. (4)

3.6 When someone sprays perfume in one corner of a room, the scent (smell) spreads throughout the entire room, allowing you to smell it far away.

3.6.1 Is this effect due to Diffusion or Brownian motion? (1)

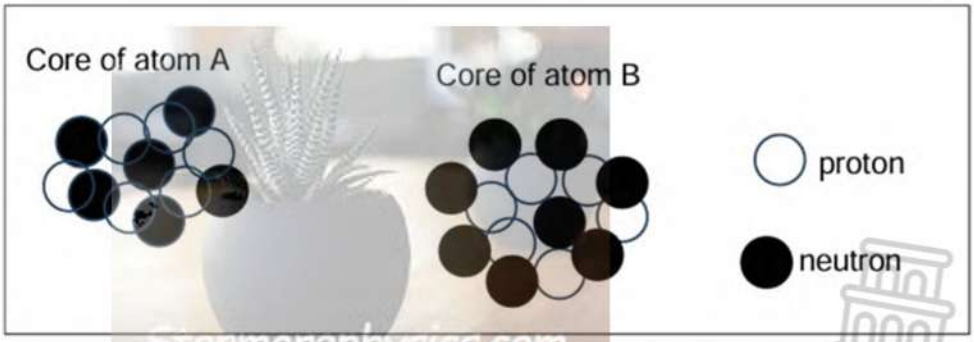
3.6.2 Explain your answer in 3.6.1 (2)

**[15]**

Stanmorephysics.com

**QUESTION 4 (Start on a new page)**

The diagrams below show two neutral **atoms A and B**.




Stanmorephysics.com

4.1 Define the term *atomic number*. (2)

4.2 For **atom B** write down:

4.2.1 the atomic number (1)

4.2.2 the particles that contribute to the volume of an atom. (1)

4.2.3 the number of electrons (1)

4.2.4 the element as Metal, Metalloid or Non-Metal? (1)

4.2.5 the ${}^{A}_{Z}E$ notation (2)

4.3 For **atom A** write the following:

4.3.1 the sp-notation (2)

4.3.2 the Aufbau diagram (3)

4.4 Element X is found naturally in three forms, namely:

| | 32% | 20% | 48% |
|---|---|---|---|
| ISOTOPES | $^{29}$**X** | $^{30}$**X** | $^{31}$**X** |

4.4.1 Define the term *isotope*. (2)

4.4.2 Determine the relative atomic mass of element **X** (3)

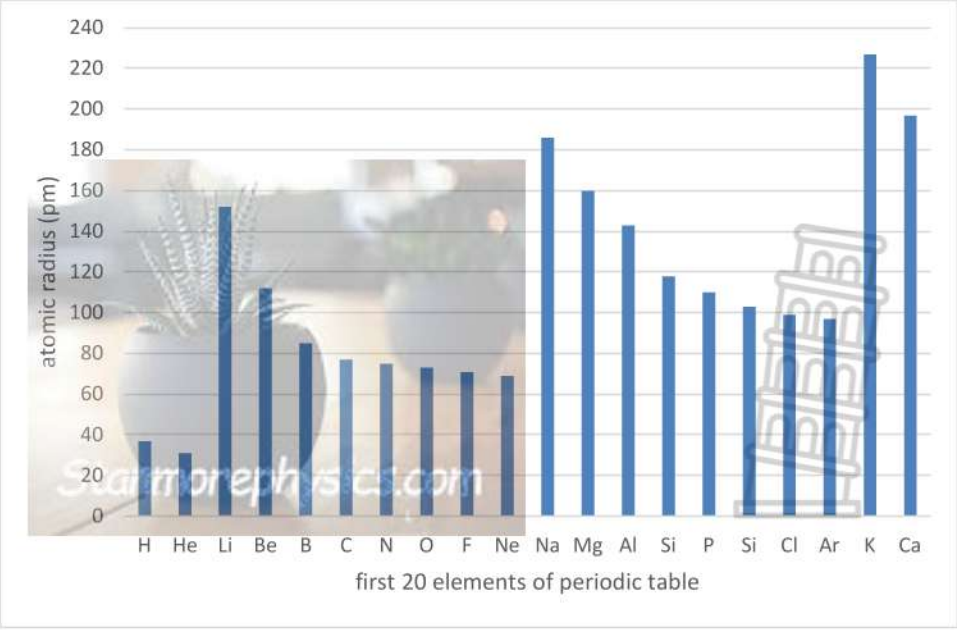
4.4.3 Write down the name of element **X**. (2)

**[20]**

Stanmorephysics.com

**QUESTION 5 (Start on a new page)**

The graph below shows atomic radius of the first 20 elements on periodic table




5.1 Define *atomic radius.* (2)

5.2 Use the graph above to predict the atom radius of chlorine (1)

5.3 Explain why there is difference in atomic radius between Lithium (Li) and Fluorine (F). stanmorephysics.com (3)

5.4 Explain why there is difference in atomic radius between Sodium (Na) and Potassium (K). (3)

**[9]**

**QUESTION 6 (Start on a new page)**

6.1 NaCl has high thermal conductivity and can easily lower the freezing point of water, which prevents ice from forming.

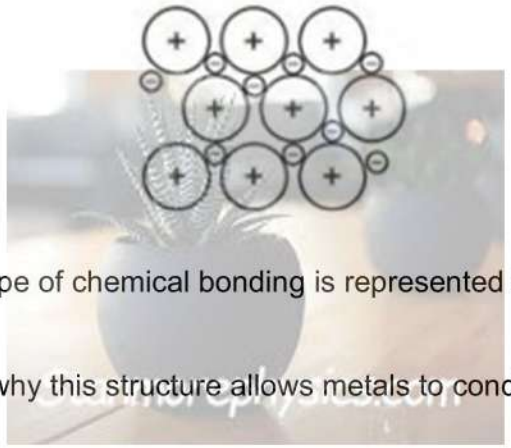
6.1.1 Give the chemical name of NaCl. (2)

6.1.2 Is the bond between Sodium and Chlorine covalent, ionic or metallic? (1)

6.1.3 Explain your answer in 6.1.2 (2)

6.1.4 Draw Lewis dot diagrams to show the formation of NaCl. (3)

6.2 Study the diagram below.



6.2.1 Which type of chemical bonding is represented by the diagram above. (1)

6.2.2 Explain why this structure allows metals to conduct electricity. (2)

**[11]**

**QUESTION 7 (Start on a new page)**

In the reaction below, $Na_2CO_3$ reacts with nitric acid solution according to the following UNBALANCED chemical equation:

$$Na_2CO_3(s) + HNO_3(aq) \rightarrow NaNO_3(s) + CO_2(g) + \mathbf{X}$$

7.1 Is the above reaction a CHEMICAL or PHYSICAL change? Explain (3)

7.2 Use the law of conservation of mass to calculate the mass of **X** in the above reaction. (5)

7.3 Write down the chemical formula for **X**. (1)

7.4 Write the balanced equation for the above equation showing ALL the molecular formulae. (2)

7.5 Write the NAME or FORMULA of the substance that causes effervescence in the above reaction. (1)

7.6 Suppose that 2000 $cm^3$ of $CO_2$ formed on the above reaction was subjected under STP:

Calculate number of moles of $CO_2$ formed. (4)

**[16]**

**TOTAL: 100 MARKS**

**TABLE 1: PHYSICAL CONSTANTS/*TABEL 1: FISIESE KONSTANTES***

| **NAME/*NAAM*** | **SYMBOL/*SIMBOOL*** | **VALUE/*WAARDE*** |
|---|---|---|
| Standard pressure<br>*Standaarddruk* | $p^{\theta}$ | $1{,}013 \times 10^{5}$ Pa |
| Molar gas volume at STP<br>*Molêre gasvolume by STD* | $V_m$ | 22,4 $dm^3 \cdot mol^{-1}$ |
| Standard temperature<br>*Standaardtemperatuur* | $T^{\theta}$ | 273 K |
| Charge on electron<br>*Lading op elektron* | e | $-1{,}6 \times 10^{-19}$ C |
| Avogadro's constant<br>*Avogadro-konstante* | $N_A$ | $6{,}02 \times 10^{23}$ $mol^{-1}$ |

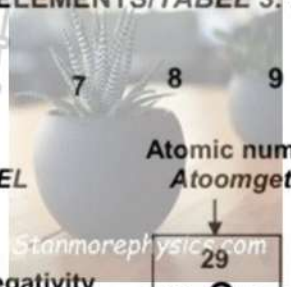
**TABLE 2: FORMULAE/*TABEL 2: FORMULES***

| | |
|---|---|
| $n = \frac{m}{M}$ | $n = \frac{N}{N_A}$ |
| $c = \frac{n}{V}$ OR $c = \frac{m}{MV}$ | $n = \frac{V}{V_m}$ |

Stanmorephysics.com

Copyright reserve

## TABLE 3: THE PERIODIC TABLE OF ELEMENTS/*TABEL 3: DIE PERIODIEKE TABEL VAN ELEMENTE*




| 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1<br>2,1 H 1 | | | | | | | | | | | | | | | | | 2<br>He 4 |
| 3<br>1,0 Li 7 | 4<br>1,5 Be 9 | | | | | | | | | | | 5<br>2,0 B 11 | 6<br>2,5 C 12 | 7<br>3,0 N 14 | 8<br>3,5 O 16 | 9<br>4,0 F 19 | 10<br>Ne 20 |
| 11<br>0,9 Na 23 | 12<br>1,2 Mg 24 | | | | | | | | | | | 13<br>1,5 Aℓ 27 | 14<br>1,8 Si 28 | 15<br>2,1 P 31 | 16<br>2,5 S 32 | 17<br>3,0 Cℓ 35,5 | 18<br>Ar 40 |
| 19<br>0,8 K 39 | 20<br>1,0 Ca 40 | 21<br>1,3 Sc 45 | 22<br>1,5 Ti 48 | 23<br>1,6 V 51 | 24<br>1,6 Cr 52 | 25<br>1,5 Mn 55 | 26<br>1,8 Fe 56 | 27<br>1,8 Co 59 | 28<br>1,8 Ni 59 | 29<br>1,9 Cu 63,5 | 30<br>1,6 Zn 65 | 31<br>1,6 Ga 70 | 32<br>1,8 Ge 73 | 33<br>2,0 As 75 | 34<br>2,4 Se 79 | 35<br>2,8 Br 80 | 36<br>Kr 84 |
| 37<br>0,8 Rb 86 | 38<br>1,0 Sr 88 | 39<br>1,2 Y 89 | 40<br>1,4 Zr 91 | 41<br>Nb 92 | 42<br>1,8 Mo 96 | 43<br>1,9 Tc | 44<br>2,2 Ru 101 | 45<br>2,2 Rh 103 | 46<br>2,2 Pd 106 | 47<br>1,9 Ag 108 | 48<br>1,7 Cd 112 | 49<br>1,7 In 115 | 50<br>1,8 Sn 119 | 51<br>1,9 Sb 122 | 52<br>2,1 Te 128 | 53<br>2,5 I 127 | 54<br>Xe 131 |
| 55<br>0,7 Cs 133 | 56<br>0,9 Ba 137 | 57<br>La 139 | 72<br>1,6 Hf 179 | 73<br>Ta 181 | 74<br>W 184 | 75<br>Re 186 | 76<br>Os 190 | 77<br>Ir 192 | 78<br>Pt 195 | 79<br>Au 197 | 80<br>Hg 201 | 81<br>1,8 Tℓ 204 | 82<br>1,8 Pb 207 | 83<br>1,9 Bi 209 | 84<br>2,0 Po | 85<br>2,5 At | 86<br>Rn |
| 87<br>0,7 Fr | 88<br>0,9 Ra 226 | 89<br>Ac | | | | | | | | | | | | | | | |

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