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DEPARTMENT OF

## **EDUCATION**

#### SEKHUKHUNE SOUTH DISTRICT

NATIONAL SENIOR CERTIFICATE

**GRADE 11** 



MARKS: 50

TIME : 1 HOUR(S)

This question paper consists of 5 pages and 1 data sheet

# PHYSICAL/SIDERED FROM StanmorephysisiosHumansDuth/June Examination P2 NSC

#### INSTRUCTIONS AND INFORMATION

- 1. Write your name on the top of your ANSWER PAGE.
- 2. Answer ALL the questions on your ANSWER BOOK.
- 3. You may use a non-programmable calculator.
- 4. You may use appropriate mathematical instruments.
- Number the answers correctly according to the numbering system used in this QUESTION PAPER.
- 6. YOU ARE ADVISED TO USE THE ATTACHED DATA SHEETS.
- 7. Give brief motivations, discussions, et cetera where required.
- 8. Round off your final numerical answers to a minimum of TWO decimal places.

## PHYSIONISTIAN Stanmorephysioshumus DUTH/JUNE EXAMINATION P2

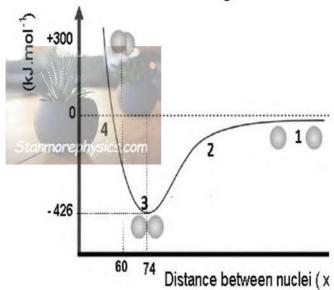
#### QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Various options are provided as possible answers to the following questions. Each question has only ONE correct answer. Choose the answer and write only the letter (A–D) next to the question numbers (1.1 to 1.5) in the ANSWER BOOK, e.g. 1.6 E.

1.1 The number of valence electrons in a silicon atom is ...

A. 4 B. 6 C. 14 D. 28

1.2 The graph below shows how the potential energy of two hydrogen atoms change as the distance between them changes.



From the graph, what is the value of the bond energy for hydrogen?

**A.** +300 kJ.mol<sup>-1</sup> **B.** -426 kJ.mol<sup>-1</sup>

**C.** 0 kJ.mol<sup>-1</sup>

**D.**  $-126 \text{ kJ.mol}^{-1}$  (2)

1.3 Which of the following diatomic elements will have the smallest bond length?

A. Cl<sub>2</sub>.

**B.** O<sub>2</sub>.

C. Na<sub>2</sub>.

**D.**  $H_2$ . (2)

# 

1.4	Which ONE of the following statements about the effect of intermolecular forces and some physical properties is INCORRECT?			
	A. B. C. D.	The weaker the intermolecular forces, the faster the rate of evaporation The weaker the intermolecular forces, the lower the boiling point. The stronger the intermolecular forces, the lower the melting point. The stronger the intermolecular forces, the greater the viscosity.	(2)	
1.5	The boiling point of CH <sub>4</sub> is much lower than that of HF. Which ONE of the following best explains this difference in boiling points?			
	A. B. C. D.	There are hydrogen bonds between HF molecules. CH <sub>4</sub> molecules are more polar than HF molecules. There are dipole-dipole forces between CH <sub>4</sub> molecules. HF molecules are more polar than CH <sub>4</sub> molecules	(2)	
			[10]	
QUESTION 2 (Start on a NEW page)				
2.1	Metha compo	the $CH_4(g)$ and water $H_2O(\ell)$ are both examples of covalent bunds.		
	2.1.1	Define the term covalent bond.	(2)	
	2.1.2	Draw Lewis structures for the following molecules (a) $CH_4$ (b) $H_2O$	(2) (2)	
	2.1.3	Write down the: (a) Number of bonding pairs in CH <sub>4</sub> (b) Number of lone pairs on the oxygen atom in H <sub>2</sub> O	(1) (1)	
2.2	The ELEC	polarity of molecules depends on the DIFFERENCE IN TRONEGATIVITY and the MOLECULAR SHAPE.		
	2.2.1	Define the term <i>electronegativity</i> .	(2)	
	2.2.2	Calculate the difference in electronegativity between:  (a) C and O in CO <sub>2</sub> (b) H and O in H <sub>2</sub> O	(1) (1)	
	2.2.3	Explain the difference in polarity between $CO_2$ and $H_2O$ by referring to the polarity of the bonds and the shape of the molecules.	(6)	
			[18]	

## PHYSICALISATION StanmorephysisiosHumusDUTH/JUNE EXAMINATION P2 NSC

#### QUESTION 3 (Start on a NEW page)

3.1 Ammonia (NH<sub>3</sub>) forms a dative covalent bond with the hydrogen ion (H<sup>+</sup>).

3.1.3 By means of a Lewis diagram, show the formation of 
$$NH_4^+$$
. (3)

3.2 The valence shell electron repulsion theory (VSEPR) is used to predict geometrical shape of molecules. Write down the shape of the following molecules.

$$3.2.2 \text{ NH}_3$$
 (1)

$$3.2.3 \text{ CF}_4$$
 (1)

[10]

#### QUESTION 4 (Start on a NEW page)

Consider the following reaction of the formation of water.

$$H_2 + O_2 \rightarrow H_2O$$

The boiling points of the substances in the reaction are as follows:

SUBSTANCE	BOILING POINT (°C)	
H <sub>2</sub>	-252,9	
O <sub>2</sub>	-183	
H <sub>2</sub> O	100	

4.1 Define the term *boiling point*. (2)

4.2 Refer to the intermolecular forces and explain the difference in boiling point between H<sub>2</sub>O and O<sub>2</sub>. (4)

4.3 Which substance in the table will have the highest vapour pressure? (1)

4.4 Explain your answer in QUESTION 4.3 above. Refer to the type and relative strength of the intermolecular forces. (4)

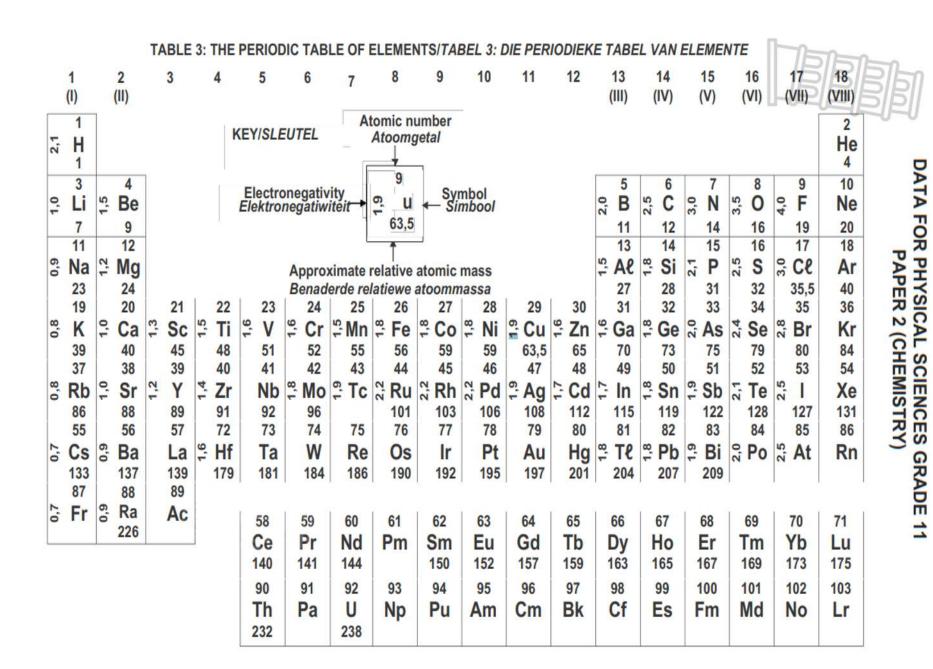
4.5 Write down the FORMULA of the substance in the table that will have the highest melting point. (1)

[12]

TOTAL MARKS: 50

FOR PHYSICAL

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## EDUCATION

SEKHUKHUNE SOUTH DISTRICT

NATIONAL
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**GRADE 11** 

PHYSICAL SCIENCES P2

PRE JUNE EXAMINATION MARKING GUIDELINE

2024

MARKS: 50

THIS MARKING GUIDELINE CONSISTS OF 5 PAGES

# Explanation Stanmorephysics. Coekhukhune South/June Examination CAPS-Grade 11 – Marking guideline

QUESTION 1 MULTIPLE-CHOICE

1.1 A ✓✓ (2)

1.2 B √√ (2)

1.3 D \( \sqrt{} \) (2)

1.4  $C \checkmark \checkmark$  (2)

1.5 A \/ \/ (2)

[10]

#### **QUESTION 2**

2.1

2.1.1 The sharing of electrons  $\checkmark$  between (two) atoms (to form a molecule).  $\checkmark$  (2)

2.1.2

(a)  $\mathbf{H} : \ddot{\mathbf{C}} : \mathbf{H}^{\checkmark \checkmark}$   $\ddot{\mathbf{H}}$  (2)



2.1.3

(a) 4 \( \sqrt{} \)

(b) 2 √ (1)

# Experimental Stanmorephysics. Coethukhune South/June Examination CAPS-Grade 11 – Marking guideline

2.2.1 The tendency of an atom in a molecule. ✓ to attract bonding electrons closer to itself. ✓(2)

2.2.2

(b) 
$$\Delta$$
EN (between H and O) =1,4  $\checkmark$  (1)

[18]

#### **QUESTION 3**

3.1

- 3.1.1 Dative covalent bond is a bond that occurs when both the electrons in the shared pair come from a lone pair of electrons. √√(2)
- One atom must have an empty valence shell.  $\checkmark$ 
  - The other atom must have a lone pair of electrons. √ (2)

3.1.3

3.2

### Description Stanmorephysics. Coekhukhune South/June Examination CAPS-Grade 11 - Marking guideline 3.2.2 Trigonal pyramidal ✓ (1) (1)3.2.3 Tetrahedral ✓ [10] **QUESTION 4** 4.1 Boiling point is the temperature at which the vapour pressure of a substance equals atmospheric pressure. $\checkmark\checkmark$ (2)4.2 H<sub>2</sub>O has hydrogen bonds between their molecules. ✓ O₂ has induced-dipole/London forces between their molecules. ✓ H<sub>2</sub>O has stronger intermolecular forces than O<sub>2</sub>. √ More energy is required to overcome/separate stronger forces of H<sub>2</sub>O than that of O<sub>2</sub>. ✓ OR O₂ has weaker intermolecular forces than H₂O. ✓ Less energy is required to overcome weaker forces in O₂. √ (4)(1)4.3 H<sub>2</sub> √ 4.4 (4) Both H<sub>2</sub> and O<sub>2</sub> has weaker London forces than stronger hydrogen bonds in H<sub>2</sub>O. ✓ • H<sub>2</sub> is a smaller molecule/has a lesser molecular mass/has a smaller surface area than O₂. ✓ The smaller the molecule, the weaker the intermolecular force. ✓ Therefore, less energy is required to overcome the intermolecular

TOTAL MARK: 50

(1)

[12]

4.5

H<sub>2</sub>O √

forces in H₂ than O₂. ✓