



Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

JUNE EXAMINATIONS

PHYSICAL SCIENCES P 2

MEMORANDUM

MARKS: 120

TIME: 2 ½ HOURS

Question 1

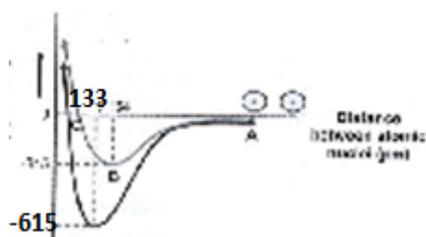
- 1.1 D ✓✓ (2)
- 1.2 A ✓✓ (2)
- 1.3 C ✓✓ (2)
- 1.4 D ✓✓ (2)
- 1.5 B ✓✓ (2)
- 1.6 C ✓✓ (2)
- 1.7 B ✓✓ (2)
- 1.8 B ✓✓ (2)
- 1.9 C ✓✓ (2)
- 1.10 A ✓✓ (2)

[20]**Question 2**

- 2.1 Bond length is the average distance between nuclear of atoms bonded covalently with each other ✓✓ (2)
- 2.1.2 Bond energy is the amount of energy absorbed to break a specific bond in 1 mole of covalently bonded gas molecules ✓✓ (1)
- 2.2.1 At point A where the atoms are very far apart the potential energy is zero, between A and B, as the atoms move closer together✓, the potential energy of the system of atoms decreases to $-345 \text{ kJ}\cdot\text{mol}^{-1}$ ✓. (2)
- 2.2.2 As the atoms move closer together, the forces of attraction between the oppositely charged atom nucleus of one atom and electron cloud of another dominate forces of repulsion between atoms✓, producing net attraction. The potential energy decreases to a more stable state. ✓ (2)
- 2.2.3 At B the potential energy is the lowest, most stable energy state is reached✓. (2)
- 2.2.4 Bond length = 154 pm ✓ and bond order = 1✓ (2)

2.2.5 Bond energy = 345 kJ.mol^{-1} ✓ (1)

2.2.6 From point B to C the atoms are forced even closer together ✓. The forces of repulsion between the two positively charged atomic nuclei and between negatively charged electron clouds of atoms increases sharply so that potential energy increases ✓ (2)



2.2.7

✓ ✓

(2)

[16]

Question 3

3.1.1 Gases absorb and re-emit infrared radiation ✓✓ (2)

3.2 At these high pressures the volume is smaller because the molecules are close together ✓ and intermolecular forces are greater ✓.

(2)

3.3 $\Delta EN = 3,5 - 2,5 = 1,0$ ✓, non-polar because of linear shape ✓ (3)

3.4 A carbon dioxide molecule contains unequal distribution of charge during vibrations resulting in dipole moment ✓. While nitrogen contains equal distribution with no dipole moments ✓.

(2)

3.5 use any one:

Plant more trees, use less electricity therefore no more coal burnt, use bicycles no cars to travel ✓. (1)

3.6

	Compound	Lewis diagram	Molecular shape	Dipole/ Non polar
3.6.1	HBr	$\text{H} \cdot \cdot \cdot \text{Br} \cdot \cdot \cdot$ ✓	linear ✓	Dipole ✓
3.6.2	BCl_3	$\begin{array}{c} \cdot \cdot \cdot \text{Cl} \cdot \cdot \cdot \\ \\ \text{B} \cdot \cdot \cdot \text{Cl} \cdot \cdot \cdot \\ \\ \cdot \cdot \cdot \text{Cl} \cdot \cdot \cdot \end{array}$ ✓	Trigonal planar ✓	Dipole ✓
3.6.3	H_2S	$\begin{array}{c} \cdot \cdot \cdot \text{S} \cdot \cdot \cdot \\ \quad \\ \text{H} \quad \text{H} \end{array}$ ✓	angular ✓	Dipole ✓

(9)

[19]

Question 4

4.1

Solvent	Molecular shape	Polar or non polar molecules	Intermolecular forces between molecules
H ₂ O	Angular ✓	Polar ✓	Hydrogen bond ✓
CCl ₄	tetrahedral ✓	Non polar ✓	Dipole induced or London forces ✓

(6)

4.2.1 Na₂S is more soluble in H₂O ✓ because it is ionic ,polar dissolves polar ✓ (2)4.2.2 CS₂ is more soluble in more soluble in CCl₄ ✓ , CS₂ is non polar ✓ (2)4.2.3 HCl is more soluble in H₂O ✓ because it is polar ✓ (2)4.2.4 Br₂ is more soluble in CCl₄ ✓ because it is non polar ✓ (2)

4.3 It will dissolve fats and natural oils in and on skin ✓ , therefore the skin will be left dry and damaged ✓ (non polar dissolves non polar) (2)

4.4.1 Boiling point is the temperature in which atmospheric pressure ✓

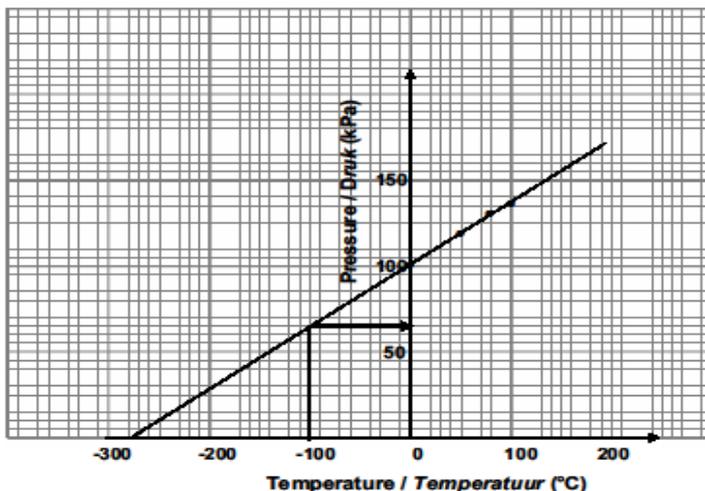
equals vapor pressure ✓ (2)

4.4.2 the Vaseline has low boiling ✓ point which causes temperature to rise when exposed to sun causing more damage to skin ✓ (2)

[20]

Question 5

5.1.1 Graph of pressure vs temperature / Grafiek van druk vs temperatuur



Criteria for the graph: <i>Kriteria vir die grafiek:</i>	1	0
Suitable heading. <i>Geskikte opskrif.</i>		
Axes correctly labelled with units. <i>Asse korrek benoem met eenhede.</i>		
Correct scale on both axes <i>Korrekte skaal op beide asse</i>		
Points correctly plotted. <i>Punte korrek geplot.</i>		
Straight line graph drawn through points. <i>Reguitlyngrafiek getrek deur punte.</i>		
Total out of 5 / <i>Totaal uit 5</i>		

(5)

5.1.2 Approximately - 273 °C ✓✓ (2)

5.1.3 The pressure for a fixed mass of gas is directly proportional to temperature in Kelvin. ✓✓ (2)

5.1.4 64 kPa (+/- 5 kPa) ✓✓ (2)

5.1.5 Increases ✓✓ (2)

[13]

Question 6

6.1 The limiting reagent is the reactant that is used up first ✓

, determining when the reaction stops, and how much product is produced. ✓ (2)

6.1.2 $n(\text{KCl}) = cV$ ✓

$= 0,25 \times 0,055$ ✓

$= 0,01375 \text{ mol}$ ✓

$$n(\text{AgNO}_3) = cV = 0,15 \times 0,07 \checkmark$$

$$= 0,0105 \text{ mol} \checkmark$$

mole ratio 1: 1

$$n = 0,0105 : 0,0105 \checkmark$$

AgNO_3 is a limiting reagent \checkmark (7)

6.1.3 mole ratio 1:1

$$n = 0,0105 : 0,0105 \quad \text{formed}$$

$$m = n \times M \checkmark$$

$$= 0,0105 \times 143,5 \checkmark$$

$$= 1,51 \text{ g} \checkmark \quad (3)$$

[12]

Question 7

$$7.1.1 \quad n(\text{Cu}) = m/M_r \checkmark$$

$$= 31,75/63,5 \checkmark$$

$$= 0,5 \text{ mol} \checkmark$$

$\text{Cu} : \text{HNO}_3$

1 : 3

$$= 0,5 : 1,333 \checkmark$$

$$C(\text{HNO}_3) = n/v \checkmark$$

$$= 1,3/0,8 \checkmark$$

$$= 1,67 \text{ mol} \cdot \text{dm}^{-3} \checkmark \quad (7)$$

7.1.2 Volume of NO produced

$\text{Cu} : \text{NO}$

$$n = \quad 3 : 2$$

0,5: 0,33

$$V(\text{NO}) = n \times V_m \checkmark$$

$$= 0,33 \times 22,4 \checkmark$$

$$= 7,47 \text{ dm}^3 \checkmark$$

(3)

7.2.1 A : C:H

B : C:H

$$96\text{g} : 16 \text{ g} \checkmark$$

$$85,7\% : 14,3\%$$

$$n = 96/12 : 16/1 \checkmark$$

$$= 8 : 16$$

A: C₈H₁₆ ✓

(3)

7.2.2 A : C₈H₁₆

Empirical formula = CH₂ ✓

B: C : H

$$85,7 : 14,3$$

$$n = 85,7/12 \checkmark : 14,3/1 \checkmark$$

$$= 7,14 : 14,3$$

$$= 1 : 2$$

Empirical formula = CH₂ ✓

(4)

$$7.2.3 M(\text{CH}_2) = 12 + 2 \times 1 = 14 \text{ gmol}^{-1} \checkmark$$

$$M(\text{molecular formula})/M(\text{empirical formula}) = 42/14 = 3$$

Molecular formula = C₃H₆ ✓

No A and B are not the same substance ✓

(3)

[20]

[TOTAL : 120]