KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 10

PHYSICAL SCIENCES P2

FINAL EXAMINATION
MARKING MEMORANDUM

NOVEMBER 2023

MARKS: 100

DURATION: 2 hours

Stanmorephysics

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1.1 D ✓✓ (2)
1.2 C ✓✓ (2)
1.3 C ✓✓ (2)
1.4 B ✓✓ (2)
1.5 D ✓✓ (2)
[10]

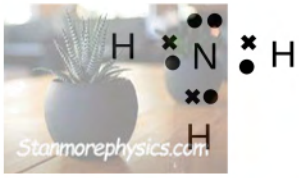
QUESTION 2

2.1 Element. ✓
It consists of one type of atom only. ✓ (2)

2.2 (Substance) Z ✓ (1)

2.3 Ammonia ✓ (1)

2.4 (2)



✓✓

2.5 Ionic bond ✓ (1)

2.6

2.6.1 $N_2 + 3H_2 \rightarrow 2NH_3$
LHS ✓
RHS ✓
Balancing ✓ (3)

2.6.2 Synthesis. ✓
Smaller elements are combining to form a larger compound ✓ (2)

2.6.3 **POSITIVE MARKING FROM 2.6.1**
Mass of reactants = 14x2+ 3 (1x2) ✓
= 34 $g.mol^{-1}$
Mass of products = 2(14 + 1x3) ✓
= 34 $g.mol^{-1}$
Mass of reactants is equal to the mass of products. Therefore mass is conserved. ✓ (3)

[15]

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QUESTION 3

3.1 The temperature at which a solid, given sufficient heat, becomes a liquid. ✓✓ (2)

3.2 16 °C ✓ (1)

3.3 Ethanol ✓
It has a higher boiling point/melting point than water. ✓ (2)

3.4 Gas ✓ (1)

3.5 Condensation ✓ (1)

3.6 No new substance is formed / No chemical bonds are broken. ✓✓ (2)

3.7 3.7.1 C ✓ (1)
3.7.2 A ✓ (1)
3.7.3 B ✓ (1)

[12]

QUESTION 4

4.1

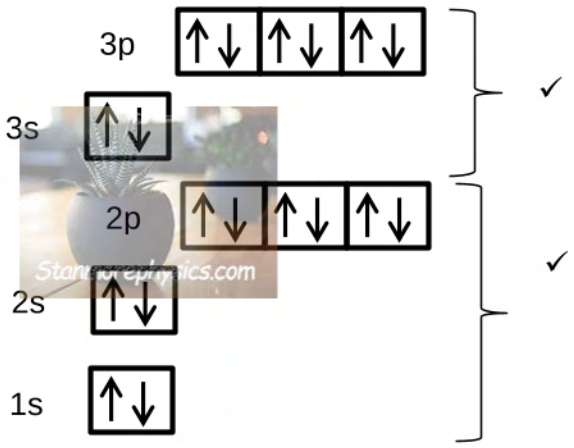
4.2.1 26 ✓ (1)

4.2.2 30 ✓ (1)

4.2.3 S^{2-} ✓ (1)

4.2.4 18 ✓ (1)

4.2



sp-notation: $1s^2 2s^2 2p^6 3s^2 3p^6$ ✓ (3)

4.3 8 ✓ (1)

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4.4

4.4.1 Atoms of the same element having the same number of protons but different numbers of neutrons. ✓✓ (2)

4.4.2 % Fe-57 = 100 – 5,8 – 91,7 = 2,5% ✓

$$\text{Relative atomic mass} = 54\times\frac{5,8}{100} + 56\times\frac{91,7}{100} + 57\times\frac{2,5}{100} \quad \checkmark$$

$$= 55,91 \text{ AMU} \checkmark$$

(3)

[13]

QUESTION 5

5.1

5.1.1 As you move from left to right across a period the effective nuclear charge increase ✓
The force of attraction between the nucleus and the electrons in the outer orbital increases. ✓ (2)

5.1.2 Losing a second electron will result in an unstable electron state in Li ✓, whilst losing a second electron results in a stable electron state in Be ✓

OR

The second electron in Li is removed from the energy level very close to the nucleus, compared to Be. ✓ Therefore the force of attraction between the nucleus and the outer electron is stronger in Li. Hence more energy is needed to remove the second electron in Li compared to Be ✓ (2)

5.1.3 Noble gas ✓ (1)

5.2

5.2.1 Na_2O ✓ (1)

5.2.2 $Ca_3(PO_4)_2$ ✓ (1)

5.2.3 $CuCO_3$ ✓ (1)

5.3

5.3.1 Magnesium bromide ✓ (1)

5.2.2 Ammonium sulphate ✓ (1)

[10]

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QUESTION 6

6.1 One mole of a gas occupies the same volume at the same temperature and pressure. ✓✓ (2)

6.2

6.2.1 $n(SO_3) = \frac{V}{V_m}$ ✓

$n(SO_3) = \frac{2,45}{22,4}$ ✓

$n(SO_3) = 0,11$ mol ✓ (3)

6.2.2 **POSITIVE MARKING FROM 6.2.1**

$SO_2 : SO_3$

2 : 2 ✓

$n(SO_2) = 0,11$ mol

$n(SO_2) = \frac{m}{M}$ ✓

$0,11 = \frac{m}{64}$ ✓

$m(SO_2) = 7,04$ g ✓ (4)

6.2.3 **POSITIVE MARKING FROM 6.2.1**

$O_2 : SO_3$

1 : 2 ✓

$n(O_2) = 0,055$ mol

$n(O_2) = \frac{N}{N_A}$ ✓

$0,055 = \frac{N}{6,02 \times 10^{23}}$ ✓

$N(O_2) = 3,31 \times 10^{22}$ O_2 molecules ✓ (4)

[13]

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QUESTION 7

7.1 7.1.1 The simplest whole number ratio of elements in a compound. ✓✓ (2)

7.1.2 Consider 100g

Element	mass (g)	$n = \frac{m}{M}$	Simplest Ratio	
Na	29,11	$\frac{29,11}{23} = 1,27$ ✓	$\frac{1,27}{1,27} = 1 \times 2 = 2$	✓ (Obtaining all simplest ratios)
S	40,51	$\frac{40,51}{32} = 1,27$ ✓	$\frac{1,27}{1,27} = 1 \times 2 = 2$	
O	30,38	$\frac{30,38}{16} = 1,9$ ✓	$\frac{1,9}{1,27} = 1,5 \times 2 = 3$	

Empirical Formula: $Na_2S_2O_3$ ✓ (5)

7.2 M ($CuSO_4.5H_2O$). = 63,5 + 32 + 4x16 + 5(2+16) ✓

= 249,5 g.mol^{-1}

$$\% H_2O = \frac{5 \times 18 \checkmark}{249,5} \times 100 \checkmark$$

= 36,07 % ✓ (4)

[11]

QUESTION 8

8.1 $m(CaCO_3) = 25 - 10$ ✓

= 15 g

$n(CaCO_3) = \frac{m}{M}$ ✓

$= \frac{15}{100}$ ✓

= 0,15 mol

$CaCO_3$: $Ca_3(PO_4)_2$

3 : 1 ✓

n $[Ca_3(PO_4)_2]$ = 0.05 mol ✓ (5)

8.2 $n(CaCO_3) = \frac{m}{M}$

$= \frac{25}{100}$ ✓

= 0,25 mol ✓ (2)

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8.3 **POSITIVE MARKING FROM 8.2**

$CaCO_3 : H_3PO_4$

3 : 2 ✓

$n(H_3PO_4) = 0,17$ mol

$c(H_3PO_4) = \frac{n}{V}$

$1,25$ ✓ $= \frac{0,17}{V}$ ✓

$V(H_3PO_4) = 0,136\ dm^3$ ✓ (4)

8.4 **POSITIVE MARKING FROM 8.2**

$CaCO_3 : CO_2$

3 : 3 ✓

$n(CO_2) = 0,25$ mol

$n(CO_2) = \frac{V}{V_m}$

$0,25 = \frac{V}{22,4}$ ✓

$V(CO_2) = 5,6\ dm^3$

$\%\ yield = \frac{actual\ yield}{theoretical\ yield} \times 100$

$\%\ yield = \frac{4}{5,6}$ ✓ $\times 100$ ✓

% yield = 71,43% ✓ (5)

[16]

TOTAL: 100

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