education

MPUMALANGA PROVINCE

REPUBLIC OF SOUTH AFRICA

NATIONAL

SENIOR CERTIFICATE

NASIONALE

SENIOR SERTIFIKAAT

GRADE/GRAAD 10

PHYSICAL SCIENCES: CHEMISTRY P2

FISIESE WETENSKAPPE: CHEMIE V2

JUNE/JUNIE 2023

MARKING GUIDELINE/NASIENRIGLYNE

Stanmorephysics

MARKS: 100

This marking guideline consists of 9 pages.

Hierdie nasienriglyne bestaan uit 9 bladsye.

QUESTION/VRAAG 1

1.1 D ✓✓ (2)

1.2 A ✓✓ (2)

1.3 A ✓✓ (2)

1.4 B ✓✓ (2)

1.5 C ✓✓ (2)

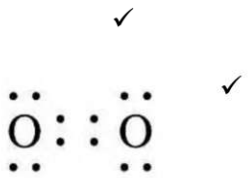
[10]

QUESTION/VRAAG 2

2.1 Chemical substance that forms when two or more atoms of different elements combine in a fixed ratio. ✓✓ (2)

Chemiese stof wat vorm wanneer twee of meer atome van verskillende elemente in 'n vaste verhouding bind. ✓✓

2.2



✓ ✓

Marking criteria/Nasienkriteria:

- One mark for double bond.
- One mark for whole structure correct.

- Een punt vir dubbelbinding.
- Een punt vir die hele struktuur korrek

(2)

2.3 Alkali metals/Alkali metale ✓ (1)

2.4 Cobalt / Nickle ✓ (1)

Kobalt/Nikkel ✓

2.5 Copper/koper ✓ (1)

2.6 O ✓ (1)

2.7 Silicon/silikon ✓ (1)

2.8.1 Br^{-1} ✓ (1)

2.8.2 45 ✓ (1)

2.8.3 36 ✓ (1)

[12]

QUESTION/VRAAG 3

3.1 Gas ✓ (1)

3.2 -80 °C ✓ (1)

3.3 Point/punt EF ✓ (1)

3.4 Point/punt BC ✓ (1)

3.5.1 Condensation/kondensasie ✓ (1)

3.5.2 Gas to liquid. ✓ (1)

Gas na ‘n vloeistof. ✓

3.5.3 At BC the temperature stays constant. ✓ The energy released causes an increase in intermolecular forces ✓ so that the gas changes into a liquid. ✓ (3)

By BC bly die temperatuur konstant. ✓ Die energie wat vrygestel word veroorsaak 'n toename in intermolekulêre kragte ✓ sodat die gas in 'n vloeistof verander. ✓

[09]

QUESTION/VRAAG 4

4.1 Atoms of elements with the same atomic number/number of protons, but different mass numbers/numbers of neutrons. ✓✓ (2)

Atome van elemente met dieselfde atoomgetal/getal protone, maar verskillende massagetalle/getal neutrone.

4.2 $$Relative\ atomic\ mass = \frac{(24 \times 78.99) + (25 \times 10) + (26 \times 11.01)}{100}$$ ✓ ✓

$$= 24.32\ u$$ ✓

(4)

The element is magnesium. ✓

Die element is magnesium. ✓

4.3.1 Ca^{2+} ✓ (1)

4.3.2

$1s^2\ 2s^2\ 2p^6$ ✓ $3s^2\ 3p^6$ ✓

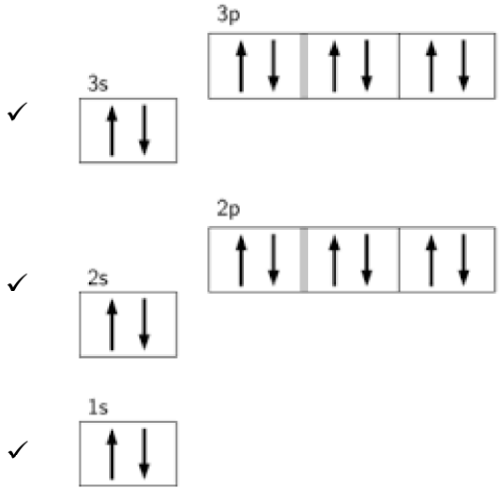
Marking criteria/Nasienkriteria

- One mark for level one and two.
- One mark for level three

- Een punt vir vlak een en twee.
- Een punt vir vlak drie.

(2)

4.3.3



✓ ✓ ✓

Marking criteria/Nasienkriteria:

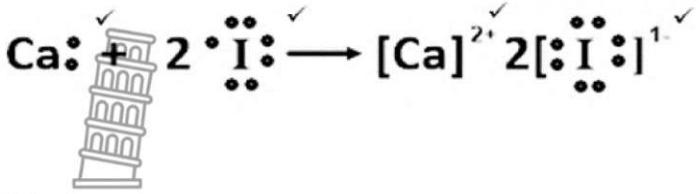
- One mark for level one.
- One mark for level two.
- One mark for level three

- Een punt vir vlak een.
- Een punt vir vlak twee.
- Een punt vir vlak drie

(3)

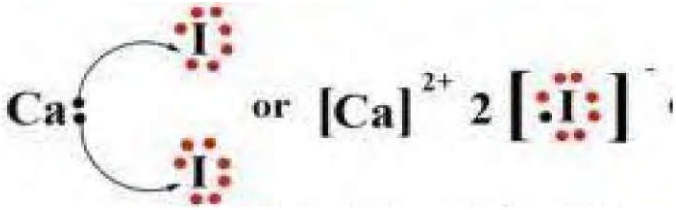
4.3.4 Ionic bond ✓ (1)

4.3.5



(4)

OR



[17]

QUESTION/VRAAG 5

5.1 The energy needed to remove the electron that is held the weakest by an atom in the gaseous phase. ✓✓ (2)

Die energie wat nodig is om die elektron te verwyder wat die swakste deur 'n atoom in die gasfase gehou word. ✓✓

5.2 They have filled energy levels (a full octet configuration) ✓ and are therefore very stable. ✓ (2)

Hulle het gevulde energievlakke ('n volle oktetkonfigurasie) ✓ en is dus baie stabiel. ✓

5.3 As you move across a period the atoms become smaller and therefore the electrons are closer to the nucleus. ✓ The size of the positive nucleus becomes bigger, and the electrons are attracted stronger which requires more energy to remove them. ✓ Therefore, fluorine has higher ionization energy than oxygen. (2)

Soos jy oor 'n periode beweeg, word die atome kleiner en daarom is die elektrone nader aan die kern. ✓ Die grootte van die positiewe kern word groter, en die elektrone word sterker aangetrek wat meer energie benodig om hulle te verwyder. ✓Fluoor het dus hoër ionisasie-energie as suurstof.

5.4 Magnesium / Mg ✓ (1)

5.5 As you move down a group new energy levels are added to the atoms ✓ and therefore the radius becomes bigger since there are more electrons.✓ (2)

Soos jy afbeweeg in 'n groep word nuwe energievlakke by die atome gevoeg ✓ en daarom word die radius groter aangesien daar meer elektrone is. ✓

5.6 Decrease/verminder ✓ (1)

[10]

QUESTION/VRAAG 6

6.1.1 Hydrogen chloride ✓ (1)

Waterstofchloried ✓

6.1.2 A covalent bond ✓is formed when electrons are shared between two non-metal atoms. ✓✓ (3)

'n Kovalente binding ✓word gevorm wanneer elektrone tussen twee nie-metaalatome gedeel word. ✓✓

6.1.3 Chlorine /Chloor/ Cℓ ✓ (1)

6.2.1 Metallic bonding/metaalbinding ✓ (1)

6.2.2
- Sea of delocalized electrons ✓
- Positive metal atoms. ✓
- See van gedelokaliseerde elektrone ✓
- Positiewe metaalatom ✓

(2)

[08]

QUESTION/VRAAG 7

7.1.1 Chemical change/Chemiese verandering ✓ (1)

7.1.2 The atoms have rearranged to form new products ✓ with new properties. ✓ (2)

Die atome het herrangskik om nuwe produkte te vorm ✓ met nuwe eienskappe. ✓

7.1.3 The total mass of substances in a closed system stays constant in any physical process. ✓✓

Or

In a chemical reaction the sum of the mass of the reactants equals the sum of the mass of the products. (2)

Die totale massa van stowwe in 'n geslote sisteem bly konstant in enige fisiese proses. ✓✓

Of

In 'n chemiese reaksie is die som van die massa van die reaktante gelyk aan die som van die massa van die produkte.

7.1.4 $$H_2O(\ell) + SO_2(g) \rightarrow H_2SO_3(aq)$$

$$2(1) + 16 + 32 + 2(16) \checkmark \rightarrow 2(1) + 32 + 3(16) \checkmark$$

$$82\ g \rightarrow 82\ g \checkmark$$

Mass is conserved ✓ (4)

Massa bly behoue ✓

7.2.1 Ion-exchange reaction ✓✓ (2)

Ioon-uitruiling reaksie ✓✓

7.2.2 Decomposition reaction ✓✓ (2)

Ontbindings reaksie ✓✓

7.3.1 $BaCO_3(s) + 2HC\ell\,(aq)$✓ $\rightarrow BaC\ell_2(aq) + H_2CO_3\,(aq)$ ✓ ✓Balancing (3)

7.3.2 $Cu\,(s) + 4HNO_3(aq)$ ✓ $\rightarrow Cu(NO_3)_2(aq) + 2NO_2(g) + 2H_2O(\ell)$ ✓ ✓Bal (3)

Marking criteria for question 7.3.1 & 7.3.2 /Nasienkriteria vir vraag 7.3.1 & 7.3.2

Reactants/Reaktante	1 mark/punt
Products/produkte	1 mark/punt
Balancing/balanseer	1 mark/punt

[19]

QUESTION/VRAAG 8

8.1 Hydrogen nitrate ✓ (1)

Waterstof nitraat ✓

8.2 $M_r(NH_4NO_3)$ = 14 + 4(1) + 14 + (3)(16) ✓

= 80 g·mol^{-1} ✓ (2)

8.3 $n = \frac{m}{M}$ ✓

$= \frac{15}{80}$ ✓

$= 0.19\,mol$ ✓ (3)

8.4 M_r(NO) = 14 + 16

= 30 g·mol^{-1} ✓

$n = \frac{m}{M}$

$= \frac{12}{30}$ ✓

$= 0.4\,mol$ ✓

$V = nV_m$ ✓

$= (0.4)(22.4)$

$= 8.96\,dm^3$ ✓ (5)

8.5 $N = nN_A$ ✓

$= (2)(6.02 \times 10^{23})$ ✓(2) ✓

$= 2.41 \times 10^{24}$ *nitrogen atoms – stikstof atome* ✓ (4)

[15]

GRAND TOTAL/GROOT TOTAAL 100