



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE/
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 10

**PHYSICAL SCIENCES: CHEMISTRY (P2)
FISIESE WETENSKAPPE: CHEMIE (V2)**

NOVEMBER 2017

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 150

**These marking guidelines consist of 10 pages.
*Hierdie nasienriglyne bestaan uit 10 bladsye.***

QUESTION/VRAAG 1

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

[20]

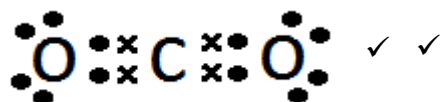
QUESTION/VRAAG 22.1.1 CO₂✓ **OR/OF** H₂O✓ (1)

2.1.2 Fe ✓ (1)

2.1.3 C₉₀ ✓ (1)

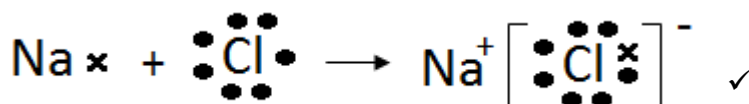
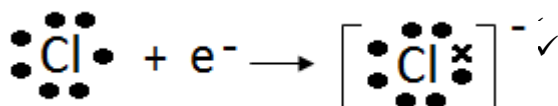
2.1.4 NaCl✓ (1)

2.2



(2)

2.3 Covalent bond✓/Kovalente binding✓ (1)

2.4 Na × → Na⁺ + e⁻ ✓

(3)

2.5.1 Potassium iodide ✓/Kaliumjodied✓ (1)

2.5.2 CH₄ ✓ (1)

2.5.3 Ammonia ✓/Ammoniak ✓ (1)

2.6.1 Physical ✓/Fisies ✓ (1)

2.6.2 Boiling point ✓/Kookpunt ✓ (1)

2.6.3 Nitrogen✓; it has the lowest boiling point.✓/Stikstof✓ Laagste kookpunt ✓ (2)

2.6.3 Nitrogen✓; it has the lowest boiling point.✓/Stikstof✓ Laagste kookpunt ✓ (2)

2.7.1 INCREASE. ✓
TOENEEM✓ (1)2.7.2 DECREASE. ✓
AFNEEM✓ (1)2.7.3 INCREASE.✓
TOENEEM✓ (1)**[20]**

QUESTION/VRAAG 3

- 3.1 Energy needed per mole to remove an electron from an atom in a gaseous phase. ✓✓
Energie benodig per mol om 'n elektron uit 'n atoom in die gasfase te verwyder. ✓✓ (2)
- 3.2 Ionisation energy increases from left to right, across a period. ✓✓
Ionisasie energie neem toe van links na regs oor 'n periode. ✓✓ (2)
- 3.3.1 Be: $1s^2 2s^2$ ✓✓
 B: $1s^2 2s^2 2p^1$ ✓✓ (4)
- 3.3.2 B has a 2p energy level; 2p has a higher energy than 2s. ✓
 Therefore less energy is needed to remove the valence electrons from B as from Be. ✓✓.
B het 'n 2p energievlak; 2p het meer energie as 2s ✓
Dus minder energie word benodig om 'n valenselektron van B te verwyder in vergelyking met Be. ✓✓
- OR/OF**
- 2s electrons are paired and 2p electron is unpaired. ✓ Therefore less energy needed to remove 2p electron. ✓✓
Die 2s elektrone is gepaard teenoor die ongepaarde 2p elektrone. ✓ *Daaom word minder energie benodig om 'n 2p elektron te verwyder.* ✓✓ (3)
- 3.4 False✓,
 The energy is high because of filled s and p-orbitals. ✓/
Vals✓
Die energie is hoog agv die vol s- en p-orbitale.✓ (2)
- 3.5.1 Alkali-metals✓
Alkali-metale✓ (1)
- 3.5.2 Reactivity increases from top to bottom✓✓
Reaktiwiteit verhoog van bo na onder in die groep.✓✓ (2)
- 3.5.3 Ionisation energy decreases, thus less energy to remove an electron. Therefore reactivity increases. ✓✓
Ionisasie-energie neem af, daarom word minder energie benodig om 'n elektron te verwyder. Reaktiwiteit neem dus toe. ✓✓ (2)

[18]

QUESTION/VRAAG 4

- 4.1.1 Isotope: atoms of the same element having the same number of protons, but different number of neutrons. **OR** Same atomic number, but different mass numbers. ✓✓

Isotoop: Atome van dieselfde element wat dieselfde getal protone het, maar verskillende getalle neutrone. ✓✓ OF Dieselfde atoomgetalle, maar verskillende massagetalle.

(2)

- 4.1.2 50% = 106,9 amu
50% = 109,1 amu ✓

$$A_r = \frac{(50 \times 106,9) + (50 \times 108,9)}{100} \\ = 108$$

(5)

- 4.1.3 Ag/Silver ✓✓
Ag/Silwer ✓✓

(2)

- 4.2.1 13 ✓
4.2.2 14 ✓
4.2.3 13 ✓
4.2.4 39 ✓
4.2.5 19 ✓
4.2.6 20 ✓
4.2.7 18 ✓

(7)
[16]**QUESTION/VRAAG 5**

- 5.1 An aqueous solution. ✓/In Waterige oplossing. ✓

(1)

- 5.2 Redox. ✓
Electron transfer took place. ✓/
Redoks. ✓
Elektron oordrag het plaasgevind. ✓

(2)

- 5.3 Chemical change. ✓/Chemiese verandering. ✓

(1)

- 5.4 The amount of substance having the same number of particles as there are atoms in 12g C-12. ✓✓
Die stofhoeveelheid wat dieselfde getal deeltjies het as wat daar atome in 12g koolstof-12 is. ✓✓

(2)



2 : 1

Therefore $n(\text{O}_2) = 2 \text{ mol}$ ✓

$$n = \frac{V}{V_m} \quad \checkmark$$

$$2 = \frac{V}{22,4} \quad \checkmark$$

$$V = 44,8 \text{ dm}^3 \quad \checkmark$$

(4)

5.6

$$\begin{aligned} n(\text{H}_2\text{O}_2) &= \frac{m}{M} \\ &= \frac{17}{34} \quad \checkmark \\ &= 0,5 \text{ mol} \end{aligned}$$

$$n = \frac{N}{N_A} \quad \checkmark$$

$$(0,5)(2) = \frac{N}{6,02 \times 10^{23}} \quad \checkmark$$

$$N = 6,02 \times 10^{23} \text{ atoms} \quad \checkmark$$

(4)

[14]**QUESTION/VRAAG 6**6.1.1 Gas forming ✓ / *Gasvormende reaksie* ✓

(1)

$$\begin{aligned} M(\text{Na}_2\text{CO}_3) &= 2(23) + 12 + 3(16) \\ &= 106 \text{ g} \cdot \text{mol}^{-1} \quad \checkmark \end{aligned}$$

(2)

$$\begin{aligned} 6.2.2 \quad n(\text{Na}_2\text{CO}_3) &= \frac{m}{M} \\ &= \frac{10,6}{106} \quad \checkmark \\ &= 0,1 \text{ mol} \quad \checkmark \end{aligned}$$

(2)

$$\begin{aligned} 6.2.3 \quad n(\text{Na}_2\text{CO}_3) : n(\text{CO}_2) \\ 1 : 1 \quad \checkmark \\ \text{Thus: } n(\text{CO}_2) &= 0,1 \text{ mol} \end{aligned}$$

$$n(\text{CO}_2) = \frac{m}{M} \quad \checkmark$$

$$0,1 = \frac{m}{44} \quad \checkmark$$

$$m = 4,4 \text{ g} \quad \checkmark$$

(4)

6.2.4

$$n(\text{CO}_2) = \frac{V_{\text{CO}_2}}{V_m} \checkmark$$

$$= \frac{4,87}{22,4}$$

$$= 0,217 \text{ mol} \checkmark$$

$$n(\text{CO}_2) : n(\text{NaCl})$$

$$1 : 2 \checkmark$$

$$n(\text{NaCl}) = 0,434 \text{ mol}$$

$$n(\text{NaCl}) = \frac{m}{M} \checkmark$$

$$0,434 = \frac{m}{58,5} \checkmark$$

$$m = 25,16 \text{ g} \checkmark$$

(6)

6.3

OPTION1/OPSIE 1:

$$\text{Mass of H}_2\text{O} = 14,2 - 5,3$$

$$= 8,9 \text{ g} \checkmark$$

$$n(\text{Na}_2\text{CO}_3) = \frac{m}{M}$$

$$= \frac{5,3}{106} \checkmark$$

$$= 0,05 \text{ mol}$$

$$n(\text{H}_2\text{O}) = \frac{m}{M}$$

$$= \frac{8,9}{18} \checkmark$$

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

$$\text{Na}_2\text{CO}_3 : \text{H}_2\text{O}$$

$$\underline{0,05 : 0,5} \checkmark$$

$$0,05 : 0,05$$

$$1 : 10$$

$$\text{Thus } x = 10 \checkmark$$

OPTION 2/OPSIE 2:Mass of H₂O = 14,2 – 5,3

= 8,9g ✓

M(Na₂CO₃) = 160 g·mol⁻¹ M(H₂O) = 18 g·mol⁻¹ $n(\text{Na}_2\text{CO}_3) : n(\text{H}_2\text{O})$ $\frac{m(\text{Na}_2\text{CO}_3)}{M(\text{Na}_2\text{CO}_3)} : \frac{m(\text{H}_2\text{O})}{M(\text{H}_2\text{O})}$ ✓ $\frac{5,3}{160} : \frac{8,9}{18}$ ✓

0,05 : 0,5

 $\frac{0,05}{0,05} : \frac{0,5}{0,05}$ ✓

1 : 10

Thus x = 10 ✓

(5)
[20]**QUESTION/VRAAG 7**

- 7.1 Distilled water does not contain free ions. ✓
Gedistilleerde water bevat geen vrye ione nie. ✓ (1)
- 7.2 Electrolyte ✓✓ / Elektroliet ✓✓ (2)
- 7.3 AgNO₃(s) → Ag⁺(aq) ✓ + NO₃⁻(aq) ✓ (2)
- 7.4.1 The conductivity of AgNO₃ solution will increase with an increase in the concentration of the AgNO₃ solution at a constant temperature. ✓✓
Die geleidingsvermoë van die AgNO₃ oplossing sal toeneem met 'n toename in die konsentrasie van die oplossing, mits die temperatuur konstant bly. ✓✓ (2)
- 7.4.2 Conductivity ✓ / Geleidingsvermoë ✓ (1)
- 7.4.3 Concentration (of the AgNO₃ solution) ✓
Konsentrasie (van die AgNO₃ oplossing) ✓ (1)
- 7.4.4 Temperature ✓ / Temperatuur ✓ (1)
- 7.5 Without water ✓ / Sonder water / Watervry. ✓ (1)

7.6 Mass of $\text{AgNO}_3 = (5,3)(2)$
 $= 10,6\text{g}$ ✓

$$c = \frac{m}{MV} \quad \checkmark$$

$$= \frac{10,6}{106(0,2)} \quad \checkmark$$

$$= 0,5 \text{ mol} \cdot \text{dm}^{-3} \quad \checkmark \quad (4)$$

7.7 No. ✓
 Tap water contains ions and it will affect the conductivity of the AgNO_3 solution. ✓/Nee, ✓
Die kraanwater sal die geleidingsvermoë van die AgNO_3 oplossing beïnvloed. ✓ (2)

7.8 An increase in concentration of ions in a solution increases conductivity of a solution. ✓✓
Met 'n toename in konsentrasie van ione, neem die geleidingsvermoë toe. ✓✓ (2)

7.9.1 DECREASE ✓/AFNEEM ✓ (1)

7.9.2 Silver chloride precipitate forms/ a reaction takes place ✓, thus decreasing the concentration of the ions. ✓
Daar vorm 'n silwerchloried neerslag/'n chemiese reaksie vind plaas ✓ wat die konsentrasie van die ione laat afneem. ✓ (2)
[22]

QUESTION/VRAAG 8

8.1 BaCl_2 (1)

8.2 $\text{CO}_3^{2-}(\text{aq}) + \text{BaCl}_2(\text{aq}) \checkmark \rightarrow \text{BaCO}_3(\text{s}) \checkmark + 2\text{Cl}^-(\text{aq}) \checkmark$ Bal ✓ (4)

8.3 $\text{BaCO}_3(\text{s}) + \text{HNO}_3(\text{aq}) \checkmark \rightarrow \text{Ba}(\text{NO}_3)_2(\text{aq}) + \text{CO}_2(\text{g}) \checkmark + \text{H}_2\text{O}(\text{l}) \checkmark$ Bal ✓ (4)

8.4 Barium carbonate ✓✓/Bariumkarbonaat. ✓✓ (2)
[11]

QUESTION/VRAAG 9

9.1.1 Condensation ✓/Kondensasie ✓ (1)

9.1.2 Precipitation ✓/Presipitasie ✓ (1)

9.1.3 Transpiration ✓/Transpirasie ✓ (1)

9.2 Released ✓, energy is released to the surrounding/cooling takes place/particles moves closer together. ✓
Vrygestel ✓, energie is vrygestel na die omgewing toe/afkoeling vind plaas/deeltjies beweeg nader aan mekaar. ✓ (2)

- 9.3 Water absorbs the infrared energy from the sun and re-emits it therefore regulating the climate. ✓✓
Water absorber die infrarooi energie van die son en stel dit weer vry om klimaat te reguleer. ✓✓ (2)
- 9.4 Drilling of boreholes/Building of dams ✓✓
Boorgate te sink/Damme te bou ✓✓ (2)
- [9]
- TOTAL/TOTAAL: 150**