



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE/
NASIONALE
SENIOR SERTIFIKAAT**

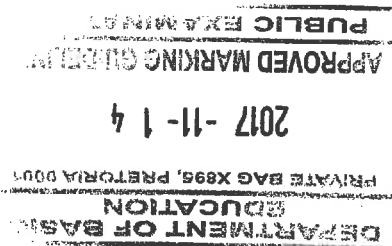
GRADE/GRAAD 10

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

NOVEMBER 2017

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 150



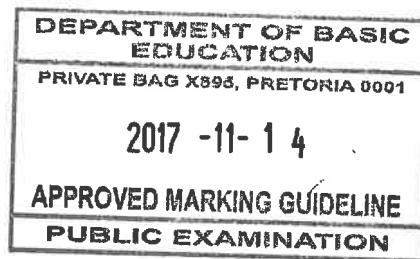
**These marking guidelines consist of 10 pages.
Hierdie nasienriglyne bestaan uit 10 bladsye.**

*Approved
Jayangir
Int. Mod. - DBE
2017: 11: 14*

*P. van der
Chief examiner
14/11/2017.*

QUESTION 1/VRAAG 1

- | | | |
|------|------|-----|
| 1.1 | C ✓✓ | |
| 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]



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QUESTION 2/VRAAG 2

2.1.1 CO₂ ✓ OR/OF H₂O ✓

2.1.2 Fe ✓

2.1.3 C₉₀ ✓

2.1.4 NaCl ✓

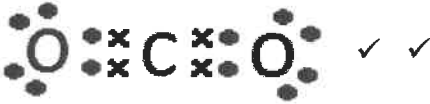
(1)

(1)

(1)

(1)

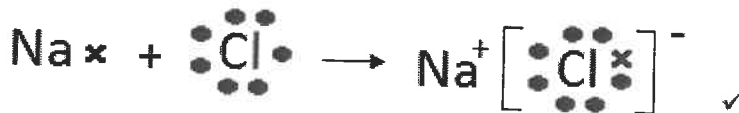
2.2



(2)

2.3 Covalent bond ✓ /Kovalente binding ✓

(1)

2.4 OPTION 1/OPSIE 1:OPTION 2/OPSIE 2:

(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)

2.7.1 INCREASE. ✓ /TOENEEM ✓

(1)

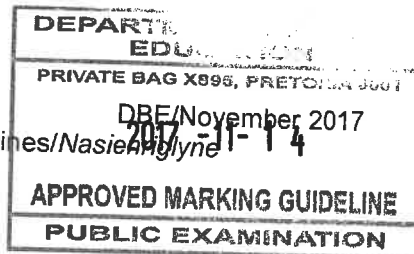
2.7.2 DECREASE. ✓ /AFNEEM ✓

(1)

2.7.3 INCREASE. ✓ /TOENEEM ✓

(1)

[20]



QUESTION 3/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. ✓ Daarom word minder energie benodig om 'n 2p elektron te verwyder. ✓✓
- OR/OF**
- The 2p electron is further away from the nucleus ✓. Therefore, the electrostatic force weaker and requires less energy. ✓✓
Die 2p electron is verder van die kern ✓; dus is die elektrostatische krag swakker en daarom word minder energie benodig om die 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 gevulde 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 4/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)

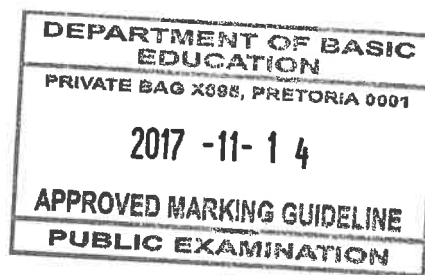
4.1.2 50% = 106,9 amu

50% = 109,1 amu ✓

$$A_r = \frac{(50 \times 106,9) + (50 \times 109,1)}{100} = 108$$

(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 5/VRAAG 5**

5.1 An aqueous solution. ✓/A solution in water ✓/In Waterige oplossing. ✓

(1)

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

Accept/Aanvaar. Change in oxidation number/ Verandering in oksidasiegetal.

(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)

5.5 $\text{H}_2\text{O}_2 : \text{O}_2$
 $2 : 1$
 $\therefore n(\text{O}_2) = 2 \text{ mol} \checkmark$
 $n = \frac{V}{V_m} \checkmark$
 $2 = \frac{V}{22,4} \checkmark$
 $V = 44,8 \text{ dm}^3 \checkmark$

(4)

5.6 $n(\text{H}_2\text{O}_2) = \frac{m}{M}$
 $= \frac{17}{34} \checkmark$
 $= 0,5 \text{ mol}$

$n = \frac{N}{N_A} \checkmark$
 $(0,5)(2) = \frac{N}{6,02 \times 10^{23}}$
 $N = 6,02 \times 10^{23} \text{ atoms/atome} \checkmark$

NOTE/NOTA:

If molar mass of H_2O_2 is incorrect, mark positively. Max 2/4
 Positiewe nasien indien molêre massa van H_2O_2 verkeerd is. Maksimum punte 2/4

(4)
[14]**QUESTION 6/VRAAG 6**6.1.1 Gas forming \checkmark / Gasvormende reaksie \checkmark

(1)

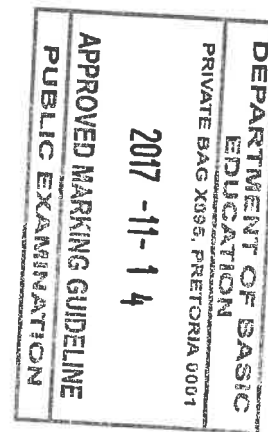
6.2.1 $M(\text{Na}_2\text{CO}_3) = 2(23) + 12 + 3(16)$
 $= 106 \checkmark \text{ g} \cdot \text{mol}^{-1} \checkmark$

(2)

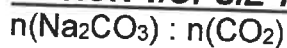
6.2.2 **POSITIVE MARKING FROM QUESTION 6.2.1**
POSITIEWE NASIEN VANAF VRAAG 6.2.1

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

(2)



6.2.3 **POSITIVE MARKING FROM QUESTION 6.2.2**
POSITIEWE NASIEN VANAF VRAAG 6.2.2

OPTION 1/OPSIE 1:

$$1 : 1 \checkmark$$

$$\text{Thus: } n(\text{CO}_2) = 0,1 \text{ mol}$$

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

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

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

OPTION 2/ OPSIE 2:

$$106 \text{ g of Na}_2\text{CO}_3 : 44 \text{ g of CO}_2 \checkmark \checkmark$$

$$10,6 \text{ g} : 4,4 \text{ g CO}_2 \checkmark \checkmark$$

(4)

6.2.4

$$\begin{aligned} n(\text{CO}_2) &= \frac{V_{\text{CO}_2}}{V_m} \\ &= \frac{4,87}{22,4} \checkmark \\ &= 0,217 \text{ mol} \end{aligned}$$

NOTE/ NOTA:

One mark for any one formula
 Een punt vir enige een formule

$$\begin{aligned} n(\text{CO}_2) : n(\text{NaCl}) \\ 1 : 2 \checkmark \\ n(\text{NaCl}) = 0,434 \text{ mol} \end{aligned}$$

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

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

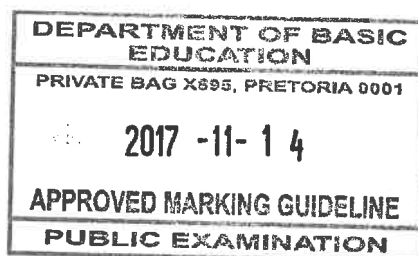
$$m = 25,16 \text{ g} \checkmark$$

NOTE/ NOTA:

If ratio 1:2 is not given, allocate two marks for 0,434 in the substitution.

Indien verhouding 1:2 nie gewys word nie, gee twee punte vir 0,434 vir die invervanging.

(6)



6.3

OPTION 1/OPSIE 1:

$$\begin{aligned} \text{Mass of H}_2\text{O} &= 14,2 - 5,3 \\ &= 8,9 \text{ g } \checkmark \end{aligned}$$

$$\begin{aligned} n(\text{Na}_2\text{CO}_3) &= \frac{m}{M} & n(\text{H}_2\text{O}) &= \frac{m}{M} \\ &= \frac{5,3}{106} \checkmark & &= \frac{8,9}{18} \checkmark \\ &= 0,05 \text{ mol} & &= 0,5 \text{ mol} \end{aligned}$$

Na₂CO₃ : H₂O

$$\begin{aligned} \frac{0,05}{0,05} : \frac{0,5}{0,05} &\checkmark \text{ Divide by smallest number} \\ 1 : 10 & \end{aligned}$$

Thus x = 10 ✓

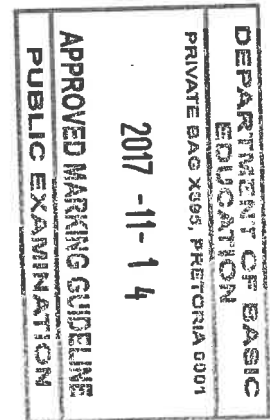
OPTION 2/OPSIE 2:

$$\begin{aligned} \text{Mass of H}_2\text{O} &= 14,2 - 5,3 \\ &= 8,9 \text{ g } \checkmark \end{aligned}$$

$$M(\text{Na}_2\text{CO}_3) = 160 \text{ g} \cdot \text{mol}^{-1} \quad M(\text{H}_2\text{O}) = 18 \text{ g} \cdot \text{mol}^{-1}$$

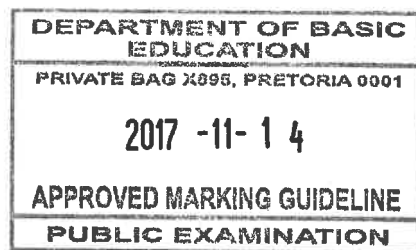
$$\begin{aligned} n(\text{Na}_2\text{CO}_3) : n(\text{H}_2\text{O}) \\ \frac{m(\text{Na}_2\text{CO}_3)}{M(\text{Na}_2\text{CO}_3)} : \frac{m(\text{H}_2\text{O})}{M(\text{H}_2\text{O})} \checkmark \\ \frac{5,3}{160} : \frac{8,9}{18} \checkmark \\ 0,05 : 0,5 \\ \frac{0,05}{0,05} : \frac{0,5}{0,05} \checkmark \text{ Divide by smallest number} \\ 1 : 10 \end{aligned}$$


Thus x = 10 ✓

(5)
[20]

QUESTION 7/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 $\text{AgNO}_3(\text{s}) \rightarrow \text{Ag}^+(\text{aq}) \checkmark + \text{NO}_3^-(\text{aq}) \checkmark$
NOTE/NOTA: Phases need not be shown/ *Fases kan uitgelaat word.* (2)
- 7.4.1 The conductivity of AgNO_3 solution will increase with an increase in the concentration of the AgNO_3 solution at a constant temperature. ✓✓
Die geleidingsvermoë van die AgNO_3 oplossing sal toeneem met 'n toename in die konsentrasie van die oplossing, mits die temperatuur konstant bly. ✓✓ (2)
- 7.4.2 Conductivity ✓/Geleidingsvermoë ✓
Accept/Aanvaar. Ammeter reading/ *Ammeter lesing* (1)
- 7.4.3 Concentration (of the AgNO_3 solution) ✓
Konsentrasie (van die AgNO_3 oplossing) ✓
Accept/Aanvaar. Spoons of AgNO_3 in distilled water/ *Lepels AgNO_3 in gedistilleerde water.* (1)
- 7.4.4 Temperature ✓/Temperatuur ✓ (1)
- 7.5 Without water ✓/Sonder water/Watervry. ✓ (1)
- 7.6 Mass of $\text{AgNO}_3 = (5,3)(2)$
 $= 10,6 \text{ g} \checkmark$
- $$c = \frac{m}{MV} \checkmark$$
- $$= \frac{10,6}{170(0,2)} \checkmark$$
- $$= 0,31 \text{ mol} \cdot \text{dm}^{-3} \checkmark$$
- (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 in the solution. ✓
Daar vorm 'n silwerchloried neerslag/n chemiese reaksie vind plaas ✓ wat die konsentrasie van die ione in oplossing laat afneem. ✓ (2)
- [22]

QUESTION 8/VRAAG 8

- 8.1 BaCl₂ ✓ (1)
- 8.2 CO₃²⁻(aq) + BaCl₂(aq) ✓ → BaCO₃(s) ✓ + 2Cl⁻(aq) ✓ BaI ✓
NOTE/NOTA: Phases need not be shown/ *Fases kan uitgelaat word* (4)
- 8.3 BaCO₃(s) + HNO₃(aq) ✓ → Ba(NO₃)₂(aq) ✓ + CO₂(g) ✓ + H₂O(l) ✓
NOTE/NOTA: Phases need not be shown/ *Fases kan uitgelaat word* (4)
- 8.4 Barium carbonate ✓✓/Bariumkarbonaat. ✓✓ (2)
- [11]

QUESTION 9/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 ✓✓
Accept/Aanvaar: Any applicable answer/ *Enige toepaslike antwoord word aanvaar.* (2)
- [9]

TOTAL/TOTAAL: 150