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.

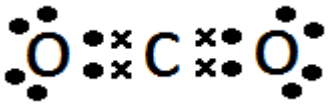
QUESTION/*VRAAG 1*

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 2*

2.1.1 CO_2✓ **OR/*OF*** H_2O✓ (1)
2.1.2 Fe ✓ (1)
2.1.3 C_{90} ✓ (1)
2.1.4 NaCl✓ (1)

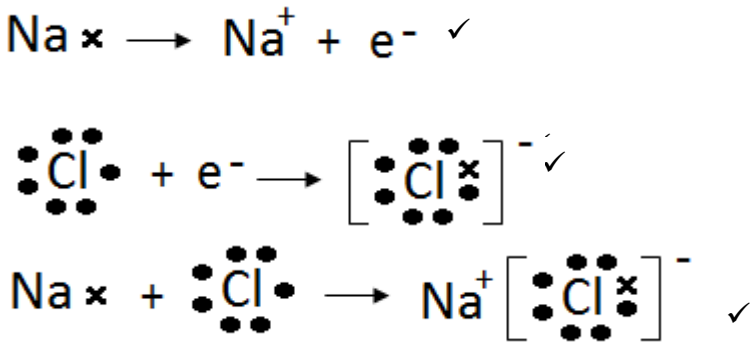
2.2



✓ ✓ (2)

2.3 Covalent bond✓/*Kovalente binding*✓ (1)

2.4



(3)

2.5.1 Potassium iodide ✓/*Kaliumjodied*✓ (1)

2.5.2 CH_4 ✓ (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. ✓ *Daarom 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 $50\% = 106{,}9 \text{ amu}$
$50\% = 109{,}1 \text{ amu}$ ✓

$$A_r = \frac{(50 \times 106{,}9) + (50 \times 108{,}9)}{100} \quad (\checkmark \checkmark \checkmark)$$
$$= 108 \checkmark$$ (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. ✓/*'n 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)

5.5 $H_2O_2 : O_2$

2 : 1

Therefore $n(O_2)$= 2 mol ✓

$$n = \frac{V}{V_m} \quad ✓$$

$$2 = \frac{V}{22,4} \quad ✓$$

$$V = 44,8dm^3 \quad ✓$$ (4)

5.6 $$n(H_2O_2) = \frac{m}{M}$$

$$= \frac{17}{34} \quad ✓$$

$$= 0,5mol$$

$$n = \frac{N}{N_A} \quad ✓$$

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

$$N = 6,02 \times 10^{23} \text{ atoms} \quad ✓$$ (4)

[14]

QUESTION/*VRAAG 6*

6.1.1 Gas forming ✓/*Gasvormende reaksie* ✓ (1)

6.2.1 $$M(Na_2CO_3) = 2(23) + 12 + 3(16)$$

$$= 106g \cdot mol^{-1} \quad ✓$$ (2)

6.2.2 $$n(Na_2CO_3) = \frac{m}{M}$$

$$= \frac{10,6}{106} \quad ✓$$

$$= 0,1mol \quad ✓$$ (2)

6.2.3 $n(Na_2CO_3) : n(CO_2)$

1 : 1 ✓

Thus: $n(CO_2)$=0,1mol

$$n(CO_2) = \frac{m}{M} \quad ✓$$

$$0,1 = \frac{m}{44} \quad ✓$$

$$m = 4,4g \quad ✓$$ (4)

6.2.4

$$n(CO_2) = \frac{V_{CO_2}}{V_m} \checkmark$$
$$= \frac{4,87}{22,4}$$
$$= 0,217 mol \checkmark$$

$n(CO_2) : n(NaCl)$
$1 : 2$ ✓
$n(NaCl) = 0,434 mol$

$$n(NaCl) = \frac{m}{M} \checkmark$$
$$0,434 = \frac{m}{58,5} \checkmark$$
$$m = 25,16 g \checkmark$$

(6)

6.3

OPTION1/*OPSIE 1*:

Mass of H_2O = 14.2 – 5,3
= 8,9 g ✓

$$n(Na_2CO_3) = \frac{m}{M} = \frac{5,3}{106} \checkmark = 0,05 mol$$

$$n(H_2O) = \frac{m}{M} = \frac{8,9}{18} \checkmark = 0,5 mol$$

$Na_2CO_3 : H_2O$ ✓
$\frac{0,05}{0,05} : \frac{0,5}{0,05}$
$1 : 10$

Thus $x = 10$ ✓

OPTION 2/*OPSIE 2*:

Mass of H_2O = 14,2 – 5,3

= 8,9g ✓

$M(Na_2CO_3)$ = 160 g·mol^{-1} $M(H_2O)$ = 18 g·mol^{-1}

$$n(Na_2CO_3) : n(H_2O)$$

$$\frac{m(Na_2CO_3)}{M(Na_2CO_3)} : \frac{m(H_2O)}{M(H_2O)}$$ ✓

$$\frac{5,3}{160} : \frac{8,9}{18}$$ ✓

$$0,05 : 0,5$$

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

$$1 : 10$$

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 $AgNO_3(s) \rightarrow Ag^+(aq)$ ✓ + $NO_3^-(aq)$ ✓ (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* ✓ (1)

7.4.3 Concentration (of the $AgNO_3$ solution) ✓
Konsentrasie (van die $AgNO_3$ oplossing) ✓ (1)

7.4.4 Temperature ✓/*Temperatuur* ✓ (1)

7.5 Without water ✓/*Sonder water/Watervry*. ✓ (1)

7.6 Mass of $AgNO_3$ = (5,3)(2)
= 10,6g ✓

$$c = \frac{m}{MV} \quad ✓$$
$$= \frac{10,6}{106(0,2)} \quad ✓$$
$$= 0,5\ mol \cdot dm^{-3} \quad ✓$$ (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 $CO_3^{-2}(aq) + BaCl_2(aq)$ ✓ → $BaCO_3(s)$✓ + $2Cl^-(aq)$ ✓ Bal ✓ (4)

8.3 $BaCO_3(s) + HNO_3(aq)$ ✓ → $Ba(NO_3)_2(aq) + CO_2(g)$✓ + $H_2O(l)$✓ 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