GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION/

PROVINSIALE EKSAMEN

NOVEMBER 2022

GRADE/*GRAAD* 11

MARKING GUIDELINES/

NASIENRIGLYNE

PHYSICAL SCIENCES: CHEMISTRY/
FISIESE WETENSKAPPE: CHEMIE
(PAPER/*VRAESTEL* 2)

8 pages/*bladsye*

QUESTION/*VRAAG* 1

1.1 B ✓✓ (2)

1.2 D ✓✓ (2)

1.3 B ✓✓ (2)

1.4 C ✓✓ (2)

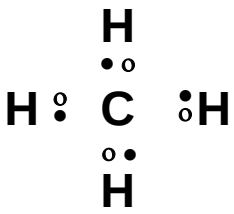
1.5 D ✓✓ (2)

1.6 C ✓✓ (2)

[12]

QUESTION/*VRAAG* 2

2.1

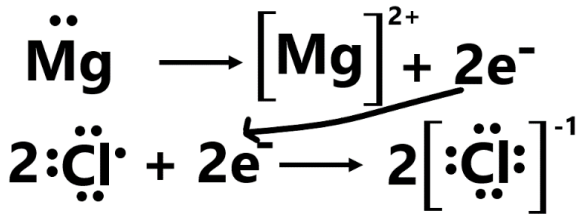


- ✓ Shape/*Vorm*
- ✓ Electrons and charge/*Elektrone en ladings*

(2)

2.2 covalent bond/*kovalente binding*✓ (1)

2.3 2.3.1



- ✓ Mg + 2e $^-$
- ✓ Empty brackets/*Leë hakies*
- ✓ Cl + 2e$^-$
- ✓ Cl Full brackets/*Cl Vol hakies*

(4)

2.3.2 EN Cl = 3,0

Mg = 1,2

ΔEN = 1,8✓ ∴ ionic/*ionies* ✓ (2)

[9]

QUESTION/*VRAAG* 3

3.1 Temperature at which the vapour pressure equals atmospheric pressure. ✓✓
Temperatuur waarby die dampdruk gelyk is aan die atmosferiese druk. ✓✓ (2)

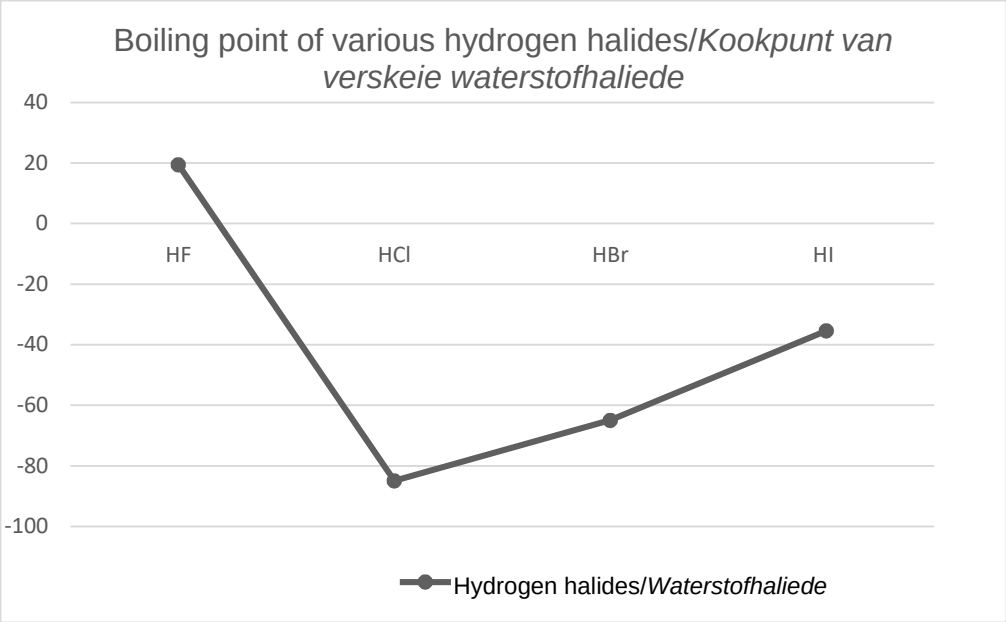
3.2 The stronger the intermolecular forces, the higher the boiling point./The boiling point is proportional to the strength of intermolecular forces. ✓
Hoe sterker die intermolekulêre kragte, hoe hoër die kookpunt./Die kookpunt is eweredig aan die sterkte van die intermolekulêre kragte. ✓

NOTE/*NOTA*: NOT DIRECTLY proportional/*NIE DIREK eweredig nie* (1)

3.3 3.3.1 B/HCℓ ✓
Lowest boiling point (Vapour inversely proportional to boiling point.) ✓
Laagste kookpunt (Dampdruk omgekeerd eweredig aan kookpunt.) ✓ (2)

3.3.2 A/HF ✓ (1)

3.4



Marking criteria/*Nasienkriteria*	
Heading/*Opskrif*	✓
Labelling axes/*Asse benoem*	✓
Scale/*Skaal*	✓
Four points correctly plotted/*Vier punte korrek geplot*	✓✓
Line graph drawn/*Lyngrafiek geteken*	✓

(6)

3.5
- Hydrogen halides (A)/HF have a hydrogen bond ✓ while (D)/HI has dipole-dipole forces. ✓
- Intermolecular forces in hydrogen bond (A)/HF are stronger than intermolecular forces in dipole-dipole forces (D)/HI. ✓
- More energy is needed to overcome intermolecular forces in hydrogen bond (A)/HF than in dipole-dipole forces (D)/HI. ✓
- *Waterstofhaliede(A)/HF het 'n waterstofbinding ✓ terwyl (D)/HI 'n dipool-dipool krag het. ✓*
- *Intermolekulêre kragte in waterstofbinding (A)/HF is sterker as die intermolekulêre kragte in dipool-dippool kragte (D)/HI. ✓*
- *Meer energie is nodig om die intermolekulêre kragte in waterstofbinding (A)/HF te oorkom as in dipool-dipool kragte. (D)/HI. ✓* (4)

[16]

QUESTION/*VRAAG* 4

4.1 It is a hypothetical gas that will obey all the gas laws under all conditions of pressure and temperature. ✓✓
Dit is 'n hipotetiese gas wat al die gaswette sal gehoorsaam onder alle toestande van druk en temperatuur. ✓✓ (2)

4.2 pV = nRT ✓
p x (0,012) ✓ = 3 x 8,31 x (273 + 15,8) ✓
p = 599 982 Pa ✓
∴ 599,98 kPa ✓ (5)

4.3 DECREASES/*NEEM AF*✓
The pressure of a gas is inversely proportional to the volume of the gas at a specific temperature. ✓
Die druk van 'n gas is omgekeerd eweredig aan die volume van die gas by 'n spesifieke temperatuur. ✓ (2)

[9]

QUESTION/*VRAAG* 5

5.1 CO_2✓ (1)

5.2 5.2.1 The amount of a substance having the same number of particles as there are atoms in 12 g carbon-12. ✓✓
Die hoeveelheid van 'n stof wat dieselfde hoeveelheid deeltjies het as wat daar atome in 12g koolstof-12 is. ✓✓ (2)

5.2.2 Na_2CO_3/Sodium carbonate ✓ because it reacts with excess hydrochloric acid. ✓
Na_2CO_3/Natriumkarbonaat ✓ want dit reageer met 'n oormaat soutsuur. ✓ (2)

5.2.3 $M(Na_2CO_3) = (2 \times 23) + 12 + (3 \times 16)$

$M(Na_2CO_3) = 106\ g.mol^{-1}$

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

$= \frac{10,6}{106}$ ✓

$n(Na_2CO_3) = 0,1\ mol$

$n(Na_2CO_3) = n(CO2) = 0,1\ mol$ ✓

$m = nM$ ✓

$= (0,1)(44)$ ✓

$= 4,4\ g$ ✓ (5)

5.2.4 $n(CO_2) = \frac{V}{V_m}$ ✓

$n(CO_2) = \frac{4,87}{22,4}$ ✓

$n(CO_2) = 0,217\ mol$

$n(CO_2) = 2n(NaCl) = 2(0,217)$ ✓

$n(NaCl) = 0,435\ mol$

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

$0,435 = \frac{m}{58,5}$ ✓

$m = 25,44\ g$ ✓ (5)

5.3 5.3.1 One mole of any gas occupies the same volume at the same temperature and pressure. ✓✓
Een mol van enige gas beslaan dieselfde volume by dieselfde temperatuur en druk. ✓✓ (2)

5.3.2 If 46 g occupies half of the molar gas volume, ✓ then the ratio is 2:1. ✓
Thus molecular formula to be able to occupy 22,4 dm^3 at STP is N_2O_4. ✓
Indien 46 g die helfte van die molêre gasvolume beslaan, ✓ *dan is die verhouding 2:1* ✓
Die molekulêre formule wat in staat is om 22,4 dm^3 by STD te beslaan is dus N_2O_4 ✓ (3)
[20]

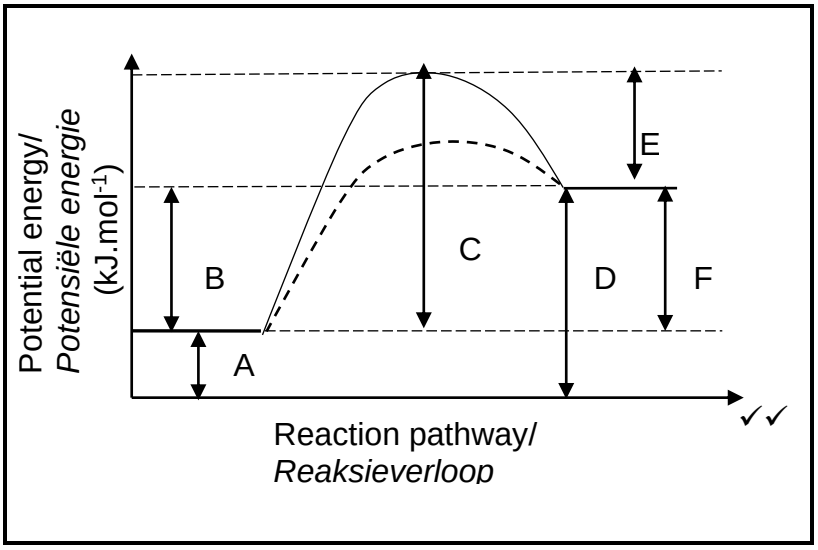
QUESTION/*VRAAG* 6

6.1 The surroundings will cool down. ✓✓
Die omgewing sal afkoel. ✓✓ (2)

6.2 E ✓ (1)

6.3 6.3.1 It will lower the activation energy ✓ by providing an alternative pathway. ✓
Dit sal die aktiveringsenergie verlaag ✓ *deur 'n alternatiewe pad te skep.* ✓ (2)

6.3.2



(2)

6.4 $\Delta H = D - A$ ✓✓ (2)
[9]

QUESTION/*VRAAG* 7

7.1 7.1.1 It is a proton (H^+ ion) donor. ✓✓
Dit is 'n proton (H^+ - ioon) skenker. ✓✓ (2)

7.1.2 Conjugate acid/*Gekonjugeerde suur*: $H_2SO_4(aq)$ ✓

Conjugate base/*Gekonjugeerde basis*: $SO_4^{2-}(aq)$ ✓ (2)

7.1.3 HSO_4^{-1} ✓✓

OR/*OF*

H_2O (2)

7.2 7.2.1 An acid that ionises completely in water ✓ to form a high concentration of H_3O^+ ions. ✓
'n Suur wat volledig in water ioniseer ✓ om 'n hoë konsentrasie H_3O^+ ione te vorm. ✓ (2)

7.2.2 nb = cbVb ✓

= (0,2)(20 x 10^{-3}) ✓

= 4 x 10^{-3} mol ✓ (3)

7.2.3 $n_a = \frac{1}{2}\ n_b$

$n_a = \frac{1}{2}$ (4 x 10^{-3}) ✓

= 2 x 10^{-3} mol ✓ (2)

7.2.4 $c_a = \frac{n}{V}$ ✓

$= \frac{2 \times 10-3}{12 \times 10-3}$ ✓

= 0,17 mol. dm^{-3} ✓ (3)
[16]

QUESTION/*VRAAG* 8

8.1 A reaction that involves an electron transfer. ✓✓
'n Reaksie waartydens elektronoordrag plaasvind. ✓✓ (2)

8.2 8.2.1 $A\ell \rightarrow A\ell^{3+} + 3e^-$ ✓✓ (2)

8.2.2 $Zn^{2+} + 2e^- \rightarrow Zn$ ✓✓ (2)

8.2.3 $2A\ell + 3Zn^{2+} \rightarrow 2A\ell^{3+} + 3Zn$ ✓✓ (2)

8.3 The aluminium metal (Aℓ) ✓ (1)
Die aluminium metaal (Aℓ) ✓ **[9]**

TOTAL/*TOTAAL*: 100

Taxonomy Grid/Taksonomie Rooster

	Recall		Comprehension		Analysis		Evaluation	
	Q no:	**Mark**	**Q no:**	**Mark**	**Q no:**	**Mark**	**Q no:**	**Mark**
	1.1	2	1.2	2	1.5	2		
	1.3	2	1.4	2				
			1.6	2				
Bonding	2.2	1	2.1	2	2.3.2	2		
			2.3.1	4				
Inter molecular	3.1	2	3.2	1	3.5	4		
			3.3	3				
			3.4	6				
Ideal gas	4.1	2			4.2	5	4.3	2
Quantitative	5.2.1	2	5.1	1	5.2.3	5		
	5.3.1	2	5.2.2	2	5.2.4	5	5.3.2	3
Energy			6.1	2	6.3.2	2		
			6.2	1	6.4	2		
			6.3.1	2				
Types	7.1.1	2	7.1.2	2	7.2.4	3		
	7.2.1	2	7.1.3	2				
			7.2.2	3				
			7.2.3	2				
	8.1	2	8.3	1	8.2	6		
Actual Total	18%	19	41%	40	35%	36	6%	5
Target Total	15%	15	40%	40	35%	35	10%	6