MEMORANDUM MARCH 2007 HG/*MEMORANDUM MAART 2007 HG*

SECTION A/*AFDELING A*

1.1	C	1.2	D	1.3	B	1.4	B	1.5	B
1.6	D	1.7	D	1.8	B	1.9	D	1.10	C
1.11	B	1.12	C	1.13	A	1.14	B	1.15	D

SECTION B/*AFDELING B*
QUESTION/ *VRAAG 2*

2.1.1.1 Hydrogen bonding / *Waterstofbinding* ✓ (1)

2.1.1.2 VD Waals forces/ *Vd Waals kragte* ✓ (1)

2.1.1.3 VD Waals forces/*Vd Waalskragte* ✓ (1)

2.1.2 Ammonia / *Ammoniak* ✓ (1)

2.1.3 Hydrogen bonding has the strongest IMF of the three substances ✓✓ (2)
Waterstofbinding het die sterkste IMK van die drie stowwe

2.1.4 Helium ✓ (1)

2.1.5 Helium has the weakest IMF between its particles ✓✓ (2)
Helium het die swakste IMK tussen sy deeltjies

2.2 pV = nRT

$$n_{initial} = \frac{pV}{RT} = \frac{100x10^{3} \times 10x10^{-3}}{8,31x(25+273)} = 0,4038 \text{ mol}$$ ✓✓✓ ✓ ✓✓

$$n_{escaped} = \frac{m}{M} = \frac{6,00}{32} = 0,1875 \text{ mol}$$ ✓ ✓

$n_{remaining} = 0,4038 - 0,1875 = 0,2163$ mol ✓

(11)

$$p = \frac{nRT}{V} = \frac{0,2163x8,31x298}{10x10^{-3}} = 53564 \text{ Pa} = 53,564 \text{ kPa}$$ ✓

OR/*OF*: pV = nRT ✓

$p \times 10x10^{-3}$ ✓ $= \frac{6}{32}$ ✓✓ $\times$ $8,31x298$ ✓✓

p = 46432,125 Pa ✓✓

Pressure in the vessel /*Druk in houer* = 100 000 – 46432,125 ✓✓
= 53567,875 Pa
= 53,567 kPa ✓

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QUESTION/*VRAAG* 3

3.1 ✓ ✓

$FeS + 2HCl \rightarrow FeCl_2 + H_2S$ (✓ for balancing/*balansering*) (3)

(Or any suitable metal sulphide eg. Na_2S)
(Of enige geskikte metaalslfied bv. Na_2S)
(Or any suitable acid eg. H_2SO_4)
(Of enige geskikte suur bv. H_2SO_4)

3.2 $Cr_2O_7^{2-}$ reduced to/*reduseer na* Cr^{3+} ✓✓ (2)

OR

Dichromate accepts electrons and is reduced
Dichromaat aanvaar elektrone en word gereduseer

3.3 $Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$ ✓✓ (2)

3.4 ✓ ✓ (2)
Has a low reduction potential and will oxidise in reaction
Het 'n lae reduksiepotensiaal and sal oksideer in reaksie

3.5 Test tube A – Redox reaction ✓
Proefbuis A – Redoks reaksie
Test tube B – Ion exchange/ precipitation reaction ✓ (2)
Proefbuis B – Ioonuitruilingsreaksie/ neerslag reaksie

3.6 ✓ ✓
$CuSO_4 + H_2S \rightarrow CuS + H_2SO_4$ (✓ for balancing/*balansering*) (3)

3.7 Turns $Pb(CH_3COO)_2$ black/ *Verander $Pb(CH_3COO)_2$ swart* ✓✓ (2)
(Any Pb^{2+} solution accepted/*Enige Pb^{2+}-oplossing word aanvaar*)

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QUESTION/*VRAAG 4*

4.1

4.1.1 $Ca(OH)_2$ ✓ + $2NH_4C\ell$ → $C\ell_2$ ✓ + $2NH_3$ + $2H_2O$ (3)

(✓ for balancing/*balansering*)

4.1.2 DOWNWARD DISPLACEMENT OF AIR ✓✓ (2)

AFWAARTSE VERPLASING VAN LUG

4.1.3 Less dense than air/ *Minder dig as lug* ✓✓ (2)

4.1.4 ✓ ✓

$HC\ell$ + NH_3 → $NH_4C\ell$ (✓ for balancing/*balansering*) (3)

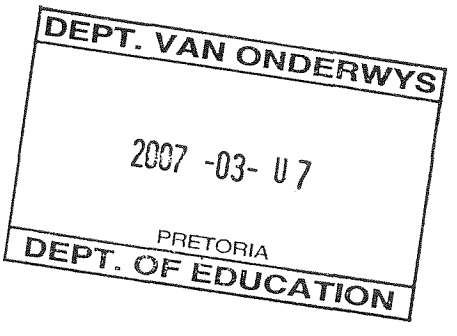
4.2

4.2.1 Chlorine gas/ *Chloorgas* ✓✓ (For/ *Vir* $C\ell_2$ - only/*slegs* ✓) (2)

4.2.2 REDUCED/ *GEREDUSEER* ✓ (1)

4.2.3 MnO_4^- + $8H^+$ + $5e^-$ → Mn^{2+} + $4H_2O$ ✓✓ (2)

[15]



QUESTION/*VRAAG 5*

5.1

5.1.1 Increases/ *Neem toe* ✓ (1)

5.1.2 FORWARD/ *VOORWAARTS* ✓ (1)

5.1.3 Increase in K_c indicates that forward reaction has been favoured. ✓
Toename in K_c toon dat die voorwaartse reaksie bevoordeel was
Increase in temperature favours the endothermic reaction. ✓ (4)
Toename in temperatuur bevoordeel die endotermiese reaksie
Therefore forward reaction is endothermic. ✓✓
Die voorwaartse reaksie is dus endotermies

5.1.4 Add a catalyst / *Voeg 'n katalisator by* ✓
Increase pressure/ *Verhoog die druk* ✓ (2)

5.2

	AgCℓ(s)	Br^-(aq)	AgBr(s)	$C\ell^-$(aq)
Mole formed/react *Mol gevorm/gereageer*		X ✓		X ✓
Mol at Eq/ *Mol by Ewewig*	Solid *Vaste stof*	(0,2-x)	Solid *Vaste stof*	X
Conc at Eq *Kons by Ewewig*		(0,2-x)		x

$$K_c = \frac{[C\ell^-]}{[Br^-]} = 360$$ ✓✓

$$\frac{x}{(0,2-x)} = 360$$ ✓ $x = 360(0,2 - x)$ $361x = 72$ $\therefore x = 0,199$ ✓ mol (8)

✓ ✓

$\therefore [Br^-] = 0,001$ mol.dm^{-3} and/*en* $[C\ell^-] = 0,199$ mol.dm^{-3}

5.3

5.3.1 A solution in which no more solute can dissolve at a particular temp. ✓✓ (2)
'n Oplossing waarin geen meer stof kan oplos by a sekere temperatuur
OR
Rate of dissociation = Rate of precipitation ✓ ✓
Tempo van dissosiasie = Tempo van neerslagvorming

5.3.2 $NaC\ell(s) \rightleftharpoons Na^+(aq) + C\ell^-(aq)$ (✓ for balancing) (3)

No negative marking/*Geen negatiewe nasien*

5.3.3 White precipitate forms/*Wit neerslag vorm.* ✓ (1)

5.3.4 Adding $HC\ell$ increases the $[C\ell^-]$ due to Common Ion effect. ✓
Byvoeging van $HC\ell$ verhoog die$[C\ell^-]$ agv die Gemeenskaplike ioon effek
Rate of the reverse reaction increases. ✓
Tempo van die terugwaartse reaksie neem toe.
More $NaC\ell(s)$ will form. ✓
Meer $NaC\ell(s)$ sal vorm (3)

5.3.5 $AgNO_3 + NaC\ell \rightarrow AgC\ell(s) + NaNO_3$ ✓✓✓
OR/*OF*: $Ag^+ + C\ell^- \rightarrow AgC\ell(s)$ ✓✓✓
OR/*OF*: $HC\ell + AgNO_3 \rightarrow AgC\ell(s) + HNO_3$ ✓✓✓ (3)

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QUESTION/*VRAAG* 6

6.1 Battery acid /*Battery suur* ✓ ✓ (2)

6.2

$pH = -\log[H^+(aq)] = 4,2$ ✓ $\quad [H^+(aq)] = 10^{-4,2} = 6,31\text{x}10^{-5}$ ✓ $mol.dm^{-3}$

$[H^+(aq)]\text{x}[OH^-(aq)] = 1 \text{ x } 10^{-14}$ ✓

$$[OH^-(aq)] = \frac{1\text{x}10^{-14}}{[H^+(aq)]} = \frac{1\text{x}10^{-14}}{6,31\text{x}10^{-5}} = 1,58\text{x}10^{-10} \text{ mol.dm}^{-3}$$ ✓ (5)

OR: pH + pOH = 14 ✓
4,2 + pOH = 14 ✓
pOH = 9,8 ✓
$[OH^-(aq)] = 10^{-9,8}$ ✓
$= 1,58 \text{ x}10^{-10} \text{ mol.dm}^{-3}$ ✓

6.3.1 INCREASES/ *NEEM TOE* ✓✓ (2)

6.3.2 INCREASES/ *NEEM TOE* ✓✓ (2)

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QUESTION/*VRAAG 7*

7.1 The point during a titration where an exact number of moles of acid will neutralise an exact number of moles of base. ✓✓ (2)
Die punt gedurende 'n titrasie waar 'n presiese getal mol suur 'n presiese getal mol basis sal neutraliseer

7.2 For NaOH:

$(c \times V)_{dilute} = (c \times V)_{conc}$ ✓ $\quad c_{dilute} = \frac{(cxV)_{conc}}{V_{dilute}} = \frac{1,63x0,05}{1} = 0,08$ ✓ $mol.dm^{-3}$

OR

Solution is diluted 20 x/ *Oplossing is 20 x verdun*
∴ Concentration must decrease 20 x/ *Konsentrasie moet dus 20 x verklein*
∴ 1,63/20 = 0,08 $mol.dm^{-3}$

$n_{NaOH} = cxV = 0,08x0,04 = 3,2x10^{-3}$ mol ✓ ✓

$2n_{NaOH} = n_{C_2H_2O_4}$ ✓ $\quad \therefore n = 1,6 \times 10^{-3}$ mol ✓ 10

$m_{C_2H_2O_4} = nxM = 1,6x10^{-3}x90 = 0,144$ g ✓ ✓ **[12]**

$\%\ purity = \frac{0,144}{0,25}x100 = 57,6\ \%$ ✓

QUESTION/*VRAAG 8*

8.1

8.1.1 Anode ✓

H_2 is oxidised because it has the highest oxidation potential ✓✓ OR (3)
H_2 word geoksideer omdat dit die hoogste oksidasie potensiaal het ***OF***
The oxidation number of H_2 increases therefore it is oxidized. **OR**
Die oksidasiegetal van H_2 neem toe en dus is dit geoksideer ***OF***
H_2 is losing electrons
H_2 verloor elektrone

8.1.2 $2H_2O + O_2 + 4e^- \rightarrow 4OH^-$ ✓✓ (2)

8.1.3 $2H_2 + O_2 \rightarrow 2H_2O$ ✓✓ (2)

8.1.4 $E^\circ_{cell} = E^\circ_{cathode} - E^\circ_{anode}$ ✓

✓ ✓
$= 0,4 - (-0,83)$
$= 1,23\ V$ ✓ (4)

8.1.5 In the fuel cell the Pt is inert/inactive; whereas in the Zn-Cu cell the Zn electrode forms ions thus decreasing its mass ✓✓ (2)
In die brandstofsel is die Pt onreaktief, waarteenoor Zn elektrode in die Zn-Cu-halfsel ione vorm en dus die massa daarvan verlaag

8.2

8.2.1 HNO_3(concentrated/ *gekonsentreerd*) ✓✓ (2)

8.2.2 Fe^{2+} is a stronger reducing agent than NO_2 and will reduce NO_3^- toNO_2✓✓
Fe^{2+} is 'n sterker reduseermiddel as NO_2 en sal NO_3^- reduseer na NO_2
OR NO_3^- is a stronger oxidizing agent than Fe^{3+} and will oxidize Fe^{2+} to Fe^{3+} (2)
OF *NO_3^- is 'n sterker oksideermiddel as Fe^{3+} and sal Fe^{2+} oksidee na Fe^{3+}*
OR Fe^{2+} is not a strong enough oxidizing agent to oxidize NO_3^- toNO_2
OF *Fe^{2+} is nie 'n sterk genoeg ksideermiddel om NO_3^- na NO_2 te oksideer.*

8.2.3 ✓ ✓
$Fe^{2+} + NO_3^- + 2H^+ \rightarrow Fe^{3+} + NO_2 + H_2O$ (3)
(✓ for balancing/*balansering*)

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QUESTION /*VRAAG* 9

9.1

9.1.1 Different boiling points/*Verskillende kookpunte* ✓✓ (2)

9.1.2 Ethane/*Etaan* ✓ (1)

9.1.3 Ethane has a lower boiling point than butane. ✓✓ (2)
Etaan het 'n laer kookpunt as butaan
OR/*OF*
Ethane has a smaller mass (number of electrons) than butane
Etaan het 'n kleiner massa (getal elektrone) as butaan

9.2

9.2.1 D ✓ (1)

9.2.2 C ✓ (1)

9.2.3 E ✓ (1)

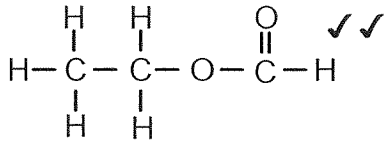
9.2.4 B ✓ (1)

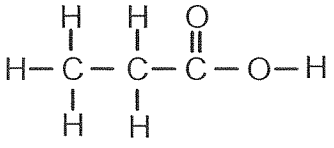
9.3

9.3.1 Methyl ethanoate/ *Metieletanoaat* ✓✓ (2)

9.3.2 Methanol/*Metanol* ✓✓

Ethanoic acid /*Etanoësuur* ✓✓ (4)

9.3.3  ✓✓
ethyl methanoate ✓
etielmetanoaat


propanoic acid
propanoësuur (3)

[18]

TOTAL/*TOTAAL:* 150