

POSSIBLE ANSWERS
FEB / MARCH 2007

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 Waals kragte* ✓ (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 $pV = nRT$

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

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

$$n_{\text{remaining}} = 0,4038 - 0,1875 = 0,2163 \text{ mol} \quad \checkmark$$

$$p = \frac{nRT}{V} = \frac{0,2163 \times 8,31 \times 298}{10 \times 10^{-3}} = 53564 \text{ Pa} = 53,564 \text{ kPa} \quad \checkmark$$

OR/OF: $pV = nRT$

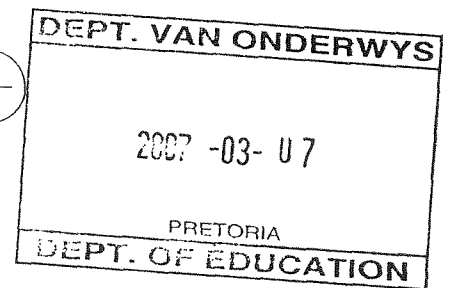
$$p \times 10 \times 10^{-3} = \frac{6}{32} \times 8,31 \times 298$$

$$p = 46432,125 \text{ Pa} \quad \checkmark$$

Pressure in the vessel / *Druk in houer* = $100\,000 - 46432,125$ ✓✓

$$= 53567,875 \text{ Pa}$$

$$= 53,567 \text{ kPa} \quad \checkmark$$

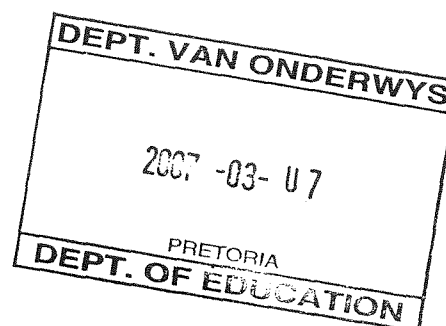


(11)

[20]

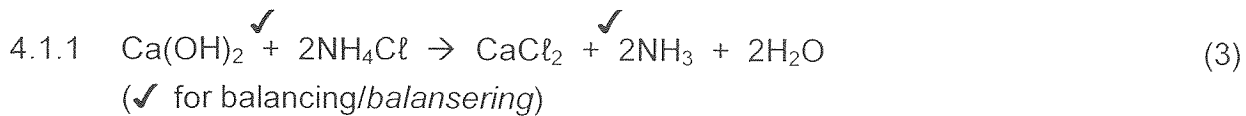
QUESTION/VRAAG 3

- 3.1 ✓ ✓
 $\text{FeS} + 2\text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2\text{S}$ (✓ 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
 $\text{Cr}_2\text{O}_7^{2-}$ reduced to/reduceer na Cr^{3+} ✓✓ (2)
 OR
 Dichromate accepts electrons and is reduced
 Dichromaat aanvaar elektrone en word gereduseer
- 3.3
 $\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{e}^- \rightarrow 2\text{Cr}^{3+} + 7\text{H}_2\text{O}$ ✓✓ (2)
- 3.4 Has a low reduction potential and will oxidise in reaction
 Het 'n lae reduksiepotensiaal and sal oksideer in reaksie (2)
- 3.5 Test tube A – Redox reaction ✓
 Proefbuis A – Redoks reaksie (2)
 Test tube B – Ion exchange/ precipitation reaction ✓
 Proefbuis B – Ioonuitruilingsreaksie/ neerslag reaksie
- 3.6 ✓ ✓
 $\text{CuSO}_4 + \text{H}_2\text{S} \rightarrow \text{CuS} + \text{H}_2\text{SO}_4$ (✓ for balancing/*balansering*) (3)
- 3.7 Turns $\text{Pb}(\text{CH}_3\text{COO})_2$ black/ Verander $\text{Pb}(\text{CH}_3\text{COO})_2$ swart ✓✓ (2)
 (Any Pb^{2+} solution accepted/Enige Pb^{2+} -oplossing word aanvaar)

[16]

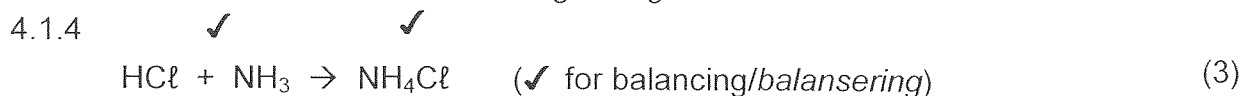
QUESTION/VRAAG 4

4.1



4.1.2 DOWNWARD DISPLACEMENT OF AIR ✓✓ (2)
 AFWAARTSE VERPLASING VAN LUG

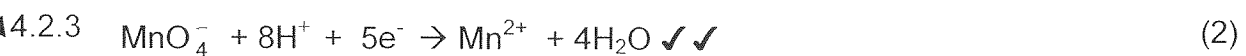
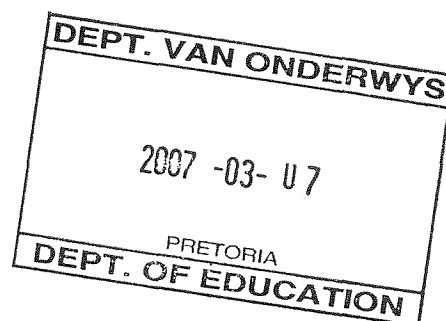
4.1.3 Less dense than air/ Minder dig as lug ✓✓ (2)



4.2

4.2.1 Chlorine gas/ Chloorgas ✓✓ (For/ Vir Cl_2 - only/slegs ✓) (2)

4.2.2 REDUCED/ GEREDUSEER ✓ (1)

**[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)

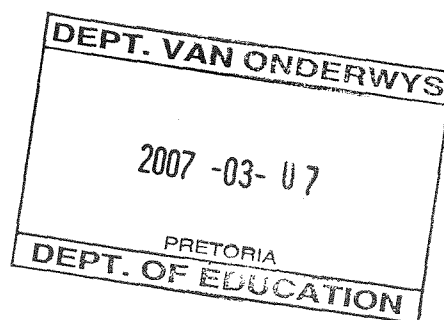
5.2

| | AgCl(s) | Br ⁻ (aq) | AgBr(s) | Cl ⁻ (aq) |
|--|----------------------------|----------------------|----------------------------|----------------------|
| Mole formed/react <i>Mol gevorm/gereageer</i> | | X ✓ | | X ✓ |
| Mol at Eq/ <i>Mol by Ewewig</i> | Solid <i>Vaste stof</i> | (0,2-x) | Solid <i>Vaste stof</i> | X |
| Conc at Eq <i>Kons by Ewewig</i> | | (0,2-x) | | x |

$$K_c = \frac{[Cl^-]}{[Br^-]} = 360 \quad \checkmark \checkmark$$

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

$$\therefore [Br^-] = 0,001 \text{ mol.dm}^{-3} \quad \checkmark \quad \text{and/en} \quad [Cl^-] = 0,199 \text{ mol.dm}^{-3} \quad \checkmark$$



5.3

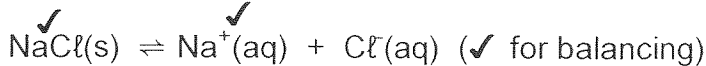
5.3.1 A solution in which no more solute can dissolve at a particular temp. (2)
'n Oplossing waarin geen meer stof kan oplos by a sekere temperatuur

OR

Rate of dissociation = Rate of precipitation

Tempo van dissosiasie = Tempo van neerslagvorming

5.3.2



| | |
|---|-----|
| No negative marking/Geen negatiewe nasien | (3) |
|---|-----|

5.3.3

White precipitate forms/Wit neerslag vorm. (1)

5.3.4

Adding HCl increases the [Cl⁻] due to Common Ion effect.

Byvoeging van HCl verhoog die[Cl⁻] agv die Gemeenskaplike ioon effek

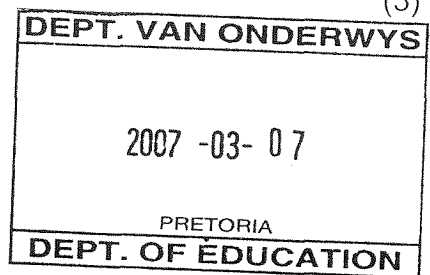
Rate of the reverse reaction increases. ✓

Tempo van die terugwaartse reaksie neem toe.

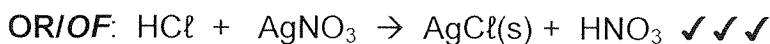
More NaCl(s) will form. ✓

Meer NaCl(s) sal vorm

(3)



5.3.5



(3)

[28]

QUESTION/VRAAG 6

6.1

Battery acid /Battery suur ✓✓

(2)

6.2

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

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

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

OR: $\text{pH} + \text{pOH} = 14$ ✓

$4,2 + \text{pOH} = 14$ ✓

$\text{pOH} = 9,8$ ✓

$[\text{OH}^-(aq)] = 10^{-9,8}$ ✓

$= 1,58 \times 10^{-10} \text{ mol.dm}^{-3}$ ✓

6.3.1

INCREASES/ NEEM TOE ✓✓

(2)

6.3.2

INCREASES/ NEEM TOE ✓✓

(2)

[11]

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:

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

OR

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

$$n_{\text{NaOH}} = c \times V = 0,08 \times 0,04 = 3,2 \times 10^{-3} \text{ mol}$$

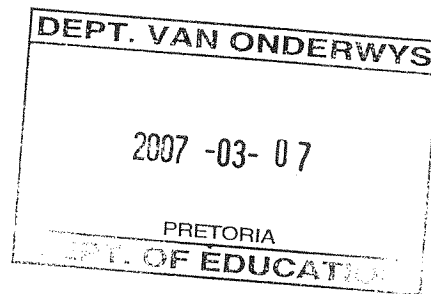
$$2n_{\text{NaOH}} = n_{\text{C}_2\text{H}_2\text{O}_4} \quad \therefore n = 1,6 \times 10^{-3} \text{ mol}$$

$$m_{\text{C}_2\text{H}_2\text{O}_4} = n \times M = 1,6 \times 10^{-3} \times 90 = 0,144 \text{ g}$$

$$\% \text{ purity} = \frac{0,144}{0,25} \times 100 = 57,6 \%$$

10

[12]



QUESTION/VRAAG 8

8.1

8.1.1 Anode ✓

H₂ is oxidised because it has the highest oxidation potential ✓✓ OR (3)

H₂ word geoksideer omdat dit die hoogste oksidasie potensiaal het OF

The oxidation number of H₂ increases therefore it is oxidized. OR

Die oksidasiegetal van H₂ neem toe en dus is dit geoksideer OF

H₂ is losing electrons

H₂ verloor elektrone

8.1.2 $2\text{H}_2\text{O} + \text{O}_2 + 4\text{e}^- \rightarrow 4\text{OH}^-$ ✓✓ (2)

8.1.3 $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$ ✓✓ (2)

8.1.4 $E^\circ_{\text{cell}} = E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$ ✓
 $= 0,4 - (-0,83)$
 $= 1,23 \text{ V}$ ✓ (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 brandstofselsel 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 HNO₃(concentrated/ gekonsentreerd) ✓✓ (2)

8.2.2 Fe²⁺ is a stronger reducing agent than NO₂ and will reduce NO₃⁻ to NO₂ ✓✓
Fe²⁺ is 'n sterker reduseermiddel as NO₂ en sal NO₃⁻ reduseer na NO₂
 OR NO₃⁻ is a stronger oxidizing agent than Fe³⁺ and will oxidize Fe²⁺ to Fe³⁺ (2)

OF NO₃⁻ is 'n sterker oksideermiddel as Fe³⁺ and sal Fe²⁺ oksideer na Fe³⁺

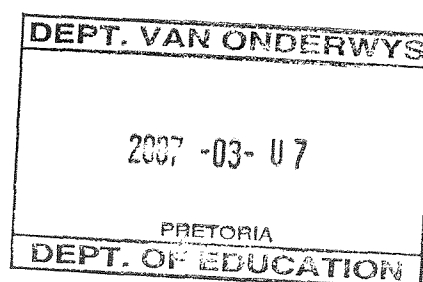
OR Fe²⁺ is not a strong enough oxidizing agent to oxidize NO₃⁻ to NO₂

OF Fe²⁺ is nie 'n sterk genoeg oksideermiddel om NO₃⁻ na NO₂ te oksideer.

8.2.3 $\text{Fe}^{2+} + \text{NO}_3^- + 2\text{H}^+ \rightarrow \text{Fe}^{3+} + \text{NO}_2 + \text{H}_2\text{O}$ (3)

(✓ for balancing/balansering)

[20]



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)

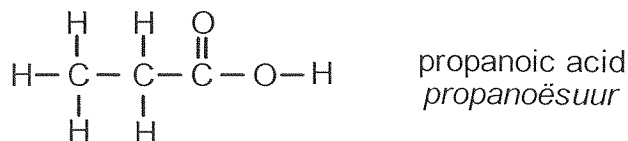
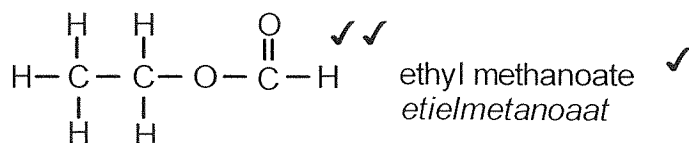
9.2.4 B ✓ (1)

9.3

9.3.1 Methyl ethanoate/ *Metieletanoaat* ✓✓ (2)9.3.2 Methanol/*Metanol* ✓✓Ethanoic acid /*Etanoësuur* ✓✓

(4)

9.3.3



(3)

[18]

TOTAL/TOTAAL: 150

