1.6 A ✓✓ (2)

1.7 A ✓✓ (2)

1.8 B ✓✓ (2)

1.9 D ✓✓ (2)

1.10 D ✓✓ (2)

QUESTION 8/*VRAAG 8*

8.1 A hydroxide ion can act as proton acceptor. ✓✓
'n Hidroksiedioon kan optree as protonontvanger. (2)

8.2 Dative covalent bond ✓
Datiefkovalente binding (1)

8.3 $HC\ell(aq) + H_2O(\ell)$ ✓ → $H_3O^+(aq) + C\ell^-(aq)$ ✓
OR/*OF*
$HC\ell(aq) + NH_3(g)$ ✓ → $NH_4^+(aq) + C\ell^-(aq)$ ✓ (2)

8.4 Concentration is the amount of solute per litre of solution. ✓✓
Konsentrasie is die hoeveelheid opgeloste stof per liter van 'n oplossing.
OR/*OF*
Concentration is the number of moles of a substance per dm^3 of solution.
Konsentrasie is die aantal mol van 'n stof per dm^3 –oplossing. (2)

8.5

OPTION 1/*OPSIE 1*	**OPTION 2/*OPSIE 2***
$c = \frac{n}{V}$ ✓ $0,75 = \frac{n}{5}$ ✓ n = 3,75 mol $c = \frac{n}{V}$ $= \frac{3,75}{1000}$ ✓ $= 3,75 \times 10^{-3}$ mol·dm^{-3} ✓	$c_1V_1 = c_2V_2$ ✓ (0,75)(5) ✓ = c_2(1000) ✓ $c_2 = 3,75 \times 10^{-3}$ mol·dm^{-3} ✓ **OPTION 3/*OPSIE 3*** ✓ ✓ $\frac{5}{1000} = \frac{c}{0,75}$ ✓ $c = 3,75 \times 10^{-3}$ mol·dm^{-3} ✓

(4)

8.6 **Mark allocation/Punte toekenning**

- Usage of formula(e) of c = n/V and/or n = m/M
- Usage or calculation of number of moles (3,75 mol) of HNO_3
- Ratio/*Verhouding* 2:1
- Usage of 74 $g.mol^{-1}$ in formula n = m/M
- Answer/*Antwoord*
- Correct conclusion/*Korrekte gevolgtrekking*

OPTION 1/*OPSIE 1*

$c = \frac{n}{V}$

$0,75 = \frac{n}{5}$

n = 3,75 mol ✓

✓ any one of the two formula/Enige een van formules

Ratio $HNO_3 : Ca(OH)_2$
2 : 1 ✓

$n(Ca(OH)_2)$ = 1,875 mol

$n = \frac{m}{M}$

$1,875 = \frac{m}{74}$ ✓

m = 138,75 g ✓

No, it is insufficient. ✓
Nee, dit is nie genoeg nie

POSITIVE MARKING FROM 8.5
POSITIEWE NASIEN VANAF 8.5
OPTION 2/*OPSIE 2*

$c = \frac{n}{V}$

$3,75 \times 10^{-3} = \frac{n}{1000}$

n = 3,75 mol ✓

✓ any one of the two formula/Enige een van formules

Ratio $HNO_3 : Ca(OH)_2$
2 : 1 ✓

$n(Ca(OH)_2)$ = 1,875 mol

$n = \frac{m}{M}$

$1,875 = \frac{m}{74}$ ✓

m = 138,75 g ✓

No, it is insufficient. ✓
Nee, dit is nie genoeg nie

POSITIVE MARKING FROM 8.5
POSITIEWE NASIEN VANAF 8.5
OPTION 3/OPSIE 3

$n = \frac{m}{M}$

$n = \frac{120}{74}$ ✓

n = 1,62 mol

✓ any one of the two formula/Enige een van formules

n = cV
= 3,75 x 10^{-3}(1000)
= 3,75 mol ✓

$HNO_3 : Ca(OH)_2$
2 : 1 ✓

$n(Ca(OH)_2) = ½(3,75)$
= 1,875 mol ✓

1,875 > 1,62 mol

No it is insufficient ✓
Nee dis nie genoeg nie

(6)
[17]

Reaksietipes Memo
November 2018/3

QUESTION 9/*VRAAG 9*

9.1 Reduction is a decrease in oxidation number ✓✓
Reduksie is die afname in oksidasiegetalle (2)

9.2 Mn is +7 / Mn^{7+} ✓ (1)

9.3 H_2S / S^{2-} ✓ (1)

9.4 The oxidation number of S increases ✓ from -2 to 0 ✓
Die oksidasiegetal van S neem toe van -2 na 0 (2)

9.5 MnO_4^- / Mn^{+7} ✓ (1)

9.6 $H_2S(g) \rightarrow S + 2H^+ + 2e^-$ ✓✓ (2)

9.7 $H_2S \rightarrow S + 2H^+ + 2e^-$
$MnO_4^- + 8H^+ + 5e^- \rightarrow 2Mn^{2+} + 4H_2O$ ✓
$2MnO_4^- + 5H_2S + 6H^+ \rightarrow 2Mn^{2+} + 5S + 8H_2O$ ✓ balancing ✓ equation (3)

[12]

1.9 B ✓✓ (2)

1.10 C ✓✓ (2)

QUESTION/*VRAAG 8*

8.1.1 A base is proton acceptor ✓✓
'n Basis is 'n protononttvanger ✓✓ (2)

8.1.2 $H_2SO_4(aq) + 2NaOH\ (aq)$ ✓ $\rightarrow Na_2SO_4\ (aq) + 2H_2O\ (\ell)$ ✓ balance/*balans* ✓ (3)

8.1.3 Sodium sulphate ✓✓/*Natriumsulfaat* ✓✓ (2)

8.1.4 HSO_4^- ✓✓ (2)

8.1.5 HSO_4^- and/*en* H_2SO_4 ✓✓
H_2O and/*en* H_3O^+ ✓✓ (4)

8.2.1

OPTION 1/*OPSIE 1*	**OPTION 2/*OPSIE 2***
$c = \frac{m}{MV}$ ✓	$n = \frac{m}{M}$
$c = \frac{6}{(40)(0,5)}$ ✓ ✓	$n = \frac{6}{40}$ ✓
$c = 0,3\ mol.dm^{-3}$ ✓	$n = 0,15$ mole / *mol*
	$c = \frac{n}{V}$ ✓
	$c = \frac{0,15}{0,5}$ ✓
	$c = 0,3\ mol.dm^{-3}$ ✓

(4)

8.2.2

$$n = \frac{m}{M}$$

$$n = \frac{6}{40} \checkmark$$

n = 0,15 mole/*mol* NaOH

NaOH : $NH_4C\ell$
1 : 1 ✓

$$n = \frac{m}{M}$$

$$0,15 = \frac{m}{53,5} \checkmark$$

m = 8,025 g $NH_4C\ell$

$$\frac{8,025}{10} \times 100 = 80,25\ \%$$ pure/*suiwer* ✓

100 – 80,25 ✓ = 19,75 % impurities/*onsuiwerhede* ✓

OR/*OF*

10 – 8,025 = 1,975

$$\frac{1,975}{10} \times 100 = 19,75\%$$ impurities/*onsuiwerhede*

(6)
[23]

QUESTION/*VRAAG 9*

9.1 Cr^{6+} OR/*OF* (+6) ✓✓ (2)

9.2 Gain of electrons ✓✓
Opneem van elektrone (2)

9.3 Fe^{2+}, ✓ the oxidation number increases from +2 to +3 ✓
Accept Fe if the oxidation numbers explained correctly
Fe^{2+}, ✓ die oksidasiegetal neem toe van +2 na +3 ✓
Aanvaar Fe indien die verduideliking van die oksidasiegetalle korrek is (2)

9.4 Cr^{6+} **OR/*OF*** $Cr_2O_7^{2-}$ ✓✓ (2)

9.5 $Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$ ✓✓ (2)

9.6 $6Fe^{2+} \rightarrow 6Fe^{3+} + 6e^-$ ✓

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

$Cr_2O_7^{2-} + 14H^+ + 6Fe^{2+} \rightarrow 2Cr^{3+} + 7H_2O + 6Fe^{3+}$ ✓✓

NOTE: If Fe-reaction was not shown and only net equation:
marks for reactants, products and balancing
***NOTA**: Indien die Fe-reaksie nie getoon word nie en slegs netto reaksie:*
Punte vir reaktante, produkte en balansering (3)
[13]

Reaksietipes Memo
November 2016/1

1.1 B ✓✓

1.4 A ✓✓

1.10 B ✓✓

QUESTION/*VRAAG* 6

6.1.1 Ampholyte ✓/*Amfoliet* (1)

6.1.2 HSO^-_4 .✓and/ en H_3O^+ ✓ (2)

6.2.1 **OPTION/*OPSIE* 1**

c = m/MV✓
= 3,36/(56)✓ (0,25)✓
= 0,24 mol.dm^{-3} ✓

OPTION/*OPSIE* 2

n = m/M = 3,36/56 ✓
✓ = 0,06 mol
c = n/V = 0,06 / 0,25 ✓
= 0,24 mol.dm^{-3}✓ (4)

6.3.1 Potassium sulphate ✓/ *Kaliumsulfaat* (1)

6.3.2 H_2O ✓ (1)

6.3.3 n(KOH) = cV ✓= (0,25)(0,025)✓ = 6,25 x 10^{-3} mol

$n(H_2SO_4) = ½\ n(KOH) = ½\ (6,25 \times 10^{-3})$ ✓= 3,125 x 10 $^{-3}$ mol

$m(H_2SO_4) = nM = (3,125 \times 10^{-3})(98)$✓ = 0,31 g✓ *(Accept* 0,306 g*)* (5)

[14]

QUESTION/VRAAG 7

7.1.1 The gain of electron(s) by a substance. ✓✓
Die wins van elektron(e) deur 'n stof. (2)

7.1.2 Al✓
The oxidation number increases ✓ from 0 to +3. ✓✓
Die oksidasiegetal neem toe van 0 na +3. (4)

7.1.3. n (Fe_2O_3) = m/M = 8/160 ✓ = 0,05 mol

n (Al) = m/M = 3,8/27 ✓ = 0,14 mol

n (Fe_2O_3) < n(Al) ✓ (OR/OF Fe_2O_3 is the limiting reagent/*Fe_2O_3 is die beperkte reagens)*

Notes/Aantekeninge:
- Showing calculations of limiting reagent (3 marks/*punte*)
  Toon berekeninge van beperkte reagens
- If NOT showing calculations of limiting reagent (4/7)
  Indien berekeninge van beperkte reagens NIE getoon.

n (Fe) = 2n(Fe_2O_3) = 2 x 0,05✓ = 0,1 mol

m (Fe) = nM = 0,1x 56✓ = 5,6g

% yield = 4,76/5,6 x 100 ✓
= 85% ✓ (7)

7.2 n(O_2) V/V_m ✓ = 4,48/22,4 ✓= 0,2 mol

n(C_4H_{10}) = 2/13 n(O_2) = 2(0,2)/13 ✓ = 0,03 mol

n = N/N_A
N = (0,03)(6,02 x 10^{23}) ✓= 1,806 x 10^{23} ✓ or/of 1,85 x 10^{23} (5)

7.3 X2) $4H^+ + NO_3^- + 3e^-$ ✓ → $NO + 2H_2O$ ✓ ✓bal

$H_2S \rightarrow 2H^+ + 2e^-$ to X3) $H_2S \rightarrow S + 2H^+ + 2e^-$✓

$2H^+ + 2NO_3^- + 3H_2S$ ✓→ $2NO + 4H_2O + 3S$ ✓ ✓bal (7)
[25]

Reaksietipes Memo
November 2015/1

1.2 C √√

1.6 A √√

1.7 B √√

1.8 C √√

QUESTION 6 / *VRAAG 6*

6.1 $M(Na_2SO_4) = 142\ g{\cdot}mol^{-1}$ √

$15 - 7{,}05 = 7{,}95g$ √ Na_2SO_4

$n = \frac{m}{M} = \frac{7.95}{142} = 0{,}0559\ mol$ √ Na_2SO_4

$n = \frac{m}{M} = \frac{7{,}05}{18} = 0{,}392\ mol$ √ H_2O

Ratio 1 : 7 $\therefore x = 7$ √ (5)

6.2 6.2.1 in 100 g:

$\frac{39.9}{12} = 3{,}325\ mol\ C$ √

$\frac{6.7}{1} = 6{,}7\ mol\ H$√

$\frac{53.4}{16} = 3{,}3375\ mol\ O$ √ Ratio: $C_1H_2O_1$ √

$M(C_1H_2O_1) = 12 + 2(1)+16 = 30\ g{\cdot}mol^{-1}$ √
and 60/30 = 2
Molecular formula / *molekulêre formule*: $C_2H_4O_2$ √ (6)

6.2.2 acid donates √ 1 H^+ ion √ / *suur doneer (skenk) 1 H^+ ion* (2)

6.3 6.3.1 $2HC\ell + CaCO_3$ √ $CaC\ell_2 + CO_2 + H_2O$ √√ balancing/*balansering* (3)

6.3.2 $M(CaCO_3) = 40 + 12 + 3(16) = 100\ g{\cdot}mol^{-1}$ √

$n = \frac{m}{M} = \frac{0.5}{100}$ √ = 0,005 mol √ $CaCO_3$

1 mol $CaCO_3$: 2 mol $HC\ell$ therefore/*dus* 0,005 : 0,01 mol $HC\ell$ √

$M(HC\ell) = 1 + 35,5 = 36,5\ g{\cdot}mol^{-1}$ √

M = nM = 0,01(36,5) = 0,365 g = 365 mg √ stomach acid/*maagsuur* (6)
[22]

QUESTION 7 / *VRAAG 7*

7.1 7.1.1 loss of electrons √√ / *verlies aan elektrone* (2)

7.1.2 MnO 2+ √
$A\ell_2O_3$ 3+ √

7.1.3 MnO √ Mn^{2+} reduced √ to / *gereduseer na* Mn
decrease √ in oxidation numbers/ *afname in oksidasiegetal*
OR oxidation number of Mn decreases from +2 to 0. √√ /
OF oksidasiegetal van Mn neem af van +2 na 0. (3)

7.2 $n = \frac{m}{M} = \frac{100}{27} = 3,7$ mol Aℓ √
$n = \frac{m}{M} = \frac{200}{55+16} = 2,82$ mol MnO √

Aℓ : MnO **ratio 2 : 3** √ ∴ 1,88 mol Aℓ : 2,82 mol MnO √

Aℓ in excess and MnO the limiting reagent. √ /
Aℓ in oormaat en MnO is die beperkende reagens (5)

7.3 7.3.1 $Cu \rightarrow Cu^{2+} + 2e^-$ √
$4H^+ + NO^{3-} + 3e^- \rightarrow NO + 2H_2O$ √√√

Mark positively / Merk positief (4)

7.3.2 $Cu \rightarrow Cu^{2+} + 2e^-$ (x3) √
$4H^+ + NO^{3-} + 3e^- \rightarrow NO + 2H_2O$ (x2) √
$3Cu + 8H^+ + 2NO^{3-}$ √ $\rightarrow 3Cu^{2+} + 2NO + 4H_2O$ √ (4)
[20]

1.1 C ✓✓ (2)

1.4 A ✓✓ (2)

QUESTION 9/*VRAAG 9*

9.1

9.1.1 An acid forms hydronium ions/hydrogen ions/H_3O^+ ions/H^+ ions ✓
in solution. ✓ (2)
'n Suur vorm hidroniumione/waterstofione/H_3O^+-ione/H^+-ione in oplossing.

9.1.2 Basic ✓ (1)
Basies

9.1.3 $CaCO_3(s) + \underline{2}HC\ell(aq) \rightarrow CaC\ell_2(aq) + \underline{2}H_2O(\ell) + CO_2(g)$ ✓ (1)

9.2

9.2.1 A substance that can react as either acid or base in a chemical reaction. ✓✓ (2)
'n Stof wat as of 'n suur of 'n basis kan reageer in 'n chemiese reaksie.

9.2.2 HSO_4^- ✓ (1)

9.2.3 SO_4^{2-} ✓ (1)

9.3

9.3.1 Sodium nitrate ✓
Natriumnitraat (1)

9.3.2

OPTION 1/*OPSIE 1*	**OPTION 2/*OPSIE 2***
$c(HNO_3) = \frac{n}{V}$	$c(HNO_3) = \frac{n}{V}$
$0,1 = \frac{n}{20 \times 10^{-3}}$ ✓	$0,1 = \frac{n}{20 \times 10^{-3}}$ ✓
$n(HNO_3) = = 0,002$ mol	$n(HNO_3) = = 0,002$ mol
$\underline{n(Na_2CO_3) = ½n(HNO_3)}$ $= ½(0,002)$ $= 0,001$ mol ✓	$\underline{n(Na_2CO_3) = ½n(HNO_3)}$ $= ½(0,002)$ $= 0,001$ mol ✓
$n(Na_2CO_3 \text{ in } 250\ cm^3) = \frac{250}{25} \times 0,001$ ✓ $= 0,01$ mol	
$n(Na_2CO_3 \text{ in } 250\ cm^3) = \frac{m}{M}$	
$\therefore 0,01 = \frac{m}{106}$ ✓	$n(Na_2CO_3 \text{ in } 250\ cm^3) = \frac{m}{M}$
$\therefore m = 1,06$ g ✓	$\therefore 0,01 = \frac{m}{106}$ ✓
	$\therefore m = 1,06$ g ✓

(5)

[14]

Reaksietipes Memo
November 2014/2

QUESTION 10/*VRAAG 10*

10.1 Decrease in oxidation number. ✓✓
Afname in oksidasiegetal. (2)

10.2
10.2.1 Cu ✓ (1)

10.2.2 Cu ✓
Oxidation number of Cu increases ✓ from 0 to +2. ✓
Oksidasiegetal van Cu neem toe van 0 tot +2. (3)

10.2.3 NO_3^- / HNO_3 ✓
NO_3^- gains electrons to form NO_2. ✓
NO_3^- *kry elektrone by om* NO_2 *te vorm.* (2)

10.3 $Cu \rightarrow Cu^{2+} + 2e^-$ ✓ (oxidation/*oksidasie*)
$NO_3^- + 2H^+ + e^- \rightarrow NO_2 + H_2O$ ✓ (reduction/*reduksie*) x2
$Cu + 4H^+ + 2NO_3^-$ ✓ $\rightarrow Cu^{2+} + 2NO_2 + 2H_2O$ ✓ Bal. ✓ (5)
[13]

2.7 A ✓✓ (2)
2.8 C ✓✓ (2)

VRAAG 10

10.1 'n Amfoliet is 'n stof wat as 'n suur of 'n basis kan optree. ✓✓
H_2O ✓ (3)

10.2 $HC\ell\ (aq) + H_2O\ (\ell) \rightarrow C\ell^-\ (aq) + H_3O^+\ (aq)$
$suur_1$ $basis_2$ $basis_1$ $suur_2$ ✓✓
OF
$HC\ell$ is 'n suur en $C\ell^-$ is die gekonjugeerde basis ✓
H_2O is 'n basis en H_3O^+ is die gekonjugeerde suur ✓ (2)

10.3 10.3.1 Indikator ✓ (1)

10.3.2 (i) ✓
$HC\ell$ is 'n suur ✓ en vorm H_3O^+ wat die pH verlaag ✓ (3)

10.4 ammoniumchloried ✓ $NH_4C\ell$ ✓ (2)
[11]

VRAAG 11

11.1 Oksidasienommer in SO_2 = 4 OF +4 ✓en in SO_3 = 6 OF +6 ✓ (2)

11.2 Oksidasie ✓ (1)

11.3 Reduseermiddel ✓
Sy oksidasiegetal verhoog wat aandui dat dit geoksideer word.✓ (2)
[5]