

Reaksietypes Memo

November 2018/1

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 $\text{HCl(aq)} + \text{H}_2\text{O(l)} \rightarrow \text{H}_3\text{O}^+(\text{aq}) + \text{Cl}^-(\text{aq})$ ✓
OR/OF
 $\text{HCl(aq)} + \text{NH}_3(\text{g}) \rightarrow \text{NH}_4^+(\text{aq}) + \text{Cl}^-(\text{aq})$ ✓ (2)
- 8.4 Concentration is the amount of solute per litre of solution. ✓✓
Konsentrasié 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.
Konsentrasié is die aantal mol van 'n stof per dm^3 -oplossing. (2)

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

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

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

$$n = 3,75 \text{ mol } \checkmark$$

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

Ratio $\text{HNO}_3 : \text{Ca}(\text{OH})_2$
2 : 1 ✓

$$n(\text{Ca}(\text{OH})_2) = 1,875 \text{ mol}$$

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

$$1,875 = \frac{m}{74} \checkmark$$

$$m = 138,75 \text{ g } \checkmark$$

No, it is insufficient. ✓

Nee, dit is nie genoeg nie

POSITIVE MARKING FROM 8.5

POSITIEWE NASIEN VANAF 8.5

OPTION 2/OPSIE 2

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

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

$$n = 3,75 \text{ mol } \checkmark$$

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

Ratio $\text{HNO}_3 : \text{Ca}(\text{OH})_2$
2 : 1 ✓

$$n(\text{Ca}(\text{OH})_2) = 1,875 \text{ mol}$$

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

$$1,875 = \frac{m}{74} \checkmark$$

$$m = 138,75 \text{ g } \checkmark$$

No, it is insufficient. ✓

Nee, dit is nie genoeg nie

POSITIVE MARKING FROM 8.5

POSITIEWE NASIEN VANAF 8.5

OPTION 3/OPSIE 3

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

$$n = \frac{120}{74} \checkmark$$

$$n = 1,62 \text{ mol}$$

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

$$n = cV$$

$$= 3,75 \times 10^{-3}(1000)$$

$$= 3,75 \text{ mol } \checkmark$$

$$\text{HNO}_3 : \text{Ca}(\text{OH})_2$$

$$2 : 1 \checkmark$$

$$n(\text{Ca}(\text{OH})_2) = \frac{1}{2}(3,75)$$

$$= 1,875 \text{ mol } \checkmark$$

$$1,875 > 1,62 \text{ mol}$$

No it is insufficient ✓

Nee dis nie genoeg nie

Reaksietypes 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 $\text{H}_2\text{S(g)}$ → $\text{S} + 2\text{H}^+ + 2\text{e}^-$ ✓✓ (2)
- 9.7 $\text{H}_2\text{S} \rightarrow \text{S} + 2\text{H}^+ + 2\text{e}^-$
 $\text{MnO}_4^- + 8\text{H}^+ + 5\text{e}^- \rightarrow 2\text{Mn}^{2+} + 4\text{H}_2\text{O}$ ✓
$$\underline{2\text{MnO}_4^- + 5\text{H}_2\text{S} + 6\text{H}^+ \rightarrow 2\text{Mn}^{2+} + 5\text{S} + 8\text{H}_2\text{O}}$$
 ✓ balancing ✓ equation (3)
[12]

Reaksietipes Memo

November 2017/1

1.9 B ✓✓ (2)

1.10 C ✓✓ (2)

QUESTION/VRAAG 8

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

8.1.2 $\text{H}_2\text{SO}_4(\text{aq}) + 2\text{NaOH}(\text{aq}) \rightarrow \text{Na}_2\text{SO}_4(\text{aq}) + 2\text{H}_2\text{O}(\ell)$ ✓ balance/balans ✓ (3)

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

8.1.4 HSO_4^- ✓✓ (2)

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

<p>8.2.1</p> <p>OPTION 1/OPSIE 1</p> $c = \frac{m}{MV} \quad \checkmark$ $c = \frac{6}{(40)(0,5)} \quad \checkmark$ $c = 0,3 \text{ mol} \cdot \text{dm}^{-3} \quad \checkmark$	<p>OPTION 2/OPSIE 2</p> $n = \frac{m}{M}$ $n = \frac{6}{40} \quad \checkmark$ $n = 0,15 \text{ mole / mol}$ $c = \frac{n}{V} \quad \checkmark$ $c = \frac{0,15}{0,5} \quad \checkmark$ $c = 0,3 \text{ mol} \cdot \text{dm}^{-3} \quad \checkmark$
--	---

Reaksietypes Memo

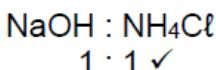
November 2017/2

8.2.2

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

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

$$n = 0,15 \text{ mole/mol NaOH}$$



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

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

$$m = 8,025 \text{ g NH}_4\text{Cl}$$

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

$$100 - 80,25 \checkmark = 19,75 \% \text{ impurities/onsuiwerhede} \checkmark$$

OR/OF

$$10 - 8,025 = 1,975$$

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

(6)
[23]

QUESTION/VRAAG 9

9.1 Cr⁶⁺ OR/OF (+6) ✓✓ (2)

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

9.3 Fe²⁺, ✓ the oxidation number increases from +2 to +3 ✓
Accept Fe if the oxidation numbers explained correctly
Fe²⁺, ✓ die oksidasiegetal neem toe van +2 na +3 ✓
Aanvaar Fe indien die verduideliking van die oksidasiegetalle korrek is (2)

9.4 Cr⁶⁺ OR/OF Cr₂O₇²⁻ ✓✓ (2)

9.5 Cr₂O₇²⁻ + 14H⁺ + 6e⁻ → 2Cr³⁺ + 7H₂O ✓✓ (2)

9.6 6Fe²⁺ → 6Fe³⁺ + 6e⁻ ✓
Cr₂O₇²⁻ + 14H⁺ + 6e⁻ → 2Cr³⁺ + 7H₂O
Cr₂O₇²⁻ + 14H⁺ + 6Fe²⁺ → 2Cr³⁺ + 7H₂O + 6Fe³⁺ ✓✓

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]

Reaksietypes 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

$$\begin{aligned}c &= m/MV \checkmark \\&= 3,36/(56) \checkmark (0,25) \checkmark \\&= 0,24 \text{ mol.dm}^{-3} \checkmark\end{aligned}$$

OPTION/OPSIE 2

$$\begin{aligned}n &= m/M = 3,36/56 \checkmark \\&= 0,06 \text{ mol} \\c &= n/V = 0,06 / 0,25 \checkmark \\&= 0,24 \text{ mol.dm}^{-3} \checkmark\end{aligned}\quad (4)$$

- 6.3.1 Potassium sulphate ✓/ Kaliumsulfaat (1)
- 6.3.2 H_2O ✓ (1)

$$\begin{aligned}n(\text{KOH}) &= cV \checkmark = (0,25)(0,025) \checkmark = 6,25 \times 10^{-3} \text{ mol} \\n(\text{H}_2\text{SO}_4) &= \frac{1}{2} n(\text{KOH}) = \frac{1}{2} (6,25 \times 10^{-3}) \checkmark = 3,125 \times 10^{-3} \text{ mol} \\m(\text{H}_2\text{SO}_4) &= nM = (3,125 \times 10^{-3})(98) \checkmark = 0,31 \text{ g} \checkmark \quad (\text{Accept } 0,306 \text{ g})\end{aligned}\quad (5)$$

[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. $n(\text{Fe}_2\text{O}_3) = m/M = 8/160 \checkmark = 0,05 \text{ mol}$

$$n(\text{Al}) = m/M = 3,8/27 \checkmark = 0,14 \text{ mol}$$

$n(\text{Fe}_2\text{O}_3) < n(\text{Al}) \checkmark$ (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 berekening van beperkte reagens
- If NOT showing calculations of limiting reagent (4/7)
Indien berekening van beperkte reagens NIE getoon.

$$n(\text{Fe}) = 2n(\text{Fe}_2\text{O}_3) = 2 \times 0,05 \checkmark = 0,1 \text{ mol}$$

$$m(\text{Fe}) = nM = 0,1 \times 56 \checkmark = 5,6 \text{ g}$$

$$\% \text{ yield} = 4,76/5,6 \times 100 \checkmark \\ = 85\% \checkmark$$

(7)

7.2 $n(\text{O}_2) V/V_m \checkmark = 4,48/22,4 \checkmark = 0,2 \text{ mol}$

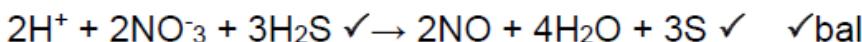
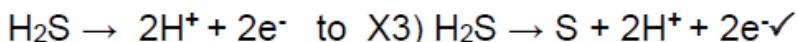
$$n(\text{C}_4\text{H}_{10}) = 2/13 n(\text{O}_2) = 2(0,2)/13 \checkmark = 0,03 \text{ mol}$$

$$n = N/N_A$$

$$N = (0,03)(6,02 \times 10^{23}) \checkmark = 1,806 \times 10^{23} \checkmark \text{ or/of } 1,85 \times 10^{23}$$

(5)

7.3 X2) $4\text{H}^+ + \text{NO}_3^- + 3\text{e}^- \checkmark \rightarrow \text{NO} + 2\text{H}_2\text{O} \checkmark \quad \checkmark \text{bal}$



(7)

[25]

Reaksietypes Memo
November 2015/1

1.2 C ✓✓

1.6 A ✓✓

1.7 B ✓✓

1.8 C ✓✓

QUESTION 6 / VRAAG 6

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

$$15 - 7,05 = 7,95 \text{ g } \checkmark \text{ Na}_2\text{SO}_4$$

$$n = \frac{m}{M} = \frac{7,95}{142} = 0,0559 \text{ mol } \checkmark \text{ Na}_2\text{SO}_4$$

$$n = \frac{m}{M} = \frac{7,05}{18} = 0,392 \text{ mol } \checkmark \text{ H}_2\text{O}$$

$$\text{Ratio } 1 : 7 \quad \therefore x = 7 \quad \checkmark \quad (5)$$

6.2 6.2.1 in 100 g:

$$\frac{39,9}{12} = 3,325 \text{ mol C } \checkmark$$

$$\frac{6,7}{1} = 6,7 \text{ mol H } \checkmark$$

$$\frac{53,4}{16} = 3,3375 \text{ mol O } \checkmark \quad \text{Ratio: C}_1\text{H}_2\text{O}_1 \checkmark$$

$$M(C_1H_2O_1) = 12 + 2(1) + 16 = 30 \text{ g} \cdot \text{mol}^{-1} \checkmark$$

and $60/30 = 2$

Molecular formula / molekuläre formule: $C_2H_4O_2$ ✓

(6)

Reaksietypes Memo

November 2015/2

6.2.2 acid donates $\sqrt{1 H^+}$ ion $\sqrt{/}$ suur doneer (skenk) $1 H^+$ ion (2)

6.3 6.3.1 $2HCl + CaCO_3 \sqrt{CaCl_2 + CO_2 + H_2O \sqrt{\sqrt{balancing/balansering}}}$ (3)

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

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

$1 \text{ mol } CaCO_3 : 2 \text{ mol } HCl$ therefore/dus $0,005 : 0,01 \text{ mol } HCl \sqrt{}$

$$M(HCl) = 1 + 35,5 = 36,5 \text{ g}\cdot\text{mol}^{-1} \sqrt{}$$

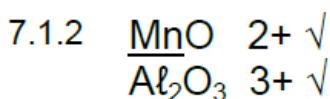
$$M = nM = 0,01(36,5) = 0,365 \text{ g} = 365 \text{ mg} \sqrt{}$$

(6)

[22]

QUESTION 7 / VRAAG 7

7.1 7.1.1 loss of electrons $\sqrt{\sqrt{}}$ / verlies aan elektrone (2)



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

$$7.2 \quad n = \frac{m}{M} = \frac{100}{27} = 3,7 \text{ mol } Al \sqrt{}$$

$$n = \frac{m}{M} = \frac{200}{55+16} = 2,82 \text{ mol } MnO \sqrt{}$$

$Al : MnO$ ratio $2 : 3 \sqrt{}$ $\therefore 1,88 \text{ mol } Al : 2,82 \text{ mol } MnO \sqrt{}$

Al in excess and MnO the limiting reagent. $\sqrt{}$ /

Al in oormaat en MnO is die beperkende reagens (5)

7.3 7.3.1 $Cu \rightarrow Cu^{2+} + 2e^-$ $\sqrt{}$
 $4H^+ + NO^{3-} + 3e^- \rightarrow NO + 2H_2O \sqrt{\sqrt{\sqrt{}}}$  Mark positively /
 Merk positief (4)

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

[20]

Reaksietypes Memo

November 2014/1

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. ✓
 'n Suur vorm hidroniumione/waterstofione/ H_3O^+ -ione/ H^+ -ione in oplossing. (2)

9.1.2 Basic ✓
Basies (1)

9.1.3 $\text{CaCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + 2\text{H}_2\text{O}(\ell) + \text{CO}_2(\text{g})$ ✓ (1)

9.2
 9.2.1 A substance that can react as either acid or base in a chemical reaction. ✓✓
 'n Stof wat as of 'n suur of 'n basis kan reageer in 'n chemiese reaksie. (2)

9.2.2 HSO_4^- ✓ (1)

9.2.3 SO_4^{2-} ✓ (1)

9.3
 9.3.1 Sodium nitrate ✓
Natriumnitraat (1)

	OPTION 1/OPSIE 1	OPTION 2/OPSIE 2
9.3.2	$c(\text{HNO}_3) = \frac{n}{V}$ $0,1 = \frac{n}{20 \times 10^{-3}}$ ✓ $n(\text{HNO}_3) = 0,002 \text{ mol}$ $n(\text{Na}_2\text{CO}_3) = \frac{1}{2}n(\text{HNO}_3)$ $= \frac{1}{2}(0,002)$ $= 0,001 \text{ mol}$ ✓ $n(\text{Na}_2\text{CO}_3 \text{ in } 250 \text{ cm}^3) = \frac{250}{25} \times 0,001$ ✓ $= 0,01 \text{ mol}$ $n(\text{Na}_2\text{CO}_3 \text{ in } 250 \text{ cm}^3) = \frac{m}{M}$ $\therefore 0,01 = \frac{m}{106}$ ✓ $\therefore m = 1,06 \text{ g}$ ✓	$c(\text{HNO}_3) = \frac{n}{V}$ $0,1 = \frac{n}{20 \times 10^{-3}}$ ✓ $n(\text{HNO}_3) = 0,002 \text{ mol}$ $n(\text{Na}_2\text{CO}_3) = \frac{1}{2}n(\text{HNO}_3)$ $= \frac{1}{2}(0,002)$ $= 0,001 \text{ mol}$ ✓ $n(\text{Na}_2\text{CO}_3 \text{ in } 250 \text{ cm}^3) = \frac{m}{M}$ $\therefore 0,01 = \frac{m}{106}$ ✓ $\therefore m = 1,06 \text{ g}$ ✓

Reaksietypes 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 $\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^-$ ✓ (oxidation/oksidasie)
 $\text{NO}_3^- + 2\text{H}^+ + \text{e}^- \rightarrow \text{NO}_2 + \text{H}_2\text{O}$ ✓ (reduction/reduksie) x2
 $\text{Cu} + 4\text{H}^+ + 2\text{NO}_3^- \rightarrow \text{Cu}^{2+} + 2\text{NO}_2 + 2\text{H}_2\text{O}$ ✓ Bal. ✓ (5)
[13]

Reaksietypes Memo

November 2013

2.7 A ✓✓

2.8 C ✓✓

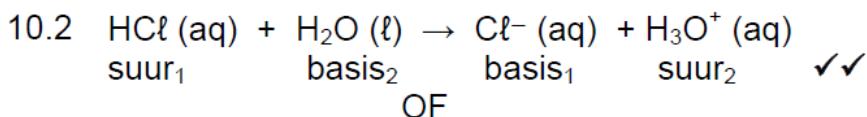
(2)

(2)

VRAAG 10

10.1 'n Amfoliet is 'n stof wat as 'n suur of 'n basis kan optree. ✓✓
H₂O ✓

(3)



HCl is 'n suur en Cl⁻ is die gekonjugeerde basis ✓
H₂O is 'n basis en H₃O⁺ is die gekonjugeerde suur ✓

(2)

10.3 10.3.1 Indikator ✓

(1)

10.3.2 (i) ✓
HCl is 'n suur ✓ en vorm H₃O⁺ wat die pH verlaag ✓

(3)

10.4 ammoniumchloried ✓ NH₄Cl ✓

(2)

[11]

VRAAG 11

11.1 Oksidasienommer in SO₂ = 4 OF +4 ✓ en in SO₃ = 6 OF +6 ✓

(2)

11.2 Oksidasie ✓

(1)

11.3 Reduseermiddel ✓

Sy oksidasiegetal verhoog wat aandui dat dit geoksideer word.✓

(2)

[5]