MULTIPLE CHOICE/ *MEERVOUDIGE KEUSE VRAE*

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

4 x 15 =[60]

QUESTION 2/*VRAAG 2*

2.1.1 C YY

2.1.2 B YY

2.1.3 A YY

2.1.4 E YY

2.1.5 B YY (10)

2.2 At low temperature the **intermolecular forces** in real gases **becomes stronger** (plays a larger role) resulting in a **decrease in pressure/volume**. [OR gas tends to liquify] Y (3)

*By lae temperature word **intermolekulêre kragte** in ware gasse **sterker** (speel 'n belangriker rol) wat 'n **verlaging in druk/volume** veroorsaak[OF gas neig om te vervloei.*

2.3.1 T = 298 K

$V = 3 \times 10^{-3}\ m^3$

$p = 165 \times 10^{3}\ Pa$

$m = 5,6\ g$

$$pV = nRT \qquad \therefore\ n = \frac{pV}{RT} = \frac{165 \times 10^{3} \times 3 \times 10^{-3}}{8,31 \times 298} = 0,2\ mol$$ Y Y Y

$$M = \frac{m}{n} = \frac{5,6}{0,2} = 28\ g.mol^{-1}$$ Y Y (6)

2.3.2 Nitrogen (N_2) / *Stikstof (N_2)* YY (2)

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QUESTION 3/ *VRAAG 3*

3.1 $Na_2SO_3 + 2HC\ell \rightarrow 2NaC\ell + SO_2 + H_2O$ (**1 balancing/ *balansering***) (3)

3.2 Cr^{3+} (2)

3.3 $SO_2 + 2H_2O \rightarrow SO_4^{2-} + 4H^+ + 2e^-$ (x3)

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

$Cr_2O_7^{2-} + 3SO_2 + 2H^+ \rightarrow 2Cr^{3+} + 3SO_4^{2-} + H_2O$ (6)

3.4 $Cr_2O_7^{2-}$ OR $K_2Cr_2O_7$ OR/*OF* potassium dicromate/ *kaliumdichromaat* *(2)*

[13]

QUESTION 4/ *VRAAG 4*

4.1.1 calcium hydroxide/ *kalsiumhidroksied* $[Ca(OH)_2]$ (**1 only/ *alleenlik***) (2)

4.1.2 blue/ *blou* (1)

4.1.3 ammonia/ *ammoniak* (NH_3) (2)

4.1.4 $Ca(OH)_2 + 2NH_4C\ell \rightarrow CaC\ell_2 + 2NH_3 + 2H_2O$ (**1 balancing/ *balansering***)
Water is product of this reaction.
Water is 'n produk van die reaksie (4)

4.2 As ammonia **dissolves** in water, the **pressure in the flask decreased** and the water is forced up the tube.
*Soos die ammoniak in die water **oplos**, sal die **druk in die fles verlaag** en water in die buisie opgeforseer word.* (4)

[13]

QUESTION 5/ *VRAAG 5*

5.1 $2C\ell^- \rightarrow C\ell_2 + 2e^-$

$MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$

$2MnO_4^- + 10C\ell^- + 16H^+ \rightarrow 2Mn^{2+} + 5C\ell_2 + 8H_2O$

OR/OF $2KMnO_4 + 16HC\ell \rightarrow 5C\ell_2 + 2MnC\ell_2 + 2KC\ell + 8H_2O$ (4)

5.2.1 $C\ell_2 + 2KBr \rightarrow 2KC\ell + Br_2$ (**1 balancing/*balansering***) (3)

5.2.2 $KC\ell$ [potassium chloride/*kaliumchloried*] (2)

5.2.3 Br_2 [bromine/ *broom*] (2)

5.3 $C\ell^-$ is not a **strong enough RA** to reduce **MnO_2 to Mn^{2+}**
or MnO_2 is not a **strong enough OA** to oxidise **$C\ell^-$ to $C\ell_2$** (4)
*$C\ell^-$ in nie 'n **sterk genoeg RM** om **MnO_2 na Mn^{2+}** te reduseer nie*
*of MnO_2 is nie 'n **sterk genoeg OM** om **$C\ell^-$ na $C\ell_2$** te oksideer nie*

[15]

QUESTION 6/ *VRAAG 6*

6.1 $2NO \rightarrow O_2 + N_2$ (2)

6.2 Equilibrium is reached. The rates of the forward and reverse reactions are equal. (3)
Ewewig is bereik. Die tempo van die voorwaartse reaksie is gelyk aan die tempo van die terugewaartse reaksie

6.3.1 decreased/ *afgeneem* (1)

6.3.2 exothermic At 15 min the **rate of the forward reaction is greater** than the rate of the reverse reaction, i.e. a **decrease in temperature** favoured the forward reaction. (3)
*Eksotermies. By 15 min is die **tempo van die voorwaartse reaksie groter** as die tempo van die terugwaartse reaksie, d.i. 'n **afname in temperatuur** bevoordeel die voorwaartse reaksie*

6.3.3 Increases/ *neem toe* (2)

6.4.1 Increased/ toe ge*neem* (1)

6.4.2 Increase in pressure increased both rates. As the number of moles of gas molecules of the reactant and product is equal, the quantity of each gas will be **the same**. (3)
*Toename in druk verhoog beide reaksietempos. Aangesien die aantal mol van gasmolekules van die reagense en produkte dieselfde is, sal die hoeveelheid van elke gas **dieselfde** wees.*

[15]

QUESTION 7/ *VRAAG 7*

7.1

	A_2	+	2B	→	2AB
initial (mol) *mol aanvanklik*	x		2		0
used/formed *gebruik/gevorm*	0,2		0,4		0,4 Y
Eq (mol) *Ew (mol*	x –0,2		1,6		0,4
[Eq] / *[Ewewig]*	x –0,2 Y		1,6 Y		0,4 Y

$$K_C = \frac{[AB]^2}{[A_2][B]^2} = \frac{(0,4)^2}{(x - 0,2)(1,6)^2} = 0,5 \quad \text{YY Y}$$

$\therefore$ $0,5\,[(x - 0,2)\,(1,6)^2] = (0,4)^2$

$\therefore$ $1,28x - 0,256 = 0,16$

$\therefore$ $x = 0,325$ mol Y (8)

If it was not shown how concentrations were obtained and they are:
Correct – give marks in substitution (Max:**5/8**)

Incorrect – only mark for correct K_c expression (Max: **1/8)**

As daar nie aangedui word hoe konsentrasies verkry is nie en dit is:
Korrek *– gee punte vir substitusies (Maks:* ***5/8****)*

Foutief *– slegs een punt vir korrekte K_c-uitdrukking (Maks:* ***1/8****)*

If table or calculations were shown but is wrong, carry that to the substituition.
No mark for the answer (Max: **4/8)**
As tabel of berekeninge aangedui word maar dit is foutief, dra oor na die substitusie.
Geen punt vir antwoord. (Maks: ***4/8****)*

7.2 equal/ *gelyk* YY (2)

7.3 turns darker/deeper red/ *word donkerder rooi* YY (2)
[12]

QUESTION 8 */VRAAG 8*

8.1 $[NaOH] = \frac{m}{MxV} = \frac{8}{40 \times 0,35}$ YY = 0,57 mol.dm^{-3} YY

$n(NaOH) = cV$ Y $= 0,57 \times 15 \times 10^{-3}$ Y $= 0,0085$ mol

2 mol NaOH neutralises 1 mol H_2SO_4 Y

$\therefore n(H_2SO_4) = ½ \times 0,0085 = 4,3 \times 10^{-3}$ mol

$\therefore [H_2SO_4] = \frac{n}{V} = \frac{4,3 \times 10^{-3}}{20 \times 10^{-3}}$ Y = 0,21 mol.dm^{-3} Y

OR

$\frac{c_a V_a}{c_b V_b} = \frac{1}{2}$ Y

$\therefore \frac{c_a \times 20}{0,57 \times 15}$ Y $= \frac{1}{2}$ Y

$\therefore c_a = 0,21$ mol.dm^{-3} Y

OR/OF

$p_a V_a c_a = p_b V_b c_b$ Y

$\therefore 2 \times 20 \times c_a = 1 \times 15 \times 0,57$ Y Y Y

$\therefore c_a = 0,21$ mol.dm^{-3} Y

(7)

8.2.1 $HC\ell + H_2O \rightarrow H_3O^+ + C\ell^-$ YY or/*of* $HC\ell \rightarrow H^+ + C\ell^-$

$HC\ell$ ionises/dissociates to form H_3O^+/ H^+ in water. YY
Increase in H_3O^+/ H^+ results in decrease in pH YY (4)
$HC\ell$ ioniseer/dissosieer om H_3O^+/ H^+ in water te vorm
Toename in H_3O^+/ H^+ veroorsaak 'n afname in pH

8.2.2 pH = 4
$[H^+] = 1 \times 10^{-4}$ mol.dm^{-3} YY
$2\ HC\ell + Na_2CO_3 \rightarrow 2NaC\ell + CO_2 + H_2O$
2 mol of $HC\ell$ neutralises/*neutraliseer* 1 mol Na_2CO_3 Y YY
no. of mol of Na_2CO_3 required to neutralise $HC\ell$ / Y
aantal mol Na_2CO_3 benodig om $HC\ell$ te neutraliseer
$\therefore = ½ \times 1 \times 10^{-4}$ mol
$\therefore = 0,5 \times 10^{-4}$ mol Y

Mass of Na_2CO_3 required: $m = nxM = 0,5 \times 10^{-4} \times 106$ g $= 5,3 \times 10^{-3}$g YY Y Y (9)
Massa Na_2CO_3 benodig:

8.2.3 Increase salinity/ More $NaC\ell$ in water YY (2)
Verhoog soutgehalte van water/ Meer $NaC\ell$ in water

[22]

QUESTION 9/*VRAAG 9*

9.1.1 $Ce \rightarrow Ce^{3+} + 3e^-$ YY (2)

9.1.2 $\underline{Pd^{2+} + 2e^- \rightarrow Pd}$
$2Ce + 3Pd^{2+} \rightarrow 2Ce^{3+} + 3Pd$ YYY (3)

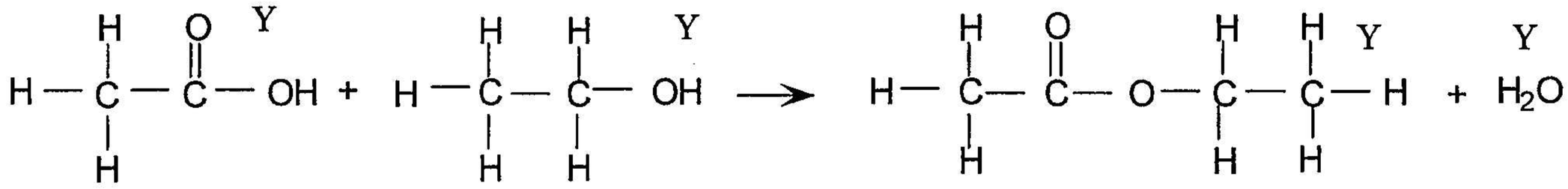
9.1.3 $E^\circ_{cell/sel} = E^\circ_{OA} - E^\circ_{RA}$ YY OR $E^\circ_{cell/sel} = E^\circ_{CAT} - E^\circ_{AN}$
$= 0,99 - (-2,3)$ YY Y
$= 3,29V$ YY (4)

9.2.1 B^{2+} YY (2)

9.2.2 B and/*en* C YY (2)
[13]

QUESTION 10/ *VRAAG 10*

10.1.1



Y Y (4)

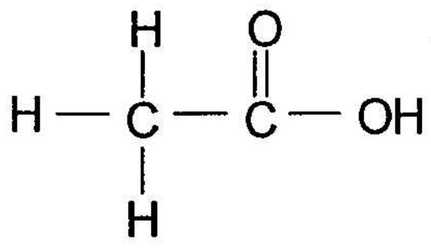
10.1.2 A and/*en* F YY (2)

10.1.3 ethylmethanoate / *etielmetanoaat* YY (2)

10.1.4 but – 2 –ene YY (2)

10.2.1 Oxidation/ *Oksidasie* YY (2)

10.2.2 Ethanoic acid/ *Etanoësuur* YY (2)



(2)
[16]
TOTAL: 200