
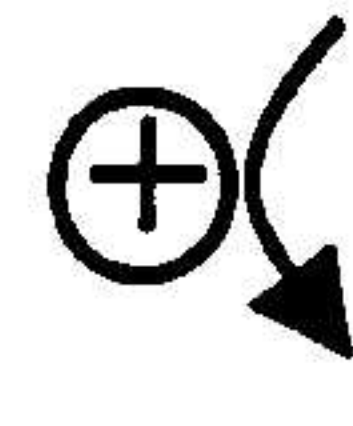


POSSIBLE ANSWERS FOR:

PHYSICAL SCIENCE SG PAPER 2
NATUUR- EN SKEIKUNDE SG VRAESTEL 2

EXPLANATION OF SYMBOLS

	2.2.2	x	(0/2)
	2.2.3	Means that if 2.2.2 is wrong, then 2.2.3 will also be wrong according to rule 16.8 in the Guideline Document. <i>Beteken dat indien 2.2.2 verkeerd is, dan is 2.2.3 ook volgens reël 16.8 in die Riglyndokument, verkeerd.</i>	
			(0/3)
	6.4	x	(0/1)
	6.5	Means that if 6.4 is wrong, the error is carried to 6.5 and marked positively according to rule 16.8 in Guideline Document. <i>Beteken dat indien 6.4 verkeerd is, en die fout na 6.5 oorgedra word, word dit positief volgens reël 16.8 in die Riglyndokument, nagesien.</i>	

QUESTION 1 / VRAAG 1

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

[45]

QUESTION 2 / VRAAG 2

2.1 2.1.1 He ✓✓ (2)

2.1.2 Van der Waals ✓✓ OR/OF London OR/OF Momentary dipoles/Momentele dipole
OR/OF Instantaneous dipoles/Tydlike dipole (2)2.1.3 CCl₄ ✓✓ (2)

2.2 2.2.1 $\frac{p_1 V_1}{T_1} = \frac{p_2 V_2}{T_2}$ ✓

$$\frac{250 \times 1,5}{300} = \frac{p_2 \times 1,75}{323}$$

$p_2 = 230,7 \text{ kPa}$ ✓

OR/OF = $2,3 \times 10^5 \text{ Pa}$

$$\frac{p_1 V_1}{T_1} = \frac{p_2 V_2}{T_2} \quad \checkmark$$

$$\therefore p_2 = \frac{p_1 V_1 T_2}{V_2 T_1} \quad \checkmark$$

$$\therefore p_2 = \frac{250 \times 1,5 \times 323}{1,75 \times 300} \quad \checkmark$$

$$\therefore p_2 = 230,7 \text{ kPa} \quad \checkmark$$

Accept values for V_1 and V_2 conversions, provided that the same factor was used / Aanvaar waardes vir V_1 en V_2 -omskakelings, maar slegs as dieselfde faktor gebruik was

(5)

2.2.2 Increases/Neem toe ✓✓ (2)

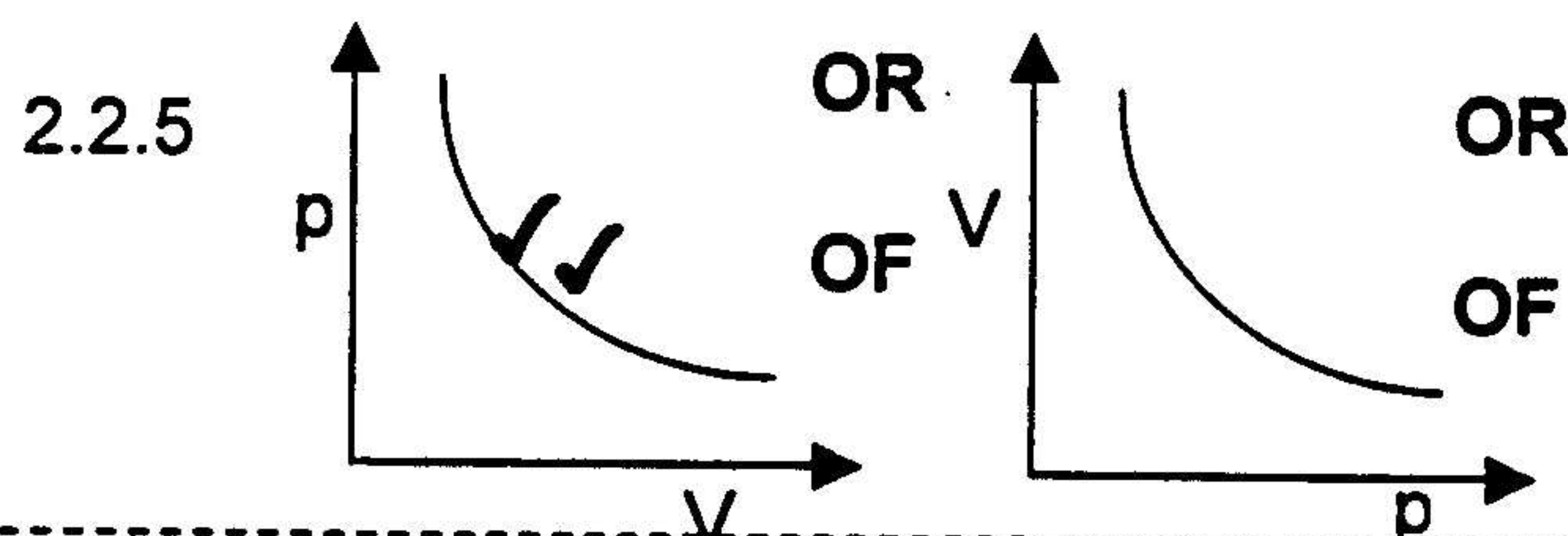
2.2.3 The temperature is an indication of the average kinetic energy of the molecules. ✓ The greater the kinetic energy, the greater the speed of the molecules. ✓

Die temperatuur is 'n aanduiding van die gemiddelde kinetiese energie van die molekule. Hoe groter die kinetiese energie dus is, hoe groter is die spoed.

$T \propto E_k \quad \checkmark \quad \therefore v \propto E_k \quad \checkmark$

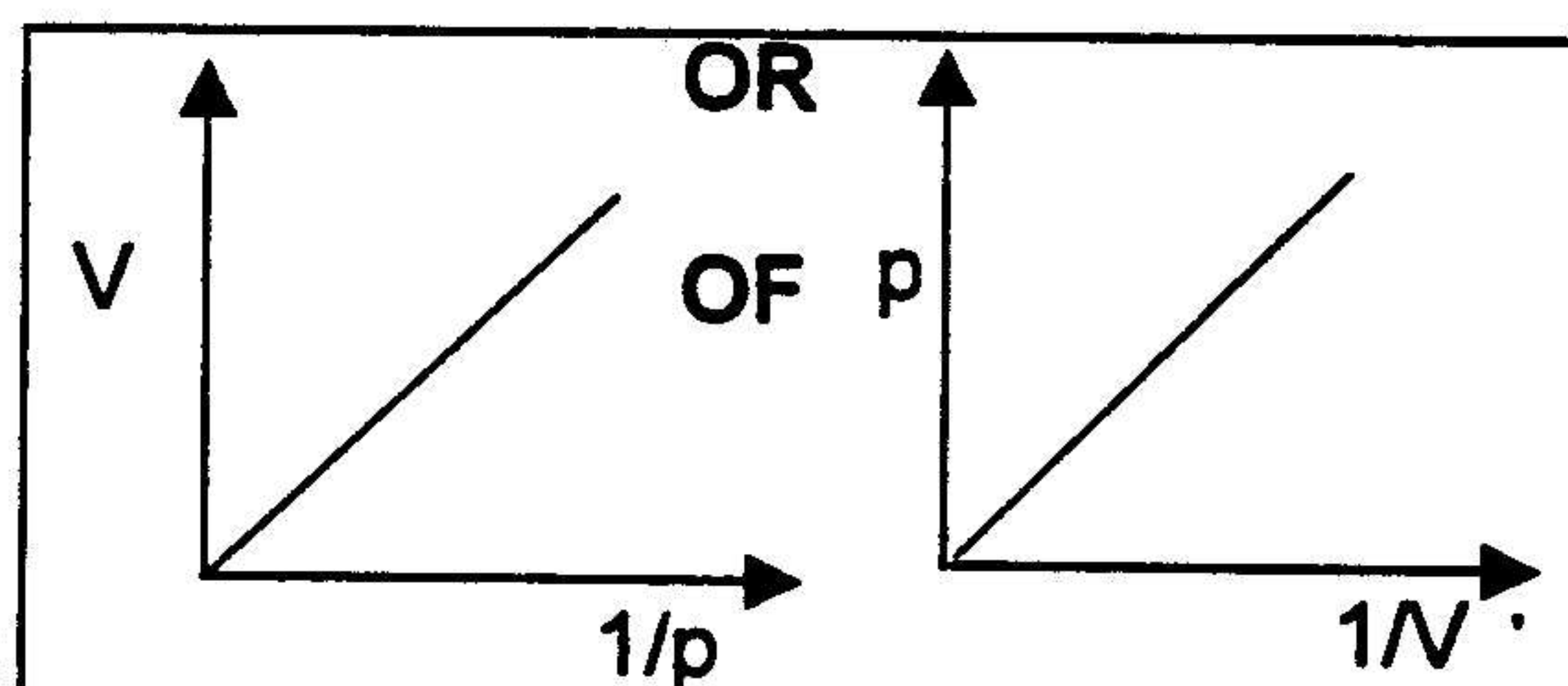
Temperature is directly proportional to speed / *Temperatuur is direk eweredig aan die spoed* OR / OF $T \propto v \quad (1/2)$

2.2.4 Pressure/Druk ✓✓ (2)



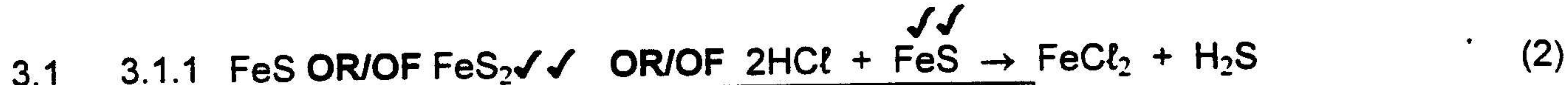
Labelling of axes not required. If labels are given, they must be correct. *Benoeming van asse nie vereis. Indien gegee, moet dit korrek wees.* If not/Indien nie: (0/2)

2.2.5 is marked independently from 2.2.4/
2.2.5 word onafhanklik van 2.2.4 gemerk



Labels must be correct. *Asse moet benoem word.* If not/Indien nie: (0/2)

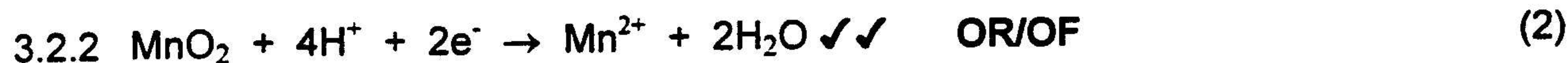
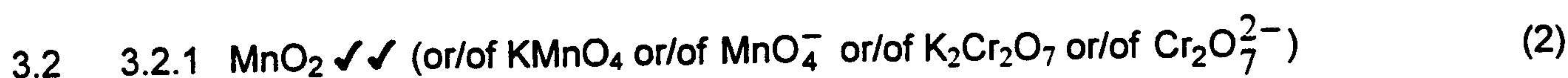
[24]

QUESTION 3 / VRAAG 3

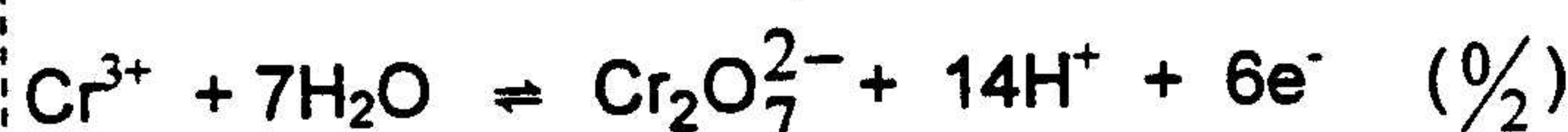
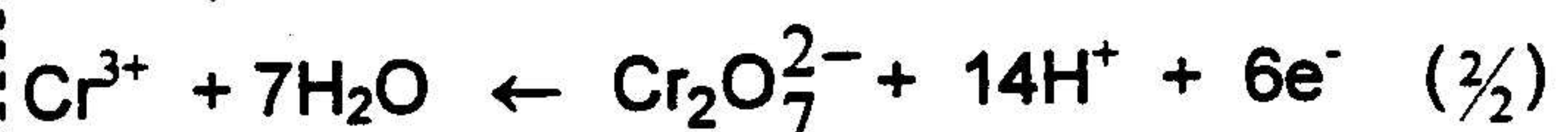
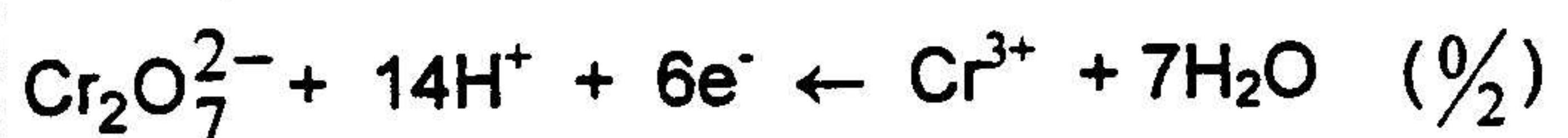
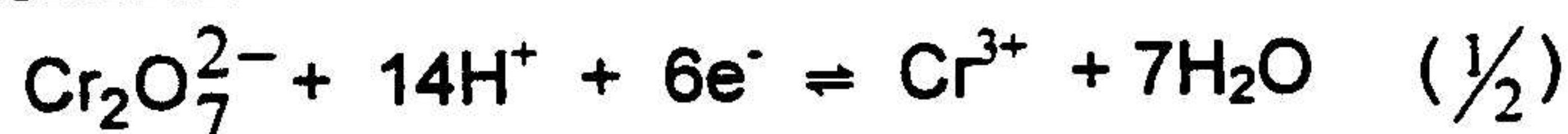
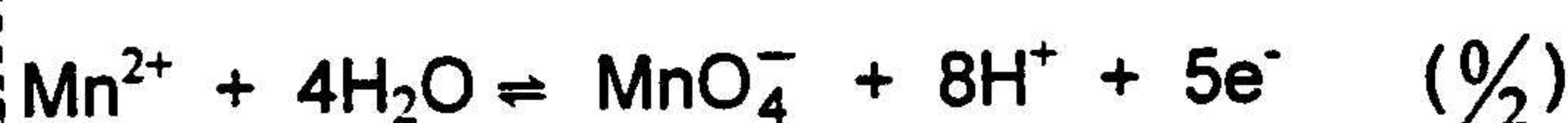
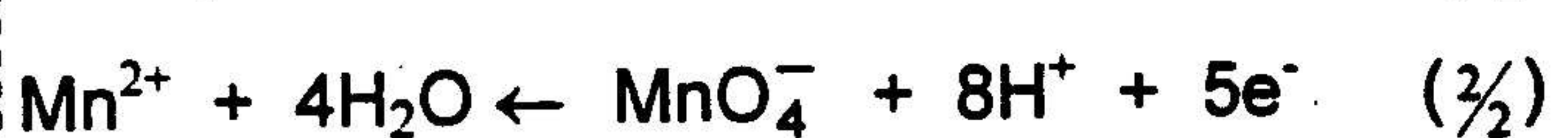
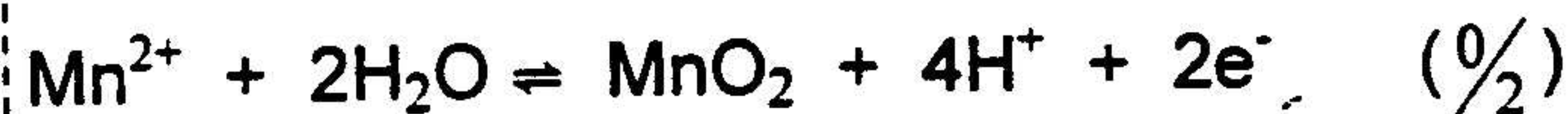
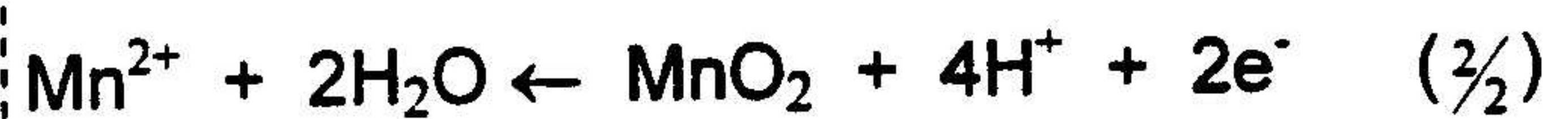
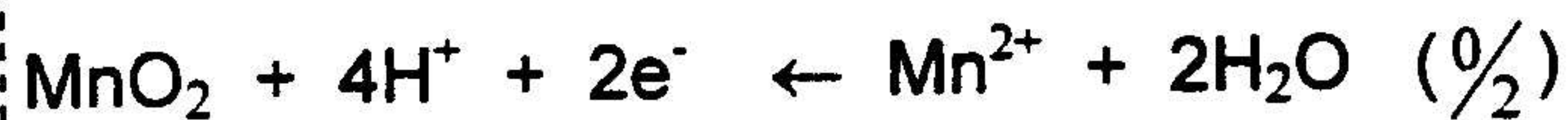
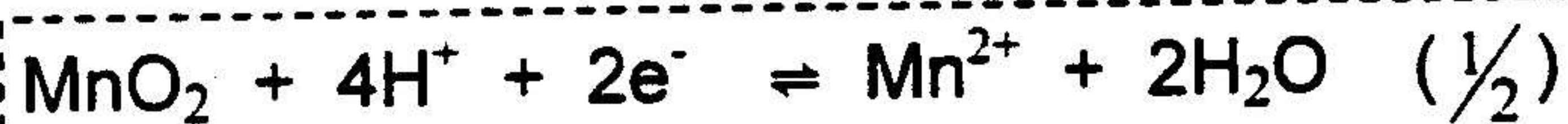
Correct name/ *Korrekte naam* ($\frac{1}{2}$)

Correct name followed by correct formula / *Korrekte naam gevolg deur korrekte formule* ($\frac{2}{2}$)
 Correct name followed by wrong formula / *Korrekte naam gevolg deur verkeerde formule* ($\frac{1}{2}$)

3.1.2 Yellow (yellow-white/cream/milky/sulphur) precipitate (solid /substance) forms
Geel (geel-wit/room/melkerige/swawel) neerslag (vaste stof/stof) word gevorm. (2)

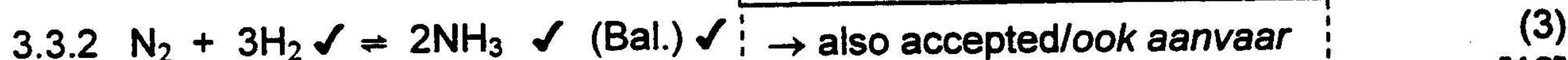


3.2.1 and 3.2.2 **MUST** correspond / 3.2.1 en 3.2.2 **MOET** ooreenstem



IF ionic charges of H^+ are omitted, 1 mark is forfeited per equation (not applicable to electrons)
 AS *ioonlading van H^+ weggelaat is, word 1 punt per vergelyking verbeur. (nie van toepassing op e^-)*

IF equation is unbalanced, 1 mark is forfeited per equation
INDIEN *vergelyking ongebalanseerd is, word 1 punt per vergelyking verbeur.*
 IF equation is incomplete/**INDIEN** *vergelyking onvolledig is - ($\frac{0}{2}$)*



Incorrect balancing/*Foutiewe balansering* (minus 1)

[16]

QUESTION 5 / VRAAG 5

5.1 5.1.1 A solution in which a solid is in equilibrium with its ions ✓✓

OR a solution in which no more of the solid can dissolve in the solvent
 OR the rate of dissolution = the rate of precipitation

'n Oplossing waarin 'n vaste stof in ewewig is met sy ione ✓✓

OR 'n oplossing waarin daar geen verdere van die vaste stof kan oplos nie.
 OR die tempo van oplos = die tempo van presipiteer

(2)

5.1.2 Use fine salt/Gebruik fyn sout ✓✓

Increase the temperature/Verhoog die temperatuur ✓✓

Stir/shake the mixture/Roer/skud die mengsel ✓✓

OR Add more solid (to increase the surface area) also accepted
 OR Voeg meer sout by (om reaksieoppervlak te verhoog) ook aanvaar

(6)

5.1.3 A precipitate (OR NaCl) will form ✓✓/ 'n Neerslag (of NaCl) sal vorm. (2)

5.1.4 Cl⁻ ✓✓ Chloride-ion/Chloried-ioon (1/2) (2)

5.2 5.2.1 Decrease/Verlaag ✓✓ (2)

5.2.2 Decrease/Verlaag ✓✓ (2)

5.2.3 Stays the same/Bly dieselfde ✓✓ (2)

5.2.4 Increases/Verhoog ✓✓ (2)

[20]**QUESTION 6 / VRAAG 6**

6.1 Yes/Ja ✓ (1)

6.2 HNO₃ ionises (almost) completely/HNO₃ ioniseer (feitlik) volledig ✓✓

OR High K_a-value
 OR Hoë K_a-waarde

(1)

(2)

6.3 A solution whose concentration is known (exactly)/ 'n Oplossing waarvan die konsentrasie (presies) bekend is. ✓✓ (2)

6.4 HNO₃ + NaOH ✓ → NaNO₃ + H₂O ✓ (Bal.) ✓ (3)

6.5
$$\frac{c_a V_a}{c_b V_b} = \frac{n_a}{n_b}$$

OR/OF

$$\frac{c_a \times 50}{0,12 \times 65} = \frac{1}{1}$$

$$c_a = 0,156 \text{ mol.dm}^{-3} \checkmark$$

$$n(\text{NaOH}) = cV = 0,12 \times 0,065 = 0,0078 \text{ mol}$$

$$n(\text{HNO}_3) = cV = 0,05 \times c_a$$

$$n(\text{NaOH}) = n(\text{HNO}_3) \checkmark$$

$$0,05 \times c_a = 0,0078 \checkmark$$

$$c_a = 0,0078/0,05 = 0,156 \text{ mol.dm}^{-3} \checkmark$$

(4)

OR/OF

$$c_a = \frac{n_a c_b V_b}{n_b V_a} \checkmark$$

$$c_a = \frac{1 \times 0,12 \times 65}{1 \times 50} \checkmark$$

$$c_a = 0,156 \text{ mol.dm}^{-3} \checkmark$$

$$p_a c_a V_a = p_b c_b V_b \checkmark$$

$$1 \times c_a \times 50 = 1 \times 0,12 \times 65$$

$$c_a = \frac{1 \times 0,12 \times 65}{1 \times 50} \checkmark$$

$$= 0,156 \text{ mol.dm}^{-3} \checkmark$$

$$p_a c_a V_a = p_b c_b V_b \checkmark$$

$$c_a = \frac{p_b c_b V_b}{p_a V_a} \checkmark$$

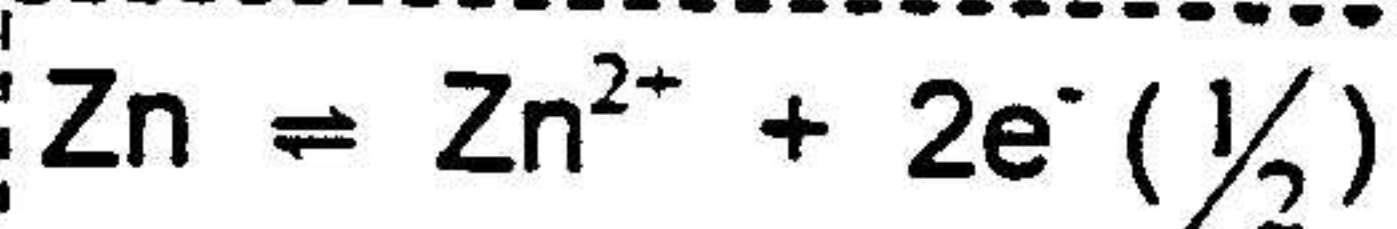
$$= \frac{1 \times 0,12 \times 65}{1 \times 50} \checkmark$$

$$= 0,156 \text{ mol.dm}^{-3} \checkmark$$

$c_a V_a = c_b V_b$ is acceptable only if the ratio is 1:1 (Maximum ¾)

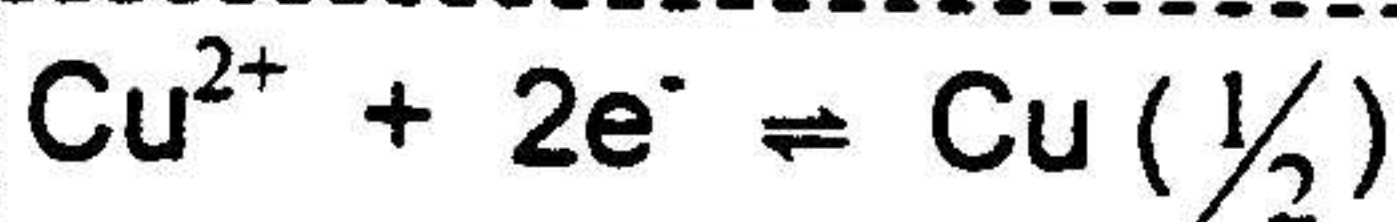
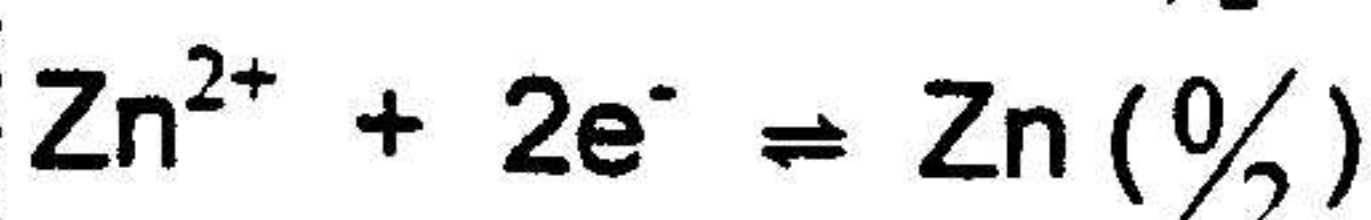
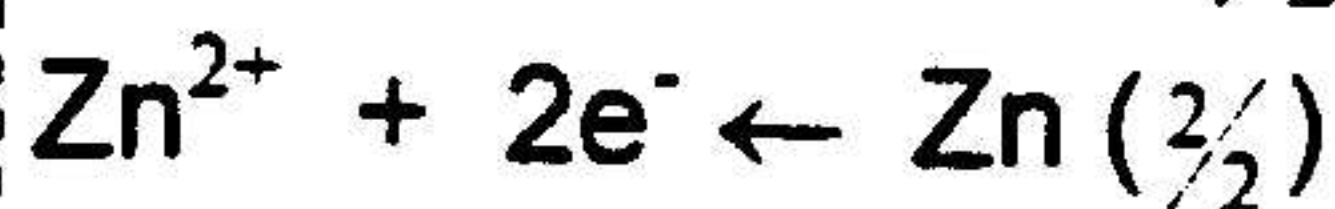
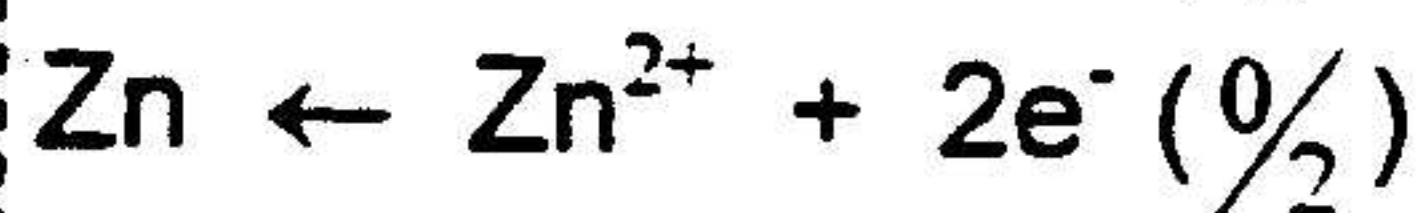
$c_a V_a = c_b V_b$ is aanvaarbaar slegs indien die verhouding 1:1 is (Maksimum ¾)

[12]

QUESTION 7. / VRAAG 7

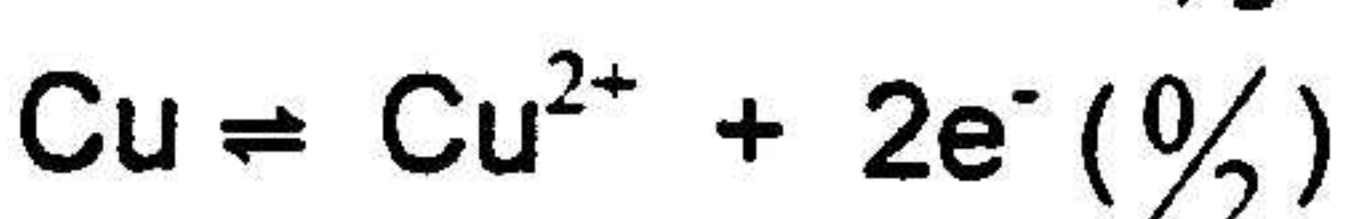
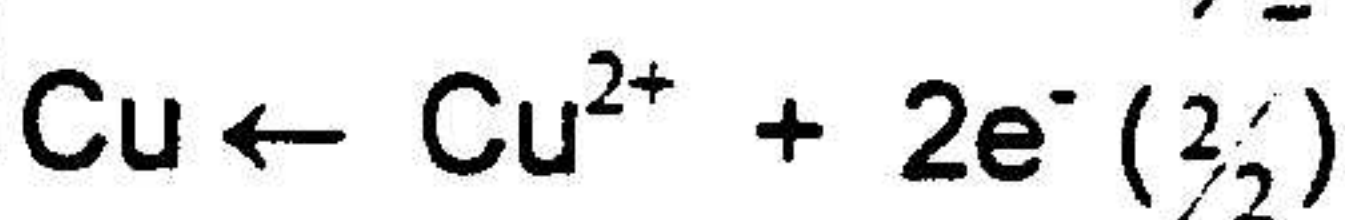
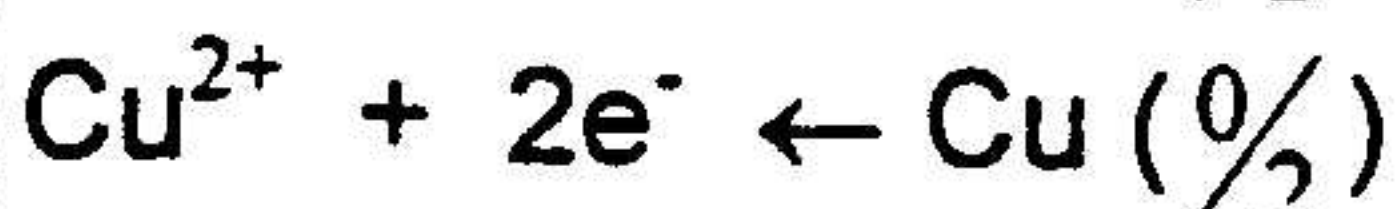
(2)

If the correct answer to 7.1.1 was given at 7.1.2, and the correct answer to 7.1.2 was given at 7.1.1, two marks are awarded for 7.1.1 + 7.1.2. (2/4)



(2)

As die regte antwoord op 7.1.1 by at 7.1.2 gegee is, die regte antwoord op 7.1.2 by 7.1.1 gegee is, word twee punte vir 7.1.1 + 7.1.2 toegeken. (2/4)



IF the charge on the electrons are omitted, no marks are forfeited
AS die lading op elektrone weggelaat is, word geen punte verbeur nie.

IF equation is unbalanced, 1 mark is forfeited per equation
INDIEN vergelyking ongebalanseerd is, word 1 punt per vergelyking verbeur.
 IF equation is incomplete/**INDIEN vergelyking onvolledig is - ($\frac{0}{2}$)**

7.2 Zinc is a strong enough reducing agent to reduce Cu^{2+} to Cu ✓✓ but not strong enough to reduce Al^{3+} to Al ✓

(3)

Marking guide: Two marks for stating the action (oxidation or reduction) and one mark for comparing Cu^{2+} and Al^{3+}

Nasiemriglyn: Twee punte vir die noem van die aksie (oksidasie of reduksie) en een punt vir vergelyking tussen Cu^{2+} en Al^{3+}

OR CuSO_4 is a stronger OA than $\text{Al}(\text{NO}_3)_3$ and can therefore oxidise Zn ($\frac{3}{3}$)

OF CuSO_4 is 'n sterker OM as $\text{Al}(\text{NO}_3)_3$ en kan dus Zn oksideer. ($\frac{3}{3}$)

OR $\text{Al}(\text{NO}_3)_3$ is a weaker OA than CuSO_4 and therefore cannot oxidise Zn ($\frac{3}{3}$)

OF $\text{Al}(\text{NO}_3)_3$ is 'n swakker OM as CuSO_4 en kan dus nie Zn oksideer nie ($\frac{3}{3}$)

(Instead of OA electron acceptor can be used)
 (Ipv OM kan elektron akseptor gebruik word.)

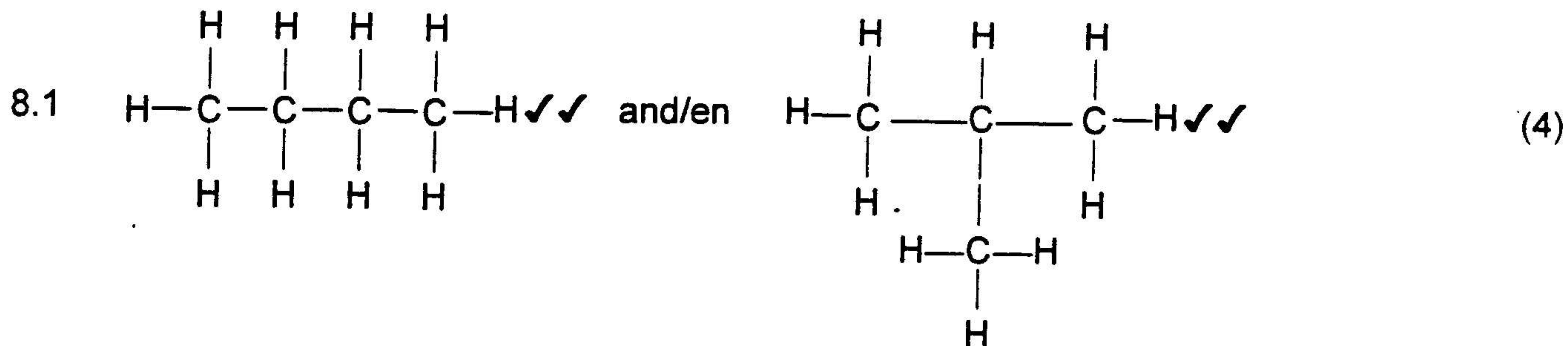
7.3 The iron wire will be covered with a copper layer OR brown layer
 OR copper is formed OR blue colour disappears OR mass of the iron decrease.
 Die ysterdraad sal met 'n lagie koper bedek wees OF bruin lagie OF koper word gevorm OF die blou kleur verdwyn OF die massa van die yster neem af.

(2)

[9]

QUESTION 8 / VRAAG 8

7



ALTERNATIVES FOR 8.1 / ALTERNATIEWE VIR 8.1:

Hydrogen atoms omitted: Deduct one mark only once in 8.1. Maximum marks then (3/4) provided structures are correct (all bonds shown).

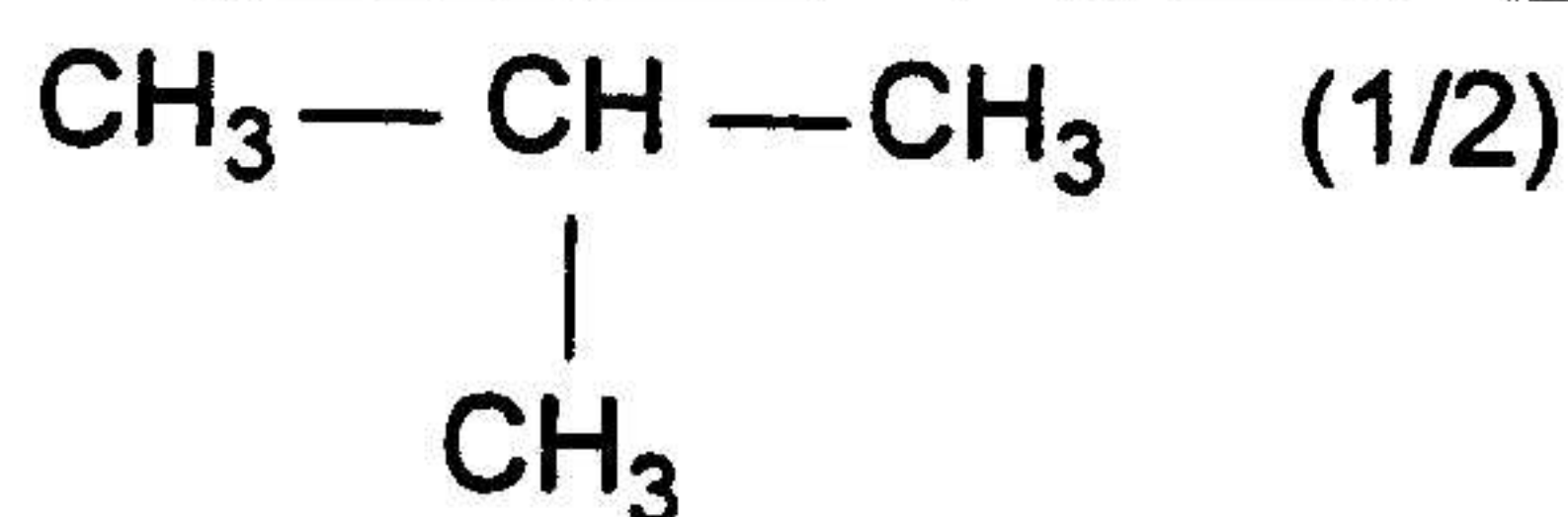
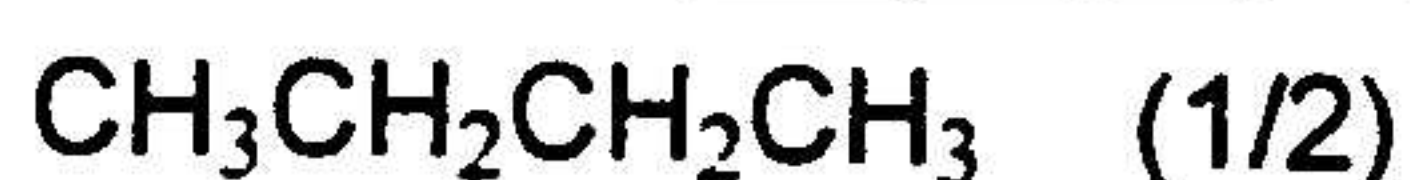
Waterstof atome weggelaat: Trek een punt slegs een keer in 8.1 af. Maksimum punte dus (3/4), op voorwaarde dat die strukture korrek is (alle bindings aangetoon).

No marks for incorrect structural formulae (e.g. one extra hydrogen).

Geen punte vir verkeerde struktuurformules (bv. Een ekstra waterstof).

One mark is awarded for (correct) condensed structural formulae:

Een punt word toegeken vir (korrekte) gekondenseerde struktuurformules:



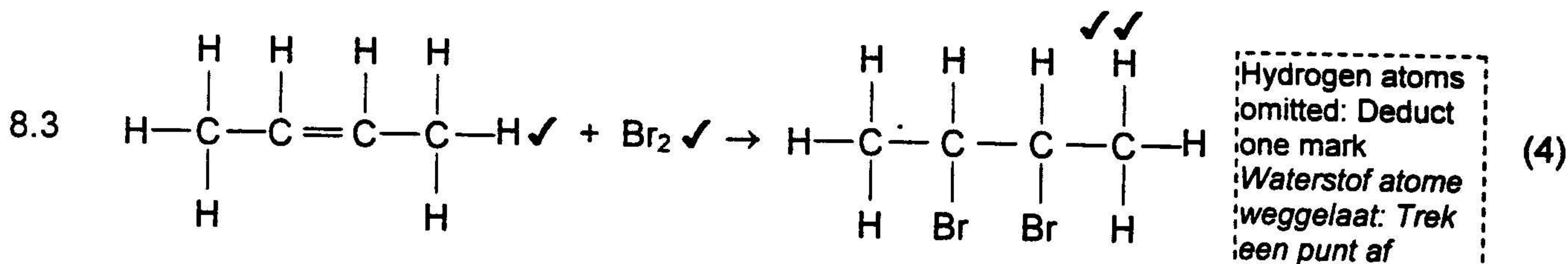
OR/OF 2-methylpropane / 2-metielpropaan

Mark 8.2 independently from 8.1. (Award marks for the correct names, irrespective of the order in which they are written.) However, if the names were not written down next to the number 8.2, but under the structural formulae in 8.1, the name has to correspond to the structural formula.

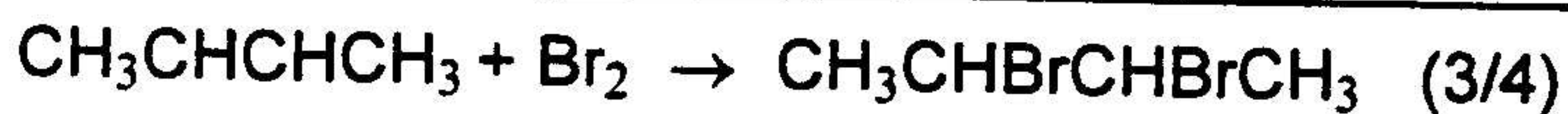
No positive marking from 8.1 to 8.2.

Merk 8.2 onafhanklik van 8.1. (gee punte vir die korrekte name, ongeag van die volgorde waarin hulle voorkom.) As die name egter nie langs die nommer 8.2 geskryf is nie, maar onder die struktuurformules in 8.1, moet die name met die struktuurformules ooreenstem.

Geen positiewe merk van 8.1 na 8.2.



Hydrogen atoms omitted: Deduct one mark
Waterstof atome weggelaat: Trek een punt af



NB : 2 x Br atoms on different C-atoms
LW : 2 x Br-atome op verskillende C-atome

[12]

END/EINDE