

PHYSICAL SCIENCE PAPER 2 SG NOV 2006-
 NATUUR-EN SKEIKUNDE VRAESTEL 2 SG NOV 2006

General Marking Rule/Algemene nasien reël

If incorrect charges are written or if charges are omitted – penalise ONE mark in a question

As verkeerde ladings gebruik word of as ladings weg gelaat word – penaliseer EEN punt in 'n vraag

QUESTION 1/VRAAG 1

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

3 x 15 = [45]

QUESTION 2/VRAAG 2

2.1

2.1.1 Experiment 1: $pV \checkmark = 96 \times 40 \checkmark = 3840 \text{ J} \checkmark$

Experiment 2: $pV = 120 \times 32 = 3840 \text{ J} \checkmark$

Experiment 3: $pV = 156 \times 24 = 3744 \text{ J} \checkmark$

The third reading is incorrect. \checkmark

Die derde lesing is verkeerd

$$\frac{pV}{T} = k \checkmark$$

$$\frac{p_1 V_1}{T_1} = \frac{96 \times 40 \checkmark}{284,9} = 13,478 \text{ J.K}^{-1} \checkmark$$

$$\frac{p_2 V_2}{T_2} = \frac{120 \times 32}{285,1} = 13,478 \text{ J.K}^{-1} \checkmark$$

$$\frac{p_3 V_3}{T_3} = \frac{156 \times 24}{285,1} = 13,13 \text{ J.K}^{-1} \checkmark$$

(6)

If learner used third set of readings and arrive at a pressure of 160 kPa without any other calculations
 Indien leerder die derde stel lesings gebruik en by 'n druk van 160 kPa uitkom sonder enige verdere berekening

($\frac{4}{6}$)

$$p_1 V_1 = p_2 V_2$$

$$96 \times 40 = 40 \times p_2$$

$$\therefore p_2 = 96 \text{ kPa}$$

$$96 \times 40 = 32 \times p_2$$

$$\therefore p_2 = 120 \text{ kPa}$$

$$96 \times 40 = 24 \times p_2$$

$$\therefore p_2 = 160 \text{ kPa}$$

2.1.2 $\frac{3840}{24} \checkmark = 160 \text{ kPa} \checkmark$

$$\frac{p_1 V_1}{T_1} = 13,5$$

$$\therefore p = \frac{13,5 \times T \checkmark}{V} = 160,37 \text{ kPa} \checkmark$$

(2)

2.1.3 INCREASE / NEEM TOE ✓✓ (2)

2.2

2.2.1 A standard solution is a solution of known concentration. ✓✓ (2 or 0)
'n Standaard oplossing is een waarvan die konsentrasie bekend is (2)

2.2.2 $c = \frac{n}{V}$ ✓ $n = 0,1 \times \frac{100}{1000} = 0,01 \text{ mol}$ ✓

mass of $\text{AgNO}_3 = n \times M = 0,01 \times 170$ ✓ $M_r(\text{AgNO}_3) = 170$
 $= 1,7 \text{ g}$ ✓ (4)

OR/OF

$m = cVM = 0,1 \times 0,1 \times 170 = 1,7 \text{ g}$

[16]

QUESTION 3/VRAAG 3

3.1

3.1.1 X is less dense than Y OR Y is denser than X ✓✓ (2)

X is minder dig as Y OF Y is digter as X

If using terms "lighter" or " heavier". (1/2)
As die terme "ligter" of "swaarder" gebruik word

3.1.2 Ammonia/ Ammoniak ✓✓ (NH₃ ½) (2)

3.1.3 NH₄Cl ✓✓ (Ammonium chloride/Ammoniumchloried (1/2)) (2)

3.1.4 H₂S ✓✓ (Hydrogen sulphide/Waterstofsulfied (1/2)) (2)

3.1.5 H₂S → S + 2H⁺ + 2e⁻ ✓✓ (2)

If / as: H₂S ⇌ S + 2H⁺ + 2e⁻ (1/2)

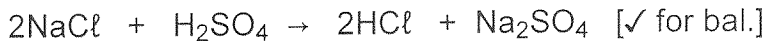
If / as: H₂S ← S + 2H⁺ + 2e⁻ (0/2)

If / as: S + 2H⁺ + 2e⁻ ← H₂S (1/2)

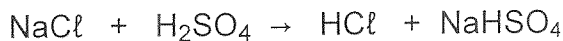
If / as: S + 2H⁺ + 2e⁻ ⇌ H₂S (0/2)

3.2

3.2.1 ✓ ✓ (3)



OR/OF



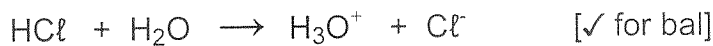
If/As ⇌ (2/3)

Can use KCl
Kan KCl gebruik

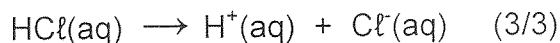
3.2.2 HCl (g) is denser than air. /HCl (g) is digter as lug. ✓✓ (2)

If using terms "lighter" or " heavier". (1/2)
As die terme "ligter" of "swaarder" gebruik word

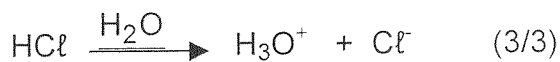
3.2.3 ✓ ✓ (3)



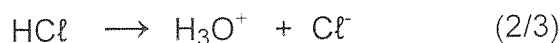
OR/OF



OR/OF



OR/OF



Accept ⇌
Aanvaar

QUESTION 4/VRAAG 4

- 4.1 Brown gas / NO₂ (is collected). / A gas with sharp irritating smell ✓ ✓ (2)
Bruin gas / NO₂ (word opgevang). / n Gas met skerp irriterende reuk
- 4.2 Blue / Blou ✓ ✓ (2)
- 4.3 Cu²⁺ ✓ ✓ (If Copper(II)-ions / As Koper(II)-ione (1/2)) (2)
- 4.4 HNO₃ / NO₃⁻ ✓ ✓ (If Nitric acid / Nitrate / As salpetersuur / nitraat (1/2)) (2)
- 4.5 The NO₂ / gas dissolved in H₂O ✓ and therefore pressure inside the test tube
is less than the pressure outside / partial vacuum forms. ✓ (2)
*Die NO₂ / gas los op in H₂O en daarom sal die druk binne die proefbuis
minder wees as die druk buite / gedeeltelike vakuüm vorm.*
- 4.6 Acidic / Suur ✓ (1)

[11]

QUESTION 5/VRAAG 5

- 5.1 ✓ (3)
CaCO₃ + 2HCl → CaCl₂ + H₂O + CO₂ [✓ for balancing / vir balansering.]
CaCO₃ + 2HCl → CaCl₂ + H₂CO₃ (Only / Slegs 2/3)
- If/As ⇒ (2/3)
- 5.2 30 – 60 seconds / sekonde ✓ ✓ (2)
- 5.3 120 s ✓ ✓ (2)
- 5.4 224 cm³ ✓ ✓ (2)
- 5.5
- 5.5.1 INCREASES / NEEM TOE ✓ ✓ (2)
- 5.5.2 THE SAME / BLY DIESELFDE ✓ ✓ (2)

[13]

QUESTION 6/VRAAG 6

6.1 If a stress✓ is placed on a system in equilibrium✓ , the system reacts in such a way as to minimise✓ the stress.

Indien 'n chemiese sisteem wat in ewewig is, versteur word, sal die sisteem op sodanige wyse reageer om die versteuring teen te werk (op te hef).

OR

When any of the conditions✓ affecting the position of a dynamic equilibrium✓ are changed, the position of the equilibrium will shift so as to minimise✓ the change. (3)

Wanneer enige faktor (kondisies) wat die posisie van die dinamiese ewewig beïnvloed, verander, sal die posisie van die ewewig sodanig skuif om die verandering teen te werk.

Or any other acceptable formulation
Of enige aanvaarbare formulering

If there is no reference to equilibrium. (0/3)
Indien daar geen verwysing is na ewewig

6.2

6.2.1 INCREASES / NEEM TOE ✓ ✓ (2)

6.2.2 STAYS THE SAME / BLY DIESELFDE ✓ ✓ (2)

6.2.3 STAYS THE SAME / BLY DIESELFDE ✓ ✓ (2)

[9]

QUESTION 7/VRAAG 7

7.1 A solution with a low concentration of H⁺-ions in comparison to water ✓✓ (2)
'n Oplossing met 'n lae konsentrasie van H⁺-ione en vergelyking met water.

OR/OF

More water than H⁺- ions
Meer water as H⁺-ione

7.2

7.2.1 Phenol red / *Fenolrooi* ✓✓ (2)

7.2.2 After neutralization of a strong acid with strong base the pH at the endpoint is 7. ✓✓ (2)



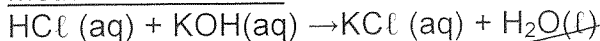
Na die neutralisering van 'n sterk suur met 'n sterk basis sal die pH van die eindpunt 7 wees.

At endpoint the pH is 7 (2/2)
Die eindpunt pH is 7

Solution is neutral at endpoint (2/2)
Oplossing is neutraal by eindpunt

7.2.3 $n = cV$ ✓✓ = (0,35 x 0,05) = 0,0175 mol. ✓✓ (3)

7.2.4 Method 1/Metode 1



1 mol acid reacts with 1 mol base / *1 mol suur reageer met 1 mol basis*

$n_{acid} = 0,0175 = n_{base}$ ✓

$c_b = \frac{n_b}{V_b} = \frac{0,0175}{0,07} = 0,25 \text{ mol.dm}^{-3}$ ✓



Positive marking only if learners use method 1
Positiewe nasien alleenlik as metode 1 gebruik wor

OR/OF

$\frac{n_b}{n_a} = \frac{c_b \times V_b}{c_a \times V_a}$
 $\frac{1}{1} = \frac{c_b \times 70}{0,350 \times 50}$
 $c_b = 0,25 \text{ mol.dm}^{-3}$ ✓

$n_a = n_b$ ✓
 $c_b V_b = c_a V_a$
 $c_b = \frac{0,35 \times 50}{70} = 0,25 \text{ mol.dm}^{-1}$ ✓

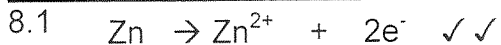
OR/OF

$pV_a c_a = pV_b c_b$
 $c_b = \frac{pV_a c_a}{pV_b} = \frac{1 \times 50 \times 0,35}{1 \times 70} = 0,25 \text{ mol.dm}^{-3}$ ✓

(4)

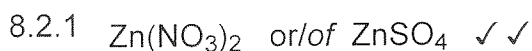
[13]

QUESTION 8 /VRAAG 8

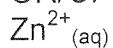


(2)

If / as: $Zn \rightleftharpoons Zn^{2+} + 2e^-$	(1/2)
If / as: $Zn \leftarrow Zn^{2+} + 2e^-$	(0/2)
If / as: $Zn^{2+} + 2e^- \leftarrow Zn$	(1/2)
If / as: $Zn^{2+} + 2e^- \rightleftharpoons H_2S^-$	(0/2)



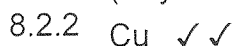
OR/OF



(Any soluble Zn-salt/ *Enige oplosbare Zn-sout*)

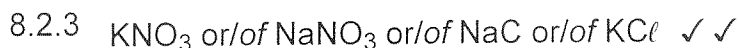
If name is written (1/2)
As naam neergeskryf word

(2)



If copper is written (1/2)
As koper neergeskryf word

(2)



any soluble salt that does not form precipitates at the electrodes
enige oplosbare sout wat nie neerslae vorm by die elektrodes nie

If name is written (1/2)
As naam neergeskryf word

(2)

8.3

8.3.1 DECREASES/ *NEEM AF* ✓✓

(2)

8.3.2 INCREASES / *NEEM TOE* ✓✓

(2)

8.4 Towards the electrode Q / Towards the copper ✓

Na die elektrode Q / Na die koper

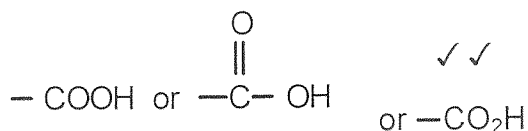
(1)

[13]

QUESTION 9/VRAAG 9

9.1

9.1.1



If single bond/"-" with C is omitted (1/2)
As enkelbinding/"-" van C weggelaat is

(2)

Using "H" instead of "-" (0/2)
Gebruik "H" in plaas van "-"

9.1.2



If single bond/"-" with C is omitted (1/2)
As enkelbinding/"-" van C weggelaat is

(2)

9.2

9.2.1

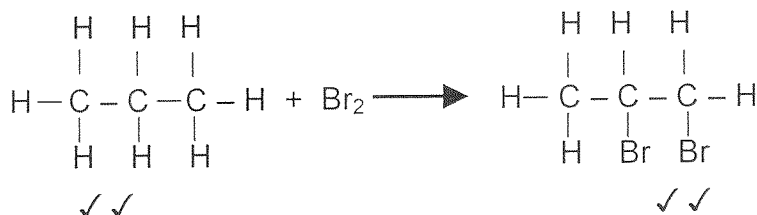
The brown colour (quickly) disappears/Solution decolourises ✓✓

(2)

Die bruin kleur verdwyn (vinnig)/Oplossing ontkleur

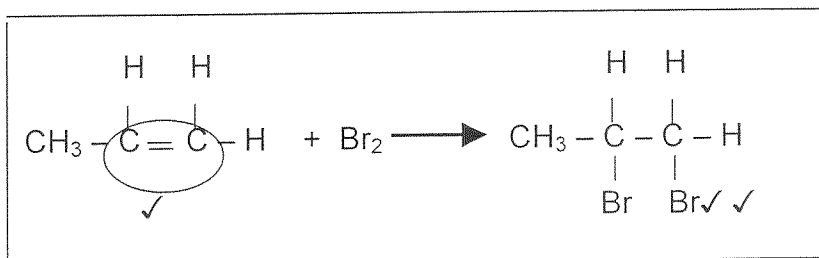
If learners only state "colour change" (0/2)
Indien leerder slegs verwys na "kleurverandering"

9.2.2



If Br₂ omitted (3/4)
As Br₂ weggelaat is

(4)



9.2.3

1,2-dibromopropane / 1,2-dibroompropaan. ✓✓ (2 or 0)

(2)

[12]

TOTAL / TOTAAL: 150