



**NATIONAL SENIOR CERTIFICATE/
NASIONALE SENIORSERTIFIKAAT**

GRADE/GRAAD 11

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**TECHNICAL SCIENCES P2/TEGNIESE WETENSKAPPE V2
MARKING GUIDELINE/NASIENRIGLYN**

MARKS/PUNTE: 75

*This marking guideline consists of 5 pages./
Hierdie nasienriglyn bestaan uit 5 bladsye.*

QUESTION/VRAAG 1

- 1.1 B ✓✓ (2)
- 1.2 D ✓✓ (2)
- 1.3 D ✓✓ (2)
- 1.4 C ✓✓ (2)
- 1.5 D ✓✓ (2)
- [10]**

QUESTION/VRAAG 2

- 2.1 The *Law of conservation of heat* states that the amount of heat lost equals the amount of heat gained, when no energy is lost. ✓✓
- Die Wet van die behoud van hitte bepaal dat die hoeveelheid hitte wat afgegee word, gelyk is aan die hoeveelheid hitte wat opgeneem word, mits geen energie verlore gaan nie.* ✓✓ (2)
- 2.2 $\Delta Q = \Delta U + \Delta W$ ✓
- 520 000 = ΔU + 310 000 ✓
- $\Delta U = 210\ 000\ \text{J}$ **OR/OF** 210 KJ ✓ (3)
- 2.3 A working substance is a substance that absorbs energy (heat) from the source. ✓✓
- 'n Werkvloeistof is die stof wat die energie (hitte) uit 'n bron opneem.* ✓✓ (2)
- 2.4 Heat engine (petrol or diesel) }
 Refrigerator or coolant } (ANY TWO ✓✓)
 Hair dryer }
 Lawn mower }
 Electrical drill }
- Warmte-enjin (petrol of diesel)* }
Yskas of verkoelmiddel } (ENIGE TWEE ✓✓)
Haardroër }
Grassnyer }
Elektriese boor }
- (2)**
[9]

QUESTION/VRAAG 3

- 3.1 Specific heat capacity of a substance is the amount of heat required to increase the temperature of 1 kg of the substance by 1 °C or 1 K. ✓✓

Die spesifieke warmtekapasiteit van 'n stof is die hoeveelheid energie wat benodig is om die temperatuur van 1 kg van 'n stof met 1 °C of 1 K te laat styg. ✓✓ (2)

- 3.2 Surrounding is anything outside the system which has some bearing on the behaviour of the system. ✓✓

Thermodynamic system is a portion of matter, e.g. gas enclosed inside a cylinder, fitted with a piston. ✓✓

Die omgewing is enigiets buite die sisteem wat 'n invloed op daardie sisteem uitoefen. ✓✓

'n Termodinamies sisteem is 'n stuk materie, bv. 'n gas in 'n geslote houer wat met 'n suier werk. ✓✓ (4)

- 3.3 3.3.1 1 l water ✓ (1)

- 3.3.2 It has a highest specific heat capacity. ✓✓

Dit het 'n hoër spesifieke warmte kapasiteit. ✓✓ (2)

- 3.4 $Q_{\text{lost by 220g of water}} = Q_{\text{gained by unknown mass of water}}$ } (Any 1 ✓)
OR

$$mc\Delta T_{\text{lost by 220g of water}} = mc\Delta T_{\text{gained by unknown mass of water}}$$

- $Q_{\text{verloor deur 220g water}} = Q_{\text{bygekry deur onbekende massa water}}$ } (Enige 1)
OF

$$mc\Delta T_{\text{verloor deur 220g water}} = mc\Delta T_{\text{bygekry deur onbekende massa water}} \quad \checkmark$$

$$(0,22) (4\ 200) (57) \checkmark = m (4\ 200) (23) \checkmark$$

$$m = \frac{(0,22)(57)}{23} = 0,545217 \text{ kg OR/OF Accept/Aanvaar } m = 545,22 \text{ g } \checkmark$$
 (4)

- 3.5 3.5.1 A closed system is a system which can exchange only heat (energy), not matter, with the surroundings ✓✓

An isolated system is a system which is not influenced by its surroundings (No exchange of heat or energy with the surroundings). ✓✓

'n Geslote sisteem is 'n sisteem wat slegs hitte (energie) en nie materie met die omgewing kan uitruil. ✓✓

'n Geïsoleerde sisteem is 'n sisteem wat nie deur die omgewing beïnvloed word nie (Geen uitruiling van hitte of energie met die omgewing nie). ✓✓ (4)

- 3.5.2 Heat given out = Heat taken in / Warmte afgegee = Warmte ingeneem

OR/OF

$$c_k m_k \Delta T_k = c_w m_w \Delta T_w$$

$$c_k (0,1) \checkmark (63) \checkmark = (4\ 200) \checkmark (0,2) \checkmark (3) \checkmark$$

$$c_k = \frac{2\ 520}{6,3} = 400 \text{ J} \cdot \text{kg}^{-1} \cdot \text{K}^{-1} \checkmark$$

(Any ONE/Enige EEN) ✓

(7)

[24]

QUESTION/VRAAG 4

- 4.1 Oxidation is a loss of electrons. ✓✓
Reduction is a gaining of electrons. ✓✓
- Oksidasie is die verlies aan elektrone. ✓✓*
Reduksie is die toename in elektrone. ✓✓ (4)
- 4.2 4.2.1 $Mn + 2(-2) = 0$ ✓
 $\therefore Mn = +4$ ✓ (2)
- 4.2.2 $2(+1) + 2Cr + 7(-2) = 0$ ✓
 $2Cr = +12$
 $\therefore Cr = +6$ ✓ (2)
- 4.2.3 $N + 4(+1) = +1$ ✓
 $\therefore N = -3$ ✓ (2)
- 4.3 The decomposition of a substance when an electric current is passed through it. ✓✓

OR

The chemical process in which electrical energy is converted to chemical energy. ✓✓

Die ontbinding van 'n stof wanneer 'n elektriese stroom deur dit gestuur word. ✓✓

OF

Die chemiese proses waarin elektriese energie in chemiese energie omgesit is. ✓✓ (2)

- 4.4 4.4.1 Oxygen ion (O^{2-}) is oxidised ✓✓
Oksied-ioon (O^{2-}) word geoksideer ✓✓ (2)
- 4.4.2 Potassium ion (K^+) is reduced ✓✓
Kalium-ioon (K^+) word gereduseer ✓✓ (2)

[16]

QUESTION/VRAAG 5

5.1 An electrolyte is a solution **OR** liquid **OR** dissolved substance that conducts electricity through the movement of ions. ✓✓

*’n Elektroliet is ’n oplossing **OF** vloeistof **OF** opgeloste stof wat elektrisiteit deur die beweging van ione gelei.* ✓✓ (2)

5.2 Carbon is inert/non-reactive ✓✓
Koolstof is onreaktief. ✓✓

(2)

5.3 Electrode/Elektrode A:
Bubbles are formed around the electrode. ✓✓
Borrels word om die elektrode gevorm. ✓✓

Electrode/Elektrode B:
A brown, solid deposit around the electrode. ✓✓
’n Bruin, soliede neerslag word om hierdie elektrode gevorm. ✓✓ (4)

6.4 5.4.1 Electrode/Elektrode **A:** Anode ✓

(2)

5.4.2 Electrode/Elektrode **B:** Cathode/Katode ✓

5.5 $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$ ✓✓

(2)

5.6 $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$ ✓✓

(2)

5.7 Electroplating
Purification or extraction of metals from their ore. } (ANY TWO ✓✓)
Preparation of Chemicals }

*Elektroplatering
Suiwering of ontrekking van metale uit hulle erts } (ENIGE TWEE ✓✓)
Bereiding van chemikalieë }*

(2)

[16]**TOTAL/TOTAAL: 75**