



NATIONAL SENIOR CERTIFICATE/ NASIONALE SENIORSERTIFIKAAT

GRADE/GRAAD 11

NOVEMBER 2023

**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 $\Delta Q = \Delta U + \Delta W$ ✓
 $520\ 000 = \Delta U + 310\ 000$ ✓
 $\Delta U = 210\ 000\ J$ OR/OF $210\ KJ$ ✓ (3)

2.3 A working substance is a substance that absorbs energy (heat) from the source. ✓✓
In Werkvloeistof is die stof wat die energie (hitte) uit 'n bron opneem. ✓✓ (2)

2.4 Heat engine (petrol or diesel)
 Refrigerator or coolant
 Hair dryer
 Lawn mower
 Electrical drill } (ANY TWO ✓✓)

Warmte-enjin (petrol or diesel)
 Yskas of verkoelmiddel
 Haardroer
 Grassnyer
 Elektriese boor } (ENIGE TWEE ✓✓)

(2) [9]

QUESTION/VRAAG 3

- 3.1 Specific heat capacity of a substance is the amount of heat required to increase the temperature of 1kg 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 enigets 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 ℥ 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

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

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

OF

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

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

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

(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

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

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

$$c_k = \frac{2 520}{6,3} = 400 \text{ J} \cdot \text{kg}^{-1} \cdot \text{K}^{-1} \checkmark \quad (\text{Any ONE/Enige EEN}) \checkmark$$

(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 omgeset is. ✓✓

(2)

- 4.4 4.4.1 Oxygen ion (O^{2-}) is oxidised ✓✓
Oksied-foon (O^{2-}) word geoksideer ✓✓

(2)

- 4.4.2 Potassium ion (K^+) is reduced ✓✓
Kalium-foon (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 Elektrolyet is 'n oplossing **OF** vloeistof **OF** opgeloste stof wat elektrisiteit deur die beweging van ione geleei.* ✓✓

(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. ✓✓

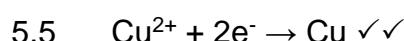
'n Bruin, soliede neerslag word om hierdie elektrode gevorm. ✓✓

(4)

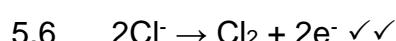
- 6.4 5.4.1 Electrode/Elektrode A: Anode ✓

(2)

- 5.4.2 Electrode/Elektrode B: Cathode/Katode ✓



(2)



(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