Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 11

NOVEMBER 2022

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

MARKS/*PUNTE:* **75**

This marking guideline consists of 7 pages. /
Hierdie nasienriglyn bestaan uit 7 bladsye.

QUESTION/*VRAAG* 1

1.1 A ✓✓ (2)

1.2 D ✓✓ (2)

1.3 A ✓✓ (2)

1.4 A ✓✓ (2)

1.5 C ✓✓ (2)

[10]

QUESTION/*VRAAG 2*

2.1 Law of Conservation of Heat/*Wet van die behoud van Hitte* ✓ (1)

2.2 Specific Heat capacity/*Spesifieke Warmtekapasiteit* ✓ (1)

2.3 Electrolysis/*Elektrolise* ✓ (1)

2.4 Surrounding/*Omliggende* ✓ (1)
[4]

QUESTION/*VRAAG* 3

3.1 If heat energy (ΔQ) is given to a system, it is used in two ways:
(i) in increasing the internal energy of the system (ΔU) ✓
(ii) in doing work against external pressure (ΔW) ✓
As hitte-energie (ΔQ) aan 'n stelsel gegee word, word dit op twee maniere gebruik:
(i) om die interne energie van die stelsel (ΔU) te verhoog ✓
(ii) om teen eksterne druk te werk (ΔW) ✓ (2)

3.2 An *isolated system* is a system which is not influenced by its surroundings. ✓✓
A *closed system* is a system which can **only** exchange energy but not matter with the surroundings. ✓✓
'n Geïsoleerde sisteem is 'n sisteem wat nie deur die omgewing beïnvloed word nie. ✓✓
*'n Geslote sisteem is 'n sisteem wat **slegs** energie kan uitruil maar nie materie met die omgewing nie.* ✓✓ (4)

3.3 Temperature/*Temperatuur* ✓
Pressure/*Druk* ✓
Volume ✓ (3)

3.4 Heat capacity of a substance is the amount of heat required to increase the temperature of the whole substance by *1 °C* or 1 K. ✓✓
Warmtekapasiteit van 'n stof is die hoeveelheid hitte wat benodig word om die temperatuur van die hele stof met 1 °C of 1 K te verhoog. ✓✓ (2)

3.5 $Q_{\text{lost by 250 g water}} = Q_{\text{gained by unknown mass of water}}$
$Q_{\textit{verloor deur 250 g water}} = Q_{\textit{wins deur onbekende massa water}}$ ✓
$mc\Delta T_{\text{lost by 250 g water}} = mc\Delta T_{\text{gained by unknown mass of water}}$
$mc\Delta T_{\textit{ verloor deur 250 g water}} = mc\Delta T_{\textit{wins deur onbekende massa water}}$
Any ONE/*Enige EEN*

(0,25)(4 200)(53) ✓ = m(4 200)(17) ✓
∴ m = 0,77941 kg (Accept/*Aanvaar 779,41 g)* ✓ (4)

3.6 Heat given out = Heat taken in
Hitte afgegee = Hitte opgeneem
$c_k m_k \Delta T = c_w m_w \Delta T$
Any ONE/*Enige EEN* ✓
c_k (0,12) ✓ (50) ✓ = (4 200)(0,25) ✓(4) ✓
∴ c_k = 700 $J.kg^{-1}.K^{-1}$ ✓ (6)
[21]

QUESTION/*VRAAG* 4

4.1 Internal energy is the sum of the kinetic and potential energies of all the molecules of the system. ✓✓
Interne energie is die som van die kinetiese en potensiële energies van al die molekules van die stelstel. ✓✓ (2)

4.2 $\Delta Q = \Delta U + \Delta W$ ✓
$\underline{650\ 000 = \Delta U + 420\ 000}$ ✓
$\therefore \Delta U = 230\ 000$ J **OR**/***OF*** *230 kJ* ✓ (3)

4.3 A substance that absorbs energy (heat) from the source. ✓✓
'n Stof wat energie (hitte) vanaf die bron absorbeer. ✓✓ (2)

4.4 Heat engine (petrol or diesel)/*Hitte-enjin (petrol of diesel)*
Refrigerator (Coolant)/*Verkoelingsmiddele*
Hair dryer/*Haardroër*
Lawn mower/*Grassnyer*
Electrical drill/*Elektriese boor*
} Any 2/*Enige 2* ✓✓ (2)
[9]

QUESTION/*VRAAG* 5

5.1 **Oxidising agent** is a substance that undergoes reduction. ✓✓
Reducing agent is a substance that undergoes oxidation. ✓✓

ACCEPT

Oxidising agent is a substance that gains electrons. ✓✓
Reducing agent is a substance that donates electrons. ✓✓

Oksideermiddel *is 'n stof wat reduksie ondergaan.* ✓✓
Reduseermiddel *is 'n stof wat oksidasie ondergaan*. ✓✓

AANVAAR

Oksideermiddel *is 'n stof wat elektrone bykry.* ✓✓
Reduseermiddel *is 'n stof wat elektrone skenk*. ✓✓ (4)

5.2 5.2.1 $+2 + C + 3(-2) = 0$ ✓ ∴ $C = +4$ ✓ (2)

5.2.2 $(+1) + Mn + 4(-2) = 0$ ✓ ∴ $Mn = +7$ ✓ (2)

5.3 5.3.1 Oxygen ion/O^{-2} is oxidised. ✓✓
Suurstof-ioon/O^{-2} word geoksideer. ✓✓ (2)

5.3.2 Magnesium ion/Mg^{+2} is reduced. ✓✓
Magnesium-ioon/Mg^{+2} word gereduseer. ✓✓ (2)

[12]

QUESTION/*VRAAG 6*

6.1 Electrolytic cell/*Elektrolitiese sel* ✓ (1)

6.2 Electrical energy is converted to chemical energy. ✓✓

OR

This cell needs a power source/battery. ✓✓

Elektriese energie word na chemiese energie omgesit. ✓✓

OF

Hierdie sel benodig 'n kragbron/battery. ✓✓ (2)

6.3 **Cathode** is the electrode where reduction takes place. ✓
Anode is the electrode where oxidation takes place. ✓
Katode *is die elektrode waar reduksie plaasvind.* ✓
Anode *is die elektrode waar oksidasie plaasvind.* ✓ (2)

6.4 Carbon electrodes/*Koolstof elektrodes.* ✓ (1)

6.5 6.5.1 Elektrode **A**
(Metallic) brown deposit around the electrode.
(Metaalagtige) bruin neerslag word om die elektrode gevorm. ✓✓ (2)

6.5.2 Elektrode **B**
Bubbles are formed around the electrode.
Borrels word rondom die elektrode gevorm. ✓✓ (2)

6.6 6.6.1 Electrode **B** is the anode/*Elektrode **B** is die anode.* ✓ (1)

6.6.2 Electrode **A** is the cathode/*Elektrode **A** is die katode.* ✓ (1)

6.7 6.7.1 $Cu^{2+} + 2e^- \rightarrow Cu$ ✓✓ (2)

6.7.2 $2Cl^- \rightarrow Cl_2 + 2e^-$ ✓✓ (2)

6.8 Electroplating/*Elektroplatering*
Galvanising/*Galvanisering*
Purification of metals/*Suiwering van metale*
Extraction of metals/*Ekstraksie van metale*
Preparation of chemicals/*Voorbereiding van chemikalieë*
Any/*Enige 3* ✓✓✓ (3)

[19]

TOTAL/*TOTAAL*: 75