Province of the
EASTERN CAPE
EDUCATION

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NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIORSERTIFIKAAT*

GRADE/*GRAAD* 11

NOVEMBER 2024

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

MARKS/*PUNTE*: **75**

This marking guideline consists of 4 pages./
Hierdie nasienriglyn bestaan uit 4 bladsye.

QUESTION/*VRAAG* 1

1.1 B ✓✓ (2)

1.2 B ✓✓ (2)

1.3 D ✓✓ (2)

1.4 C ✓✓ (2)

1.5 D ✓✓ (2)
[10]

QUESTION/*VRAAG* 2

2.1 A system, which can exchange energy only, not matter, with the surroundings. ✓✓
'n Sisteem wat slegs energie, nie materie nie, met die omgewing kan uitruil. (2)

2.2 2.2.1 A device, which converts heat energy into mechanical work. ✓✓
'n Toestel wat hitte-energie in meganiese werk omskakel. (2)

2.2.2 $\Delta Q = \Delta U + \Delta W$
$\Delta U = \Delta Q - \Delta W$ } Any/*Enige* 1 ✓
$\Delta Q = 620\,000 - 370\,000$ ✓
$\Delta Q = 250\,000$ J ✓ (3)

2.2.3 Steam engines.
Internal combustion engine
Jet engine } Any 2 ✓✓

Stroomenjins
Interne verbrandingsenjins/ Binnebrandenjins
Straalmotor/Straalenjin } *Enige* 2 ✓✓ (2)
[9]

QUESTION/*VRAAG* 3

3.1 The amount of heat lost equals the amount of heat gained, when no heat is lost. ✓✓
Die hoeveelheid warmte wat afgegee word gelyk is aan die hoeveelheid warmte wat opgeneem word indien geen warmte verlore gaan nie. (2)

3.2 A thermodynamic system is a portion of matter (e.g. gas enclosed inside a cylinder, fitted with a piston) ✓✓, where a surrounding is anything outside of the system which has some bearing on the behaviour of the system. ✓✓
'n Termodinamiese sisteem is 'n gedeelte van 'n stof (bv. 'n ingeslote gas in 'n silinder, toegerus met 'n suier), waar 'n omgewing as enigiets buite die sisteem beskou word, wat 'n invloed op die gedrag van die sisteem het. (4)

3.3 $Q = mc\Delta T$ ✓
$= 0{,}08 \times 4\,200$ ✓ $\times (100 - 15)$ ✓
$= 230\,160$ J ✓ (4)

3.4 The amount of heat required to increase the temperature of 1kg of the whole substance by 1°C or 1 K. ✓✓
Die hoeveelheid warmte benodig om die temperatuur van 1 kg van die stof met 1°C of 1 K te laat styg. (2)

3.5 $Q_{absorbed/geabsorbeer} = Q_{lost/verloor}$
$(mc\Delta T)_{absorbed/geabsorbeer} = (mc\Delta T)_{lost/verloor}$
$m_1 c_1 \Delta T_1 = m_1 c_1 \Delta T_1$
Any/Enige 1 ✓
0,75 ✓ x 4 200 ✓ x (20) ✓ = [0,5 ✓ x c_1 x (140)] ✓
$= 900$ J.kg^{-1}.K^{-1} ✓ (7)

3.6 A car radiator
Seawater cooling system at Koeberg
Water is reused in firefighting
Building materials
Materials for a heater
Materials for cookware

OR any 3 relevant answers ✓✓✓

'n Motorverkoeler.
Seewaterverkoelingstelsel by Koeberg.
Water word in brandbestryding hergebruik.
Boumateriale.
Materiale vir 'n verwarmer.
Materiale vir kookware.

***OF** enige 3 relavante antwoorde.* (3)
[22]

QUESTION/*VRAAG* 4

4.1 4.1.1 Oxidation is the loss of electrons. ✓✓
Oksidasie is die verlies/afgee van elektrone. (2)

4.1.2 Oxidising agent is a substance that undergoes reduction. ✓✓
'n Oksideermiddel word gedefinieer as 'n stof wat self gereduseer word. (2)

4.2 4.2.1 0 ✓✓ (2)

4.2.2 - 1 ✓✓ (2)

4.2.3 + 6 ✓✓ (2)

4.2.4 - 3 ✓✓ (2)

4.3 4.3.1 O ✓✓ (2)

4.3.2 H_2 ✓✓ (2)

4.4 $A\ell + 3Ag^+$ ✓→ $A\ell^{3+} + 3Ag$ ✓ (2)
[18]

QUESTION/*VRAAG* 5

5.1 Electrical energy to chemical energy. ✓✓
Elektriese energie na chemise energie (2)

5.2 Electrolysis is the decomposition of a substance when an electric current passes through it ✓✓ and an electrolyte is a solute, liquid or solution that conducts electricity through the movement of ions. ✓✓

Elektrolise is die opbreek van 'n stof wanneer 'n elektriese stroom daardeur beweeg en 'n elektroliet is 'n opgeloste stof, vloeistof of oplossing wat elektrisiteit deur die beweging van ione gelei. (4)

5.3 Electrodes B ✓
Elektrode B (1)

5.4 In an electrolytic cell the anode is taken to be positive. ✓✓
In 'n elektrolitiese sel is die anode positief. (2)

5.5 A reducing agent is a substance that undergoes oxidation. ✓✓
'n Reduseermiddel is 'n stof wat self geoksideer word. (2)

5.6 5.6.1 $Cu^{2+}_{(aq)} + 2e^- \rightarrow Cu_{(s)}$ ✓✓ (2)

5.6.2 $2\underline{C\ell}^-$ ✓ (1)

5.6.3 Gas bubbles ✓✓
Gas borrels (2)
[16]

TOTAL/*TOTAAL*: 75