Province of the
EASTERN CAPE
EDUCATION

NASIONALE SENIOR SERTIFIKAAT

GRAAD 11

NOVEMBER 2011

FISIESE WETENSKAP V2 MEMORANDUM

PUNTE: 150

Hierdie memorandum bestaan uit 12 bladsye.

LEERUITKOMSTE EN ASESSERINGSTANDAARDE		
LU1	**LU2**	**LU3**
AS 11.1.1 Beplan en voer ’n wetenskaplike ondersoek uit om data te versamel ten opsigte van akkuraatheid, betroubaarheid en die kontroleer van veranderlikes.	**AS 11.2.1** Definieer, bespreek en verduidelik voorgeskrewe wetenskaplike kennis.	**AS 11.3.2** Identifiseer etiese en morele aspekte verwant aan die ontwikkeling van wetenskap en tegnologie, en evalueer die impak (voordele en nadele) van die verwantskap uit ’n persoonlike oogpunt.
AS 11.1.2 Soek patrone en tendense, stel dit in verskillende vorms voor, verduidelik tendense, gebruik wetenskaplike beredenering om gevolgtrekkings te maak en te evalueer, en formuleer veralgemenings.	**AS 11.2.2** Verduidelik en druk voorgeskrewe wetenskaplike beginsels, teorieë, modelle en wette uit deur die verwantskap tussen verskillende feite konsepte in eie woorde aan te dui.	**AS 11.3.3** Evalueer die impak van wetenskaplike en tegnologiese kennis op volhoubare ontwikkeling van hulpbronne, en stel langtermyn en korttermyn strategieë voor om bestuur van bronne in die omgewing te verbeter.
AS 11.1.3 Pas bekende probleemoplossings strategieë toe om (ongesiene) probleme met meervoudige stappe op te los.	**AS 11.2.3** Pas wetenskaplike kennis in kontekste van die alledaagse lewe toe.	

GUIDELINES FOR MARKING

This section provides guidelines for the way in which marks will be allocated. The broad principles must be adhered to in the marking of Physical Sciences tests and examinations.

1.1 MARK ALLOCATION

1.1.1 Definitions: Two marks will be awarded for a correct definition. No marks will be awarded for an incorrect or partially correct definition.

1.1.2 Calculations:
- Marks will be awarded for: correct formula; correct substation, correct answer with unit.
- No marks will be awarded if an incorrect or inappropriate formula is used, even though there may be relevant symbols and applicable substitutions.

1.1.3 Explanations and interpretations: Allocations of marks to questions requiring interpretation or explanation e.g. AS 1.4, 2.3, 3.1, 3.2 and 3.3, will differ and may include the use of rubrics, checklists, memoranda etc. In all such answers emphasis must be placed on scientific concepts relating to the question.

1.2 FORMULAE AND SUBSTITUTIONS

1.2.1 Mathematical manipulations and change of subject of approriate formulae carry no marks, but if a candidate starts off with correct formula and then changes the subject of the formula incorrectly, marks will be awarded for the formula and the correct substitutions. The mark for the incorrect numerical answer is forfeited.

1.2.2 When an error is made during **substitution into a correct formula**, a mark will be awarded for the correct formula and for the correct substitutions, but **no further marks** will be given.

1.2.3 Marks are only awarded for a formula if a calculation had been attempted i.e. substitutions have been made or a numerical answer given.

1.2.4 Marks can only be awarded for substitutions when values are substituted into formulae and not when listed before a calculation starts.

1.2.5 All calculations, when not specified in the question, must be done to two decimal places.

1.3 UNITS

1.3.1 Candidates will only be penalised once for the repeated use of an incorrect unit **within a question of sub-question.**

1.3.2 Units are only required in the final answer to a calculation.

1.3.3 Marks are only awarded for an answer and not for a unit per se. Candidates will therefore forfeit the mark allocated for the answer in each of the following situations:

- Correct answer + wrong unit
- Wrong answer + correct unit
- Correct answer + no unit

1.3.4 SI units must be used except in certain cases, e.g. $V \cdot m^{-1}$ instead of $N \cdot C^{-1}$, and $cm \cdot s^{-1}$ where the question warrants this. (This instruction only applies to Paper 1.)

1.4 POSITIVE MARKING

Positive marking regarding calculations will be followed in the following cases:

1.4.1 **Sub-question to sub-question**: When a certain variable is calculated in one sub-question (e.g. 3.1) and needs to be substituted in another (3.2 or 3.3), e.g. if the answer for 3.1 is incorrect and is substituted correctly in 3.2 or 3.3, full marks are to be awarded for the subsequent sub-questions.

1.4.2 **A multi-step question in a sub-question**: If the candidate has to calculate, for example, current in the first step and gets it wrong due to a substitution error, the mark for the substitution and the final answer will be forfeited.

1.4.3 If a final answer to a calculation is correct, full marks will not be automatically be awarded. Markers will always ensure that the correct/appropriate formula is used and that workings, including substitutions, are correct.

1.4.4 Questions where a series of calculations have to be made (e.g. a circuit diagram question) do not always have to follow the same order. FULL MARKS will be awarded provided it is a valid solution to the problem. However, any calculation that will not bring the candidate closer to the answer than the original data, will not count any marks.

1.4.5 If one answer or calculation is required, but two given by the candidate, only the first one will be marked, irrespective of which one is correct. If two answers are required, only the first two will be marked etc.

1.4.6 Normally, if based on a conceptual mistake, an incorrect answer cannot be correctly motivated. If the candidate is therefore required to motivate in question 3.2 the answer given to question 3.1, and 3.1 is incorrect, no marks can be awarded for question 3.2. However, if the answer for e.g. 3.1. is based on a calculation, the motivation for the incorrect answer in 3.2 could be considered.

1.4.7 If instructions regarding method of answering are not followed, e.g. the candidate does a calculation when the instruction was to **solve by construction and measurement,** a candidate may forfeit all the marks for the specific question.

1.4.8 For an error of principle, no marks are awarded (Rule 1) e.g. if the potential difference is 200 V and resistance is 25 Ω, calculate the current.

CORRECT	ANSWER	POSSIBLE	ANSWER	POSSIBLE
$I = \frac{V}{R}$ √ $= \frac{200}{25}$ √ = 8 A √ (3)	$R = \frac{V}{I}$ √ $= \frac{200}{25}$ × = 8 A × (1)	$R = \frac{I}{V}$ × $= \frac{200}{25}$ = 8 A (0)	$I = \frac{V}{R}$ √ $I = \frac{R}{V}$ × $= \frac{25}{200}$ √ = 0,125 A (2)	$I = \frac{V}{R}$ √ = 8 A √ (2)

1.5 GENERAL PRINCIPLES OF MARKING IN CHEMISTRY (PAPER 2)

The following are a number of guidelines that specifically apply to Paper 2.

1.5.1 When a chemical **FORMULA** is asked, and the **NAME** is given as answer, only one of the two marks will be awarded. The same rule applies when the **NAME** is asked and the **FORMULA** is given.

1.5.2 When redox half-reactions are to be written, the correct arrow should be used. If the equation

$$H_2S \rightarrow S + 2H^+ + 2e^- \left(\frac{2}{2}\right)$$

is the correct answer, the following marks will be given:

H_2S $S + 2H^+ + 2e^- \left(\frac{1}{2}\right)$

H_2S $S + 2H^+ + 2e^- \left(\frac{0}{2}\right)$

H_2S $S + 2H^+ + 2e^- \left(\frac{2}{2}\right)$

$H_2S \leftarrow S + 2H^+ + 2e^- \left(\frac{2}{2}\right)$

1.5.3 When candidates are required to give an explanation involving the relative strength of oxidising and reducing agents, the following is unacceptable:

- Stating the position of a substance on table 4 only (e.g. Cu is above Mg).
- Using relative reactivity only (e.g. Mg is more reactive than Cu).
- The correct answer would be for an instance be: Mg is a stronger reducing agent than Cu, and therefore Mg will be also to reduce Cu^{+2} ions to Cu. The answer can also be given in terms of the relative strength as electron acceptors and donors.

1.5.4 One mark will be forfeited when the charge of an ion is omitted per equation.

1.5.5 The error carrying principle does not apply to chemical equations or half reactions. For example, if a learner writes the wrong oxidation/reduction half reaction in the sub-question and carries the answer to another sub-question (balancing of equations or calculation of E^{θ}_{cell}) then the learner is not credited for this substitution.

1.5.6 *When a calculation of the cell potential if a galvanic cell is expected, marks will only be awarded for the formula if one of the formulae indicated on the data sheet (Table 2) is used. The use of any other formula using abbreviations etc. will carry no marks.

1.5.7 In the structural formula of an organic molecule all hydrogen atoms must be shown. Marks will be deducted if hydrogen atoms are omitted.

1.5.8 When a structural formula is asked, marks will be deducted if the candidate writes the condensed formula.

1.5.8 *When an IUPAC name is asked, and the candidate omits the hyphen (e.g. instead of 1 – pentene the candidate writes 1 pentene), marks will be forfeited.

AFDELING A

VRAAG 1: EENWOORD ITEMS

1.1	Datiewe/koördinate kovalente binding √	[11.2.1]	(1)
1.2	Ru-yster/gietyster √	[11.2.1]	(1)
1.3	Eksotermiese (reaksie) √	[11.2.1]	(1)
1.4	Indikator √	[11.2.1]	(1)
1.5	Koolwaterstowwe √	[11.2.1]	(1)
			[5]

VRAAG 2: MEERVOUDIGEKEUSE-VRAE

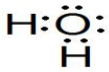
2.1	B √√	[11.2.2]	(2)
2.2	C √√	[11.1.2]	(2)
2.3	D √√	[11.2.3]	(2)
2.4	C √√	[11.2.3]	(2)
2.5	B √√	[11.2.3]	(2)
2.6	A √√	[11.2.2]	(2)
2.7	C √√	[11.2.3]	(2)
2.8	D √√	[11.1.2]	(2)
2.9	A √√	[11.3.3]	(2)
2.10	B √√	[11.3.3]	(2)
			[20]

TOTAAL AFDELING A: 25

AFDELING B

VRAAG 3

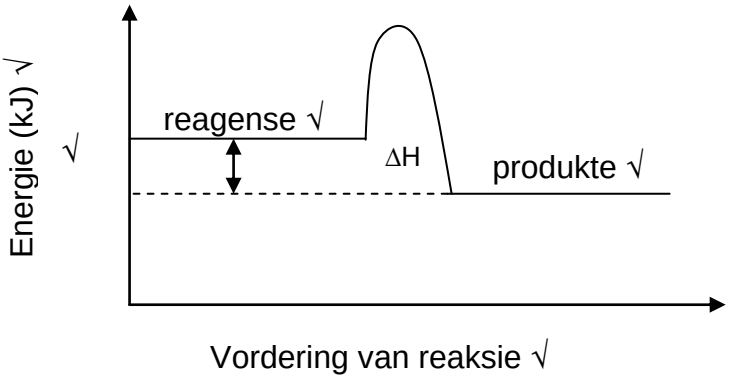
3.1 3.1.1  √ [11.2.1] (1)

3.1.2  √√ [11.2.1] (2)

3.2 Gebuig of hoekig √ [11.2.1] (1)

3.3 Eksotermies. √ ΔH is negatief/minder as nul. √ [11.2.1] (3)

3.4



[11.2.1] (4)

3.5 Polêr. √ Die O-atoom is meer elektronegatief as die H-atoom. √ Beide dipoolmomente werk in dieselfde rigting om 'n netto dipoolmoment in die rigting van die O-atoom te gee. √√ Die suurstof gedeelte van die molekuul word meer negatief as die waterstof gedeelte √ en 'n polêre molekuul word gevorm. [11.1.2] (5)

3.6 Waterstofbindings √ [11.2.1] (1)

3.7 Bindingsenergie√ [11.2.1] (1)

3.8 3.8.1 E_{Totaal} (bindingsbreking) = (2 x H − H) + (O = O)
= (2 x 436) + 499 √
= 1 371 $kJ \cdot mol^{-1}$ √ [11.1.3] (2)

3.8.2 E_{Totaal} (bindingsbreking) = 4 × O − H
= 4 × 460 √
= 1 840 $kJ \cdot mol^{-1}$ √ [11.1.3] (2)

[22]

VRAAG 4

4.1 4.1.1 Wat is die verwantskap tussen temperatuur en volume van 'n gas teen konstante druk? √√ [11.1.2] (2)

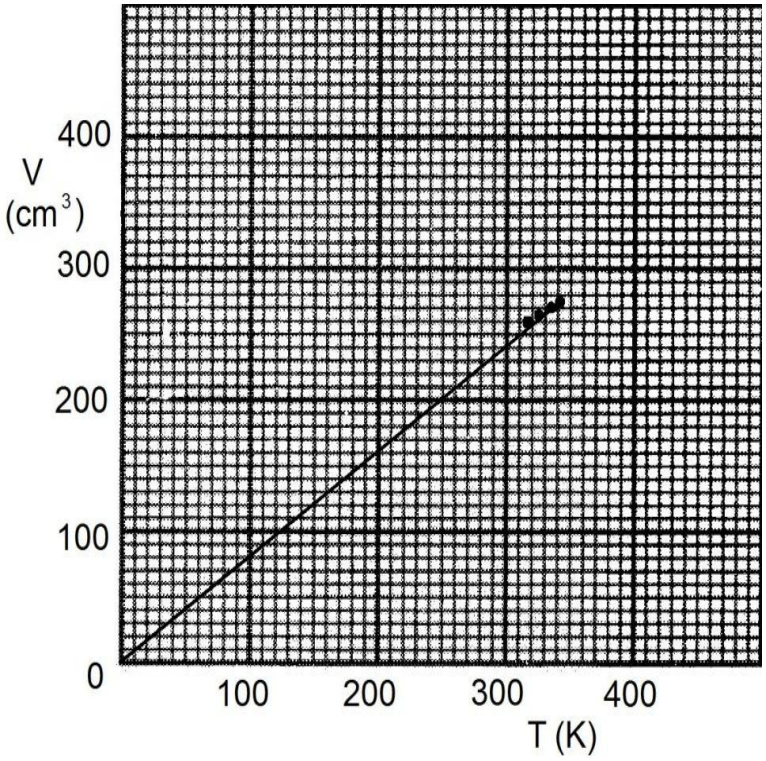
4.1.2 318 K √ ; 260 cm^3 √ [11.2.3] (2)

4.1.3 $V \propto T$ √√ [11.1.2] (2)

4.1.4 Volume √ [11.1.1] (1)

4.1.5 (5)

Kriteria	Punte
Asse byskrifte korrek met eenhede	√
Geskikte koördinate	√
Korrekte plotting	√√
Grafiek ekstrapoleer tot nul	√



[11.1.2]

4.2 p_1 = 110 kPa ; V_1 = 125 cm^3 ; T_1 = 25 °C + 273 = 298 K

p_2 = 230 kPa ; V_2 = 135 cm^3 ; T_2 = ?

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2} \quad √$$

$$\frac{110 \text{ x } 125}{298} √ = \frac{230 \text{ x } 135}{T2} √$$

T_2 = 672, 94 K √

∴ temperatuur in °C = 672, 94 K − 273

= 399, 94 °C √ [11.1.3] (5)

4.3 $p = 70\ kPa = 70\ 000\ Pa$; $V = 200\ dm^3 = 0,2\ m^3$; $n = 3\ mol$;
$R = 8,31\ J{\cdot}K^{-1}{\cdot}mol^{-1}$; $T = ?$

$pV = nRT$ √

$(70\ 000)$ √$(0,2)$ √ $= (3)(8,31)T$ √

∴ $T = 561,57\ K$ √ ∴ $t = 561,57 - 273 = 288,57\ °C$ √ [11.1.3] (6)

[23]

VRAAG 5

5.1 5.1.1 'n Oplossing waarvan die konsentrasie presies geken is. √√ [11.2.1] (2)

5.1.2 Volumetriese fles / meetfles √ [11.1.1] (1)

5.1.3 $c = 0,1\ mol.dm^{-3}$; $V = 250\ cm^3 \div 1000 = 0,25\ dm^3$;
$M(COOH)_2.2H_2O = (2 \times 12) + (6 \times 16) + (6 \times 1)$
$= 126\ g.mol^{-1}$ √;
$m = ?$

$c = = \frac{n}{V} = \frac{m}{MV}$ √ $0,1$ √ $= \frac{m}{126 \times 0,25}$ √ ∴ $m = 3,15\ g$ √	**OF**	$c = \frac{n}{V}$ ∴ $0,1 = \frac{n}{0,25} \Rightarrow n = 0,025\ mol$√ $m = nM$ √ $= 0,025 \times 126$ √ $= 3,15\ g$ √

[11.1.3] (5)

5.1.4 Swak suur. √ Dit ioniseer nie volledig in oplossing nie. √√ [11.2.1] (3)

5.2 5.2.1 A − Burette √
B − Kegelfles/Erlenmeyerfles √ [11.1.1] (2)

5.2.2 pipet √√ / wasbottel √√ (Enige 1) [11.1.1] (2)

5.3 $2NaOH + (COOH)_2$ √ → $(COONa)_2 + 2H_2O$ √ (Bal. √) [11.2.3] (3)

5.4 bytsoda √√ [11.3.3] (2)

[20]

VRAAG 6

6.1 $4Fe + 3O_2$ √ → $2Fe_2O_3$ √ (Bal. √) [11.2.3] (3)

6.2 Redoksreaksie √√ [11.2.1] (2)

6.3 Roes √ [11.3.2] (1)

6.4 0 √ [11.2.3] (1)

6.5 -2 √ [11.2.3] (1)

6.6 Reduksie √√ 11.2.1] (2)

6.7 Oksidasie is verlies van elektrone. √√ [11.2.1] (2)

6.8 Fe √√ [11.2.3] (2)

6.9 Galvaniseer dit √√ bedek dit met 'n lagie Zn-metaal/verf/olie of plastiek .√√ (Enige 2) [11.3.2] (4)

[18]

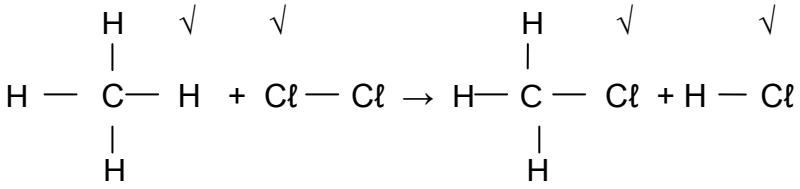
VRAAG 7

7.1 7.1.1 Alkane √√ [11.2.1] (2)

7.1.2 Eteen √√ [11.2.1] (2)

7.1.3 C √√ [11.2.1] (2)

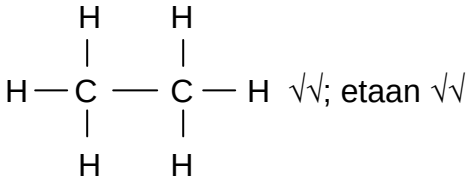
7.1.4



[11.2.3] (4)

7.1.5 Substitusie √√ [11.2.1] (2)

7.1.6



[11.2.3] (4)

7.1.7 Addisie/hidrogenasie √√ [11.2.1] (2)

7.1.8 Margarien √√ [11.3.2] (2)

7.1.9 Eliminasie √√ [11.2.1] (2)

[22]

VRAAG 8

8.1 Sand √ [11.2.3] (1)

8.2 8.2.1 Fe_2O_3 (s) + 3CO (g) √ → 2Fe (ℓ) + $3CO_2$ (g) √ (Bal. √) [11.2.3] (3)

8.2.2 Vloeistof √ [11.2.1] (2)

8.3 Die koolstofdioksied wat vervaardig word as 'n byproduk, is 'n kweekhuisgas en 'n bydraer tot globale verwarming. √√ **/** Afvalstowwe soos swawel en ander swaar metale kan bydra tot grond- en waterbesoedeling. √√ (Enige 1) [11.3.3] (2)

8.4 Die konstruksie-bedryf √**/**vervaardiging van voertuie √ **/** masjinerie √ **/**gereedskap √ **/** kombuis gereedskap √**,** ens. [11.3.3] (1)

8.5 Sement √√ [11.3.1] (2)
[10]

VRAAG 9

9.1 Koolstofdioksied, √ metaan, √ stikstofoksied, √ chloorfluoorkoolstowwe √ (Enige 2) [11.3.1] (2)

9.2 Die kweekhuiseffek is die versameling van hitte naby die aarde se oppervlak deur gasse (soos koolstofdioksied) in die atmosfeer. √√ [11.3.3] (2)

9.3 Toename in temperatuur op Aarde √ / styging van seevlakke √ **/**vloede √ strawwe droogtes √ (Enige 1) [11.3.3] (1)

9.4 Gebruik skoner brandstowwe in motors √ **/** Gebruik publieke vervoer √ **/** Gebruik 'n fiets of 'n motorfiets in plaas van 'n motor. √ (Enige ander toepaslike voorbeeld √) (Enige 1) [11.3.3] (1)

9.5 Die osoonlaag beskerm die aarde van die son se bestraling. √ Dit beskerm ons teen te veel bestraling wat kan lei tot velselbeskadiging of velkanker. √ [11.3.3] (2)

9.6 Kyoto Protokol/Ooreenkoms √√ [11.3.1] (2)
[10]

TOTAAL AFDELING B: 125

GROOTTOTAAL: 150