Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE/*GRAAD* 11

PHYSICAL SCIENCES – SECOND PAPER
FISIESE WETENSKAPPE – TWEEDE VRAESTEL

MEMORANDUM

NOVEMBER 2009

MARKS/*PUNTE*: **150**

TIME/*TYD*: **3 hours/*uur***

This memorandum consists of 10 pages./
Hierdie memorandum bestaan uit 10 bladsye.

SECTION A/*AFDELING A*

QUESTION 1: ONE-WORD ITEMS/*VRAAG 1: EEN WOORD ITEMS*

1.1 Helium✓ (1)
11.2.1

1.2 Empirical formula/*Empiriese formule*✓ (1)
11.2.1

1.3 Exothermic/*Eksotermies*✓ (1)
11.2.1

1.4 Covalent bond/*Kovalente binding*✓ (1)
11.2.1

1.5 Alkanes/*Alkane*✓ (1)
11.2.1
[5]

QUESTION 2: FALSE ITEMS/*VRAAG 2: ONWAAR ITEMS*

2.1 an ideal gas/*'n ideale gas*✓✓ (2)
11.2.1

2.2 spherically/*sferiese*✓✓ (2)
11.2.1

2.3 activation energy/*aktiveringsenergie*✓✓ (2)
11.2.1

2.4 pressure is also 0/*druk is ook 0*✓✓ (2)
11.2.1

2.5 at least one C-C double bond/*ten minste een C-C dubbelbinding*✓✓ (2)
11.2.1
[10]

QUESTION 3: MULTIPLE-CHOICE QUESTIONS/
VRAAG 3: MEERVOUDIGEKEUSE-VRAE

3.1 A✓✓ (2)
11.2.1

3.2 D✓✓ (2)
11.2.3

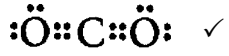
3.3 C✓✓ (2)
11.2.3

3.4 C✓✓ (2)
11.3.2

3.5 A✓✓ (2)
11.3.2
[10]

TOTAL SECTION A/TOTAAL AFDELING A: 25

SECTION B/*AFDELING B*
QUESTION 4/*VRAAG 4*

4.1.1  ✓ (1)
11.2.1

4.1.2 Bent or angular/*Gebuig of hoekig*✓ (1)
11.2.1

4.1.3 Polar/*Polêr*✓ (1)
11.2.1

4.1.4 Polar/*Polêr*✓ (1)
11.2.1

4.1.5 gas✓ (1)
11.2.1

4.2.1 Sublimation/*Sublimasie*✓✓ (2)
11.2.1

4.2.2 Dissociation/*Dissosiasie*✓✓ (2)
11.2.1

4.2.3 Ionization energy/*Ionisasie-energie*✓✓ (2)
11.2.1
[11]

QUESTION 5/*VRAAG 5*

5.1 N_2✓✓ (2)
11.2.1

5.2 Covalent bond/*Kovalente binding*✓✓ (2)
11.2.1

5.3 Methane/*Metaan*✓✓ (2)
11.1.2

5.4 O: 1 x 336 = 336 kJ.mol^{-1}✓✓
N: 1 x 519 = 519 kJ.mol^{-1}✓✓
Total/*Totaal* = 855 kJ.mol^{-1}✓ (5)
11.2.3
[11]

QUESTION 6/*VRAAG 6*

6.1 What is the relationship between volume and pressure of air? ✓✓ (2)
Wat is die verwantskap tussen volume en druk van lug? 11.1.1

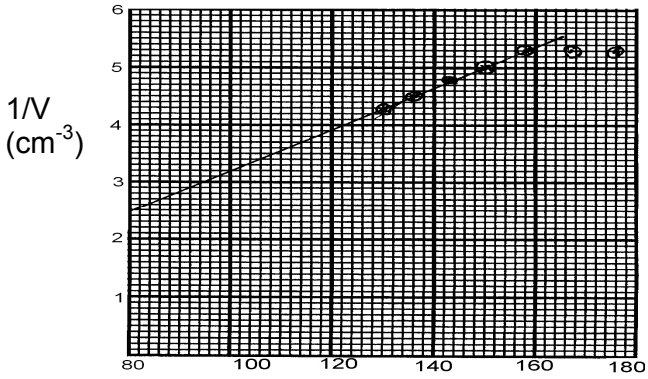
6.2 ANY ONE ✓✓
The pressure of air is directly proportional to volume OR
The pressure is inversely proportional to volume OR
When pressure increases volume decreases OR
When pressure increases volume increases./

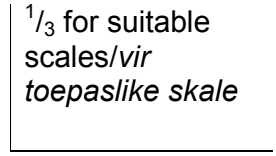
ENIGE EEN✓✓
Die druk van lug is direk eweredig aan die volume. OF
Die druk van lug is omgekeerd eweredig aan die volume OF
Wanneer druk toeneem neem volume af OF (2)
Wanneer druk toeneem neem volume toe. 11.1.1

6.3 Temperature (not mass). ✓✓ (2)
Temperatuur (nie massa nie) 11.1.1

6.4 Boyle's law apparatus OR Bourdon Gauge ✓✓ (2)
Boyle se Wet-apparaat OF Bourdon-Gauge 11.1.1

6.5 Graph of p vs 1/V
Grafiek van p vs 1/V
Both axes labelled correctly✓/Shape of graph ✓/Suitable scales✓
Beide asse korrekte byskrifte/Vorm van grafiek/Geskikte skale





1/3 for suitable scales/*vir toepaslike skale*

Axes starting with (0;0) = 3/3 (3)
Asse wat begin met (0;0) = 3/3 11.1.3

6.6 pV is a constant✓/*pV is konstant* (1)
11.1.2

6.7 $p \propto \frac{1}{V}$ ✓✓ (2)
11.1.2

6.8 Boyle's law ✓✓/*Boyle se Wet* (2)
11.2.1

6.9 The volume of a fixed mass of gas is inversely proportional to the pressure provided the temperature remains constant. ✓✓✓/
Die volume van 'n ingeslote massa gas is omgekeerd eweredig aan die druk mits die temperatuur konstant bly. (3)
11.2.2

[19]

QUESTION 7/*VRAAG 7*

7.1.1 N_2 + $3H_2$✓ → $2NH_3$✓ bal✓ (3)
11.2.3

7.1.2 Any two/*Enige twee*

Positive impact/*Positiewe impak:*
The process has led to/*Die proses het gelei tot:*
- Creation of jobs/*Werkverskaffing*

Production of/*Produksie van:*
- Fertilizers to ensure enough food production/*Kunsmis om voldoende voedsel produksie te verseker*
- Plastics used to make containers, etc,/*Plastiek wat gebruik word om houers temaak, ens.*
- Coolants used in air conditioners, etc./*Koelmiddels gebruik in lugreëling, ens.*
- Cleaning agents for household use, etc./*Skoonmaakmiddels vir houshoudelike gebruik, ens.*
- Explosives used in mining industry, etc./*Plofstowwe vir gebruik in mynwese, ens.*
- Medicines to improve health/*Medisyne om gesondheid te verbeter*

Any two/*Enige twee:*

Negative impact/*Negatiewe impak:*
- Preparation of explosives – risk/*Bereiding van plofstowwe – lewensrisiko*
- Air pollution: increased amounts of nitrogen oxides is a health risk/*Lugbesoedeling: toenemende hoeveelhede stikstofoksiede is 'n gesondheidsrisiko*
- Waterpollution eg. excessive nitrates in water can cause blue baby syndrome/*Waterbesoedeling bv. oormaat nitrate in water kan bloubabasindroom veroorsaak*
- Eutrophication and its consequences eg. dead zones/ *Eutrofisering en gevolge daarvan bv. dooie sones* (4)
11.3.2

7.2.1 An acid/*'n Suur*✓

ANY ONE/*ENIGE EEN*

It is sour in taste/It can donate hydrogen ions/Its pH is less than 7 ✓✓/ (3)
Het suur smaak/Kan waterstofione doneer/Die pH is laer as 7. 11.1.2

7.2.2 Ethanoic acid or acetic acid ✓✓/ (2)
Etanoësuur of asynsuur 11.1.2

7.2.3 M(CH_3COOH) = 2(12) + 4(1) + 2(16)
= 60 $g.mol^{-1}$✓✓

% of C = (24/60) x 100 = 40 %✓

% of H = (4/60) x 100 = 7 %✓

(5)

% of O = (32/60) x 100 = 53 %✓ 11.1.3

7.2.4 Water (H_2O)✓ (2)
Carbon dioxide/*Koolstofdioksied* (CO_2)✓ 11.1.2
[19]

QUESTION 8/*VRAAG 8*

8.1 +6✓ (1)
11.2.3

8.2 Oxygen (O_2) ✓/*Suurstof(O_2)* (1)
11.2.2

8.3 $2SO_2 + O_2$✓ $\rightarrow 2SO_3$ ✓ (2)
11.2.3

8.4 The acid must always be added to the water. ✓✓/ (2)
Die suur moet altyd by die water gevoeg word. 11.3.2
[6]

QUESTION 9/*VRAAG 9*

9.1 alkanes✓✓/*alkane* (2)
11.2.1

9.2 Cigarette lighters✓✓
Or any other example as an energy source/

Sigaretaanstekers (2)
Of enige ander voorbeeld as 'n energiebron. 11.3.2

9.3 Combustion/Oxidation✓✓/ (2)
Verbranding/Oksidasie 11.1.1

9.4 Hexane burns with a yellow flame/yellowish-red flame ✓✓/
(2)
Heksaan brand met 'n geel vlam/geel-rooi vlam 11.1.2

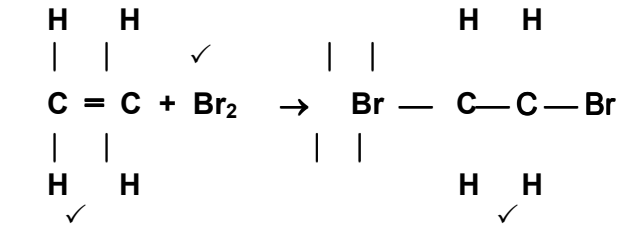
9.5 $2C_6H_{14} + 19O_2$ ✓ $\rightarrow 12CO_2 + 14H_2O$✓ bal ✓ (3)
11.2.3
[11]

QUESTION 10/*VRAAG 10*

10.1 C_nH_{2n}✓✓ (2)
11.2.1

10.2.1 Halogenation/Addition✓✓/ (2)
Halogenasie/Addisie 11.2.1

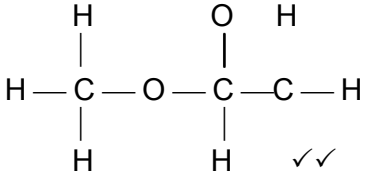
10.2.2



(3)
11.2.3

10.3 Welding✓✓/*Sweiswerk* (2)
11.3.2

10.4.1



(2)
11.2.3

10.4.2 methylethanoate✓✓/*metieletanoaat* (2)
11.2.3
[13]

QUESTION 11/*VRAAG 11*

11.1 Protondonor✓ (1)
11.2.1

11.2.1 n(NaOH) = m/M ✓ = 6/40 = 0,15 mol✓ (2)
11.1.3

11.2.2 [NaOH] = n/V✓ = 0,15/0,25✓ = 0,6 mol.dm^{-3}✓ (3)
11.1.3

11.2.3 2 mol NaOH reacts with 1 mol of H_2SO_4
0,15 mol NaOH reacts with 1 x $\frac{0,15}{2}$

$$[H_2SO_4] = \frac{0,075 \text{ mol}✓}{V}$$

$$= \frac{0,075}{0,02}✓$$

$$= 3,75 \text{ mol.dm}^{-3}✓$$

(3)
11.1.3

11.3 $HC\ell + H_2O$ ✓ $\rightarrow H_3O^+ + C\ell^-$ ✓

$HC\ell$ ionises/dissociates to form H_3O^+/H^+ in water. ✓
Increase in H_3O^+/H^+ results in decrease in pH✓
$HC\ell$ ioniseer/dissosieer om H_3O^+/H^+ in water te vorm. (4)
Toename in H_3O^+/H^+ veroorsaak 'n afname in pH. 11.1.4
[13]

QUESTION 12/*VRAAG 12*

12.1 ANY TWO
Preparation of ore✓/
production of the metal✓
purification of the metal ✓/

ENIGE TWEE
Bereiding van erts
Produksie van metaal (2)
Suiwering van metaal 11.2.3

12.2 Fe_2O_3✓✓ (2)
11.2.1

12.3 Fe_2O_3 (s) + 3CO (g)✓ $\rightarrow$ 2Fe (s) + $3CO_2$ (g)✓ bal✓ (3)
11.2.3

12.4 Sand✓✓ (2)
11.2.3

12.5 Rusting✓✓/*Verroesting* (2)
11.3.3

12.6 ANY TWO
Oiling✓/painting✓/galvanising✓/

ENIGE TWEE
Om te olie/deur te verf/galvanisering (2)
11.3.3
[13]

QUESTION 13/*VRAAG 13*

13.1 Global warming✓✓/*Aardverwarming* (2)
11.3.3

13.2 Methane, ✓ sulphur dioxide,✓ nitrogen monoxide✓/ (3)
metaan, swaweldioksied,stikstofmonoksied 11.3.3

13.3 The layer of greenhouse gases high in the atmosphere traps heat in and reflects it back to the earth.✓✓/
Die laag kweekhuisgasse hoog in die atmosfeer behou hitte en reflekteer dit terug na die aarde. (2)
11.3.2

13.4 ANY TWO
Use less electricity generated from coal✓
Share transport/Use public transport✓
Don't make fires

ENIGE TWEE
Bespaar elektrisiteit wat met steenkool opgewek word
Deel vervoer/Gebruik publieke vervoer
Moenie vuur maak nie (2)
11.3.2
[9]

TOTAL SECTION/TOTAAL AFDELING B: 125

GRAND TOTAL/GROOTTOTAAL: 150