Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2010

PHYSICAL SCIENCES P2 MEMORANDUM

MARKS: 150

TIME: 3 hours

This memorandum consists of 7 pages.

SECTION A

QUESTION 1 ONE-WORD ITEMS

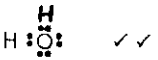
1.1	Dative covalent bond✓/Coordinate covalent bond	11.2.1	(1)
1.2	Boyles Law ✓	11.2.1	(1)
1.3	Empirical formula ✓	11.2.1	(1)
1.4	Standard solution ✓	11.2.1	(1)
1.5	Oxidising agent ✓	11.2.1	(1)
			[5]

QUESTION 2: MULTIPLE-CHOICE QUESTIONS

2.1	B✓✓	11.1.3	(2)
2.2	A✓✓	11.2.2	(2)
2.3	C✓✓	11.2.3	(2)
2.4	D✓✓	11.1.2	(2)
2.5	D✓✓	11.1.2	(2)
2.6	C✓✓	11.2.2	(2)
2.7	A✓✓	11.1.3	(2)
2.8	B✓✓	11.2.1	(2)
2.9	B✓✓	11.2.1	(2)
2.10	C✓✓	11.3.3	(2)
			[20]

TOTAL SECTION A: 25

QUESTION 3

3.1 3.1.1  ✓✓ 11.2.3 (2)

3.1.2  ✓✓ 11.2.3 (2)

3.1.3  ✓✓ 11.2.3 (2)

3.2 3.2.1 Non-polar ✓✓ 11.2.3 (2)

3.2.2 Polar ✓✓ (2)

3.2.3 Polar ✓✓ (2)

3.3 3.3.1 Bond energy ✓ [11.2.1] (1)

3.3.2 Energy absorbed to break bonds of reactants.

N ≡ N + 3 x H - H

941 kJ.mol^{-1} ✓ + 3 x 436 kJ.mol^{-1} ✓ = 2249 kJ.mol^{-1}

Energy released when bonds formed.

6 x N – H

6 x 389 kJ.mol^{-1} ✓ = 2334 kJ.mol^{-1}

ΔH = Energy absorbed to break bonds - Energy released when bonds form✓

= 2249 kJ.mol^{-1}✓ - 2334 kJ.mol^{-1} ✓

= -85 kJ.mol-1✓ 11.1.3 (7)

3.4 3.4.1 A = + ΔH ✓
B = - ΔH ✓ 11.2.3 (2)

3.4.2 Graph-2✓ ; energy of products is greater than energy of reactants✓✓, reaction is endothermic (3)
[25]

QUESTION 4

4.1 What is the relationship between temperature and pressure of an enclosed mass of gas? ✓✓ 11.1.2 (2)

4.2 P α T ✓✓ 11.2.3 (2)

4.3 Volume of the gas. ✓ 11.2.3 (1)

4.4 Temperature is a measure of the average kinetic energy of the particles. ✓ When temperature increases the speed of the molecules increase which results in an increase in the number of effective collisions. ✓When the number of collisions increases the pressure increases. ✓ 11.2.3 (3)

4.5 $\frac{P_1}{T_1} = \frac{P_2}{T_2}$ ✓

$\frac{100✓}{298✓} = \frac{150✓}{T_2}$

$T_2 = \frac{150x298}{100}$

$T_2 = 447$ K✓

t °C = 447 – 273 = 174 °C✓ 11.1.3 (6)

4.6 $PV = nRT$✓ **OR** $PV = \frac{m}{M}RT$

100 x 10^3 ✓ X 1 x 10^{-3} ✓ = n x 8,31 x 298

$n = \frac{(100x10^3)(1x10^{-3})}{8,31x298}$

= 0,04 mole✓

M_{SO2} = 32 + (2 x16) = 64 g.mol^{-1}

n = $\frac{m}{M}$ ✓

0,04 = $\frac{m}{64}$✓

m = 0,04 x 64

= 2,56 g ✓ 11.1.3 (7)

4.7 -273 °C✓ ; Absolute zero✓ 11.2.3 (2)
[23]

QUESTION 5

5.1 Determine the molecular formula of ethanoic acid.

% mass (g)	Atomic mass	Mole ratio n = m/M	Whole No. ratio
39,9	12	39,9/12 = 3,325✓	3,325/3,325 = 1
6,7	1	6,7/1 = 6,7✓	6,7/3,325 = 2✓
53,4	16	53,4/16 = 3,375✓	3,375/3,325 = 1✓

Empirical formula = C H_2 O✓

Empirical formula mass = 12 +2 +16= 30 g.mol^{-1}

Relative molecular mass = 60 g.mol^{-1}

$n = \frac{m}{M} = \frac{60}{30} = 2$✓

Molecular formula = n x empirical formula = 2 (C H_2 O) = C_2 H_4 O_2✓ 11.1.3 (8)

5.2 5.2.1 $n = \frac{m}{M}$✓ $= \frac{2,2}{84}$ ✓= 0,03 mole ✓ 11.2.3 (3)

5.2.2 Weak acid. ✓
Ethanoic acid ionises only partially in solution. ✓✓ 11.2.1 (3)

5.2.3 $\frac{c_a V_a}{c_b V_b} = \frac{n_a}{n_b}$✓

$\frac{c_a(75)}{(0,1)(60)} = \frac{1}{1}$✓

$c_a = \frac{1(0,1)(60)}{1(75)}$

$c_a = 0,08\ mol \cdot dm^{-3}$

11.1.3 (5)
[19]

QUESTION 6

6.1 A substance that loses electrons during a redox reaction. ✓✓ 11.2.1 (2)

6.2 $Zn \rightarrow Zn^{2+} + 2e^-$ ✓✓ 11.2.3 (2)

6.3 Reduction ✓ 11.2.1 (1)

6.4 Redox reaction ✓✓

$Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$ ✓(balancing) 11.2.3 (5)

6.5 $Mg + 2H^+ \rightarrow Mg^{2+} + H_2$ ✓(balancing) 11.2.3 (3)

6.6 H^+ ✓ 11.2.1 (1)

6.7 +3✓ 11.2.1 (1)
[15]

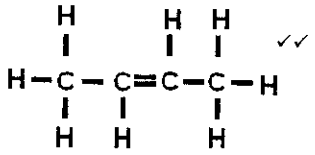
QUESTION 7

7.1 Saturated hydrocarbon. ✓
Contains only single (covalent) bond between two carbon atoms. ✓ 11.2.1 (2)

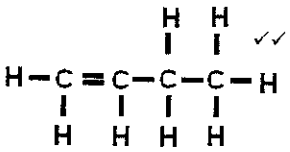
7.2 $2\ C_4H_{10} + 13\ O_2 \rightarrow 8\ CO_2 + 5\ H_2O$ ✓(balancing) 11.2.3 (3)

7.3 Organic compounds with the same molecular formula but with different structural formula. ✓✓ 11.2.1 (2)

7.4

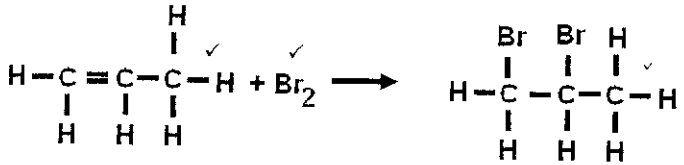


But-2-ene✓



But-1-ene✓ 11.2.3 (6)

7.5 7.5.1



11.2.3 (3)

7.5.2 1,2-dibromo propane ✓✓ 11.2.1 (2)

7.5.3 Addition reaction ✓✓ 11.2.1 (2)
[20]

QUESTION 8

8.1 The naturally occurring compound of a metal from which the metal can be extracted. ✓✓ 11.2.1 (2)

8.2 Carbon monoxide ✓ 11.2.1 (1)

8.3 $Fe_2O_3 + 3\ CO \rightarrow 2\ Fe + 3\ CO_2$ ✓(balancing) 11.2.3 (3)

8.4 To remove the impurity from the ore as slag. ✓✓ 11.2.1 (2)

8.5 $CaSiO_3$ ✓✓ 11.2.1 (2)

8.6 For the construction of roads. ✓✓
To manufacture cement. ✓✓
For making building materials. (any two) 11.3.3 (4)
[14]

QUESTION 9

9.1 Greenhouse gases like carbon dioxide produce greenhouse effect by trapping the Sun's warmth in the lower atmosphere. ✓✓ An increase in the concentration of greenhouse gases results in an increase in the temperature on the Earth. ✓✓ 11.3.3 (4)

9.2 Carbon dioxide✓, water vapour✓, methane gas✓, Nitrogen oxides.(Any three) 11.3.1 (3)

9.3 Uses of fossil fuels for energy ✓
Burning coal to produce electricity ✓
Stock farming (Any two) 11.3.3 (2)
[9]

TOTAL SECTION B: 125

GRAND TOTAL: 150