



Province of the  
**EASTERN CAPE**  
EDUCATION

**PHYSICAL SCIENCES P2**

**MEMORANDUM**

**COMMON TEST**

**JUNE 2014**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**N.B. This memorandum consists of 7 pages including this page.**

**SECTION A****QUESTION 1**

- 1.1 A ✓✓ (2)
- 1.2 C ✓✓ (2)
- 1.3 B ✓✓ (2)
- 1.4 D ✓✓ (2)
- 1.5 D ✓✓ (2)
- 1.6 D ✓✓ (2)
- 1.7 B ✓✓ (2)
- [14]**

**SECTION B****QUESTION 2**

- 2.1
- 2.1.1 Carboxylic acid ✓ (1)
- 2.1.2 Butanal ✓ (1)
- 2.1.3
- $$\begin{array}{ccc} \text{H} & & \text{H} \\ | & & | \\ \text{C} & = & \text{C} \quad \checkmark\checkmark \\ | & & | \\ \text{H} & & \text{H} \end{array}$$
- (2)
- 2.2 Tertiary ✓ (1)
- 2.3 They have the same molecular formula but different functional groups. ✓✓ (2)
- [7]**

**QUESTION 3**

3.1 Hydrocarbons are organic compounds that consist of hydrogen and carbon only. ✓ (1)

3.2

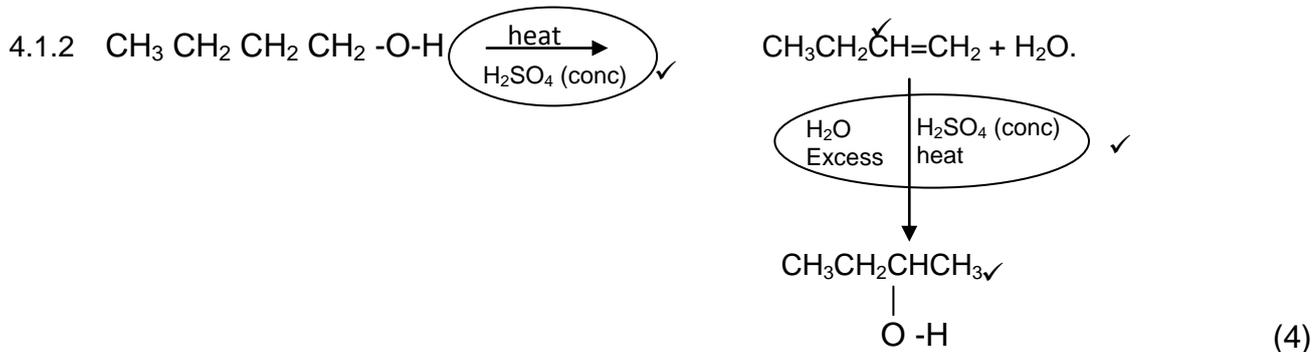
3.2.1 Boiling point increases as the surface area increases ✓ OR Boiling point decreases as the chain become more branched (1)

3.2.2 The more branches the smaller the surface area, ✓ the weaker the intermolecular (Van der Waals) forces. ✓ Lesser energy needed to separate the chains. ✓ (the lower the boiling point). (3)

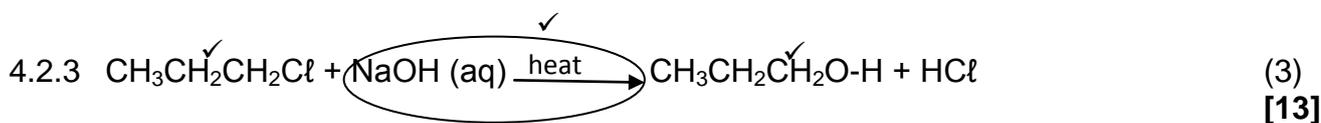
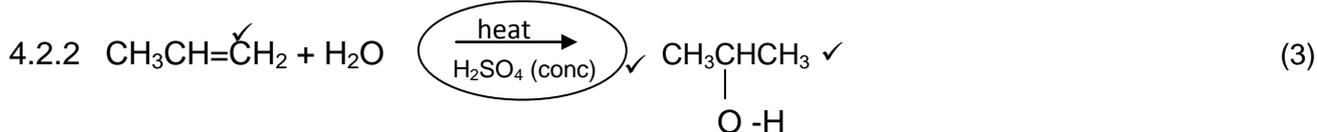
3.3 A. ✓ (1)  
[6]

#### QUESTION 4

4.1.1  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{-O-H}$  ✓✓ (2)



4.2.1 Alcohol ✓ (1)



**QUESTION 5**

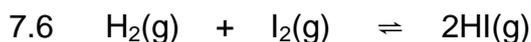
- 5.1 Exothermic ✓  
 $\Delta H = \text{energy of the products} - \text{energy of the reactants}$   
 $\Delta H = -197 - 0$   
 $\Delta H = -197 \text{ kJmol}^{-1}$  ✓ (2)
- 5.2  $1580 \text{ kJmol}^{-1}$  ✓ (1)
- 5.3  $1777 \text{ kJmol}^{-1}$  ✓ (1)
- 5.4  $1537 \text{ kJmol}^{-1}$  ✓ (1)
- [5]**

**QUESTION 6**

- 6.1  $\text{Zn(s)} + 2\text{HCl(aq)} \checkmark \rightarrow \text{ZnCl}_2 \text{(aq)} + \text{H}_2 \text{(g)} \checkmark$  bal ✓ (3)
- 6.2 surface area ✓ / state of division (1)
- 6.3 To make the investigation fair ✓ / To have 1 independent variable (1)
- 6.4 Volume of  $\text{H}_2 \text{(g)}$  is dependant on the amount of zinc used. ✓ (1)
- 6.5 Average reaction rate  $= \frac{\Delta V}{\Delta t}$   
 $= \frac{48 - 30}{40 - 20}$  ✓✓  
 $= 0,9 \text{ cm}^3 \cdot \text{s}^{-1}$  ✓ (3)
- 6.6 Greater than ✓ (1)
- 6.7 Zn is powder, the more finely divided (greater surface area) the greater the contact area. ✓ This will result in more effective collision occur simultaneously per unit time. ✓ (2)
- 6.8  
 6.8.1 Remains the same. ✓ (1)  
 6.8.2 Steeper. ✓ (1)
- 6.9 Copper is a catalyst. Increase the rate of reaction. ✓✓ (2)
- [16]**

**QUESTION 7**

- 7.1 Homogenous, ✓ reactants and products are in the same phase. ✓ (2)
- 7.2 Catalyst ✓ (1)
- 7.3 The equilibrium in graph C is reached faster than in graph A while the concentration of the products in graph A and C are equal and also the concentration of the reactants in both graphs A and C are equal. ✓✓ (2)
- 7.4 Exothermic. ✓ (1)
- 7.5 If the temperature is increased from 500<sup>0</sup>C to 600<sup>0</sup>C the concentration of the products decreases and the reactants concentration increases. ✓ The reverse reaction is thus favoured. According to Le Chateliers' principle endothermic reaction is favoured when temperature is increased. ✓ Thus the forward reaction is exothermic. (2)



$$n(\text{H}_2) = \frac{1}{2}$$

$$= 0,5 \text{ mol}$$

$$n(\text{I}_2) = \frac{127}{254}$$

$$= 0,5 \text{ mol}$$

Mole Ratio	H <sub>2</sub>	I <sub>2</sub>	2HI
Initial mol	(0,5	0,5) ✓	0
Change (used/ formed)	(0,4	0,4	0,8) ✓
Equilibrium mol	(0,1	0,1) ✓	0,8 ✓
Equilibrium Concentration C= n/v	$\frac{0,1}{2}$ (0,05)	$\frac{0,1}{2}$ (0,05)	$\frac{0,8}{2}$ (0,4) ✓

$$K_c = \frac{[\text{HI}]^2}{[\text{H}_2] \cdot [\text{I}_2]} \quad \checkmark$$

$$K_c = \frac{(0,4)^2}{(0,05)(0,05)} \quad \checkmark$$

$$K_c = 64 \quad \checkmark$$

(8)  
**[16]**

**QUESTION 8**

8.1

8.1.1 C ✓ (1)

8.1.2 A ✓ (1)

8.1.3 E ✓ (1)

8.1.4 B ✓ (1)

8.2  $\text{H}_2\text{SO}_4 + 2\text{H}_2\text{O} \rightarrow 2\text{H}_3\text{O}^+ + \text{SO}_4^{2-}$ pH =  $-\log [\text{H}_3\text{O}^+]$  ✓pH =  $-\log (2 \times 0,1)$  ✓

pH = 0,698 ✓ (3)

8.3  $\text{Na}_2\text{CO}_3 \rightarrow \text{Na}^+ + \text{CO}_3^{2-}$  ✓ $\text{CO}_3^{2-} + \text{H}_2\text{O} \checkmark \rightarrow \text{HCO}_3^- + \text{OH}^- \checkmark$ (3)  
**[10]**

**QUESTION 9**

9.1 Dilute acid contains a small number of moles of acid in proportion to the volume of water. ✓ (1)

9.2 Standard solution is the solution of known concentration. ✓ (1)

9.3  $c = \frac{m}{MV}$  ✓

$$0,2 \checkmark = \frac{m}{56 \times 0,3 \checkmark}$$

$$m = 3,36\text{g} \checkmark \quad (4)$$

9.4 To change the colour at the end point of titration. ✓ OR  
To indicate/show when equivalent number of moles of acid and base have reacted. (1)

9.5 Bromothymol blue, ✓ because the equivalent point will be approximately pH = 7 since H<sub>2</sub>SO<sub>4</sub> is a strong acid and KOH is a strong base. ✓ (2)

9.6

$$\frac{C_a \times V_a}{C_b \times V_b} = \frac{n_a}{n_b} \checkmark$$

$$\frac{C_a \times 20,15 \checkmark}{15,04 \times 0,2} = \frac{1}{2} \checkmark$$

$$C_a = 0,075 \text{ mol.dm}^{-3} \checkmark$$

(4)

[13]

**TOTAL SECTION B: 86**  
**GRAND TOTAL: 100**