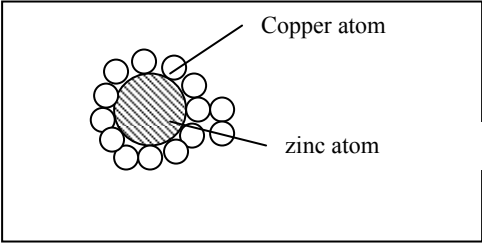
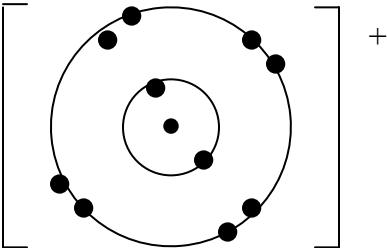
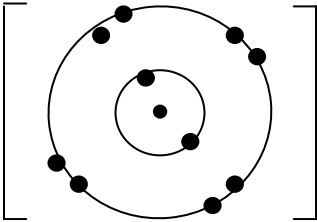
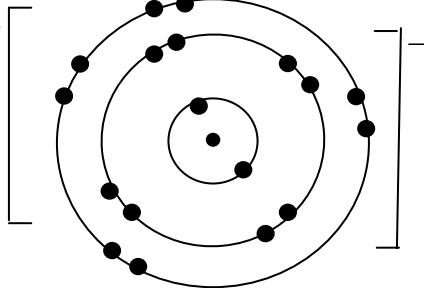
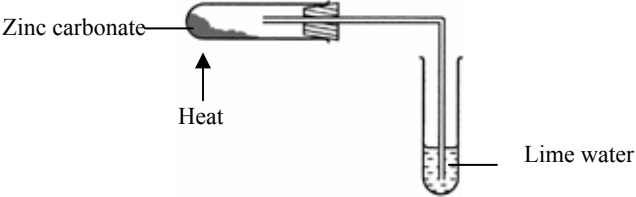


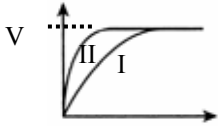
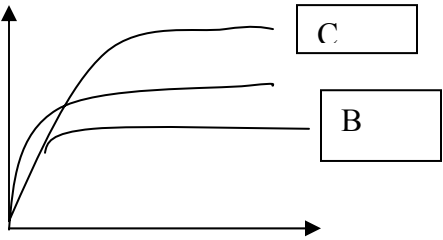
**MARKING SCHEME  
CHEMISTRY PAPER 2**

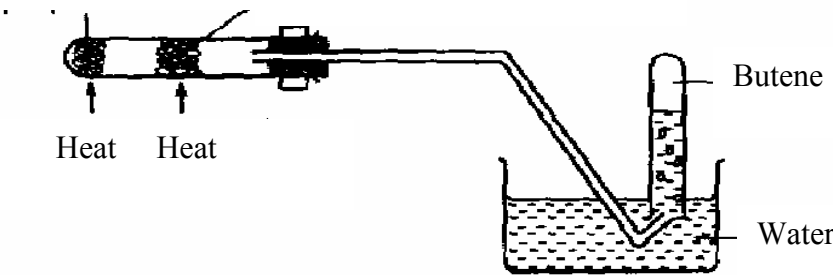
NO	ANSWER	MARK	$\Sigma$ MARK	
1	(a) Ceramic	1	1	
	(b) (i) -The presence of zinc atom will disrupt the orderly arrangement in pure copper	1	2	
	- The atom not easily slide	1		
	(ii)			
				
	Note:			
	- labeled each atom		1	2
	- different size of atom		1	
	(c) (i) Boron oxide		1	
	(ii) High refractive index		1	2
(d) (i)				
$\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H} - \text{C} = \text{C} - \text{H} \end{array}$		1	1	
(ii) Making plastic bag/ pails/battery cases		1	1	
<b>Total</b>			<b>9</b>	

NO	ANSWER	MARK	Σ MARK																
2	(a) The total number of proton and neutron in an atom	1	1																
	(b) (i) Q and R	1																	
	(ii) Q and R have the same proton number but different nucleon number	1	2																
	(c) 2.8.1	1	1																
	(d)																		
																			
	Note:																		
	-No of shells and electrons correct	1																	
	-Charge of the ion	1	2																
	(e)																		
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Element</th> <th>C</th> <th>H</th> <th>O</th> </tr> </thead> <tbody> <tr> <td>Mass</td> <td>64.87</td> <td>13.51</td> <td>21.62</td> </tr> <tr> <td>Mole atom</td> <td><math>\frac{64.87}{12}</math> = 5.41</td> <td><math>\frac{13.51}{1}</math> = 13.51</td> <td><math>\frac{21.62}{16}</math> = 1.35</td> </tr> <tr> <td>Simplest mole ratio</td> <td>4</td> <td>10</td> <td>1</td> </tr> </tbody> </table>	Element	C	H	O	Mass	64.87	13.51	21.62	Mole atom	$\frac{64.87}{12}$ = 5.41	$\frac{13.51}{1}$ = 13.51	$\frac{21.62}{16}$ = 1.35	Simplest mole ratio	4	10	1	1	
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	Empirical formula = C <sub>4</sub> H <sub>10</sub> O	1	3																
	<b>Total</b>		<b>9</b>																

NO	ANSWER	MARK	$\Sigma$ MARK
3	<p>(a) Proton, electron, neutron</p> <p>(b) (i) The number of shells occupied with electrons</p> <p>(ii) - Period 3 - W has 3 shells occupied with electrons</p> <p>(c) (i) Atomic size of atom X is smaller</p> <p>(ii) - Proton number of atom X is larger - attraction of nucleus on the electrons in Period 2 increases</p> <p>(d) (i) ZX</p> <p>(ii)</p> <div style="display: flex; justify-content: center; align-items: center; gap: 20px;"> <div style="text-align: center;">  <p><math>Z^+</math> 2.8</p> </div> <div style="text-align: center;">  <p><math>X^-</math> 2.8.8</p> </div> </div> <p>- No of electrons and shells are correct - The presence of charges</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p><b>Total</b></p>	<p>1</p> <p>1</p> <p>2</p> <p>1</p> <p>2</p> <p>1</p> <p>2</p> <p>1</p> <p>1</p> <p>2</p> <p><b>10</b></p>

NO	ANSWER	MARK	$\Sigma$ MARK
4	<p>(a) (i) White</p> <p>(ii) Double decomposition/precipitation reaction</p> <p>(b) (i) carbon dioxide</p> <p>(ii) <math>\text{ZnCO}_3 \longrightarrow \text{ZnO} + \text{CO}_2</math></p> <p>- Reactants and products are correct</p> <p>- Equation is balanced</p> <p>(iii)</p>  <p>- Labelled diagram</p> <p>- Functional</p> <p>(c)</p> $1 \text{ mol ZnCO}_3 = \frac{6.25}{125} = 0.052 \text{ mol}$ <p>Mol of <math>\text{ZnSO}_4 = 0.052 \text{ mol}</math></p> $\text{Mass} = 0.052 \times 148$ $= 7.696 \text{ g}$	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p><b>Total</b></p>	<p>1</p> <p>1</p> <p>1</p> <p>2</p> <p>2</p> <p>3</p> <p><b>10</b></p>

NO	ANSWER	MARK	$\Sigma$ MARK
5	<p>(a) (i) Catalyst</p> <p>(ii) Collect the gas carbon dioxide released</p> <p>(b) (i) - Same - catalyst change the initial rate of reaction only The volume and concentration of HCl are the same</p> <p>(ii) – provides new path that lowers the activation energy - the frequency of collision increases - the effective collision increases</p> <p>(c)</p>  <ul style="list-style-type: none"> <li>- Correct curve</li> <li>- V is labeled</li> </ul> 	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p><b>Total</b></p>	<p>1</p> <p>1</p> <p>2</p> <p>3</p> <p>2</p> <p>2</p> <p><b>11</b></p>

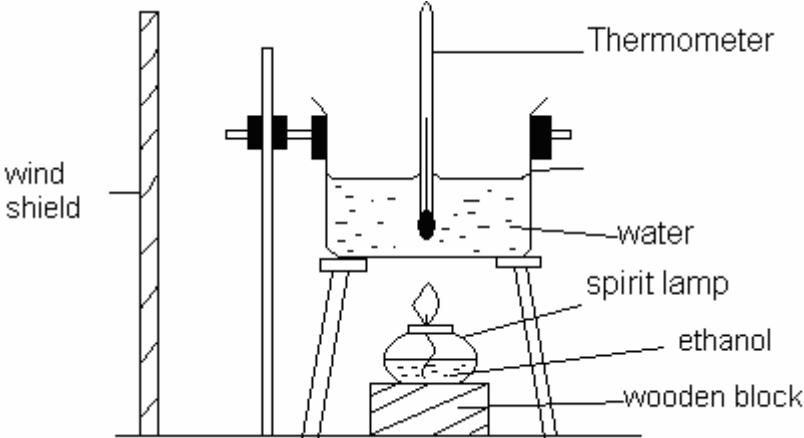
NO	ANSWER	MARK	$\Sigma$ MARK
6	(a) C <sub>4</sub> H <sub>10</sub>	1	1
	(b) <pre>       H H H H               H - C - C - C - C - H                     H H H H </pre>	1	
	<pre>       H             H - C - H                   H   H                 H - C - C - C - H                       H   H   H </pre>	1	2
	(c) - Butene is an unsaturated hydrocarbon/ has double bond	1	
	- Butane is a saturated hydrocarbon/ has single bond	1	2
	(d) C <sub>4</sub> H <sub>8</sub> + H <sub>2</sub> → C <sub>4</sub> H <sub>10</sub> - correct reactants and products - balanced equation	1 1	2
	(e) <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 20px;"> <p>Glass wool soaked with butanol</p>  </div> <div style="margin-left: 20px;"> <p>Porcelain chips</p> <p>Butene</p> <p>Water</p> </div> </div>		
	- Functional diagram - Labelled diagram	1 1	2
	(f) Hexene produced more soot More carbon in one molecule of hexene compare to one molecule of hexane	1 1	2
	<b>Total</b>		<b>11</b>

**SECTION B**

Question	Answer	Marks
7.	(a) Ethanoic acid ionizes in water produce H <sup>+</sup> ions  The present of H <sup>+</sup> ions shows the acidity  Ethanoic acid in propanone, cannot ionize to form H <sup>+</sup> ions//exist as molecules  No H <sup>+</sup> ions cannot shows the acidity	[1]  [1]  [1]  [1]
	(b)(i) $\text{H}_2\text{SO}_4 + 2 \text{NaOH} \longrightarrow \text{Na}_2\text{SO}_4 + 2 \text{H}_2\text{O}$  Correct formula of reactant Correct formula of product Balance  The no. of mol of $\text{H}_2\text{SO}_4 = 22 \times 0.1 / 1000 // 0.0022$ Mol of NaOH = 0.0044  Molarity of NaOH = $0.0044 \times 1000 / 25 //$ $= 0.176 \text{ mol dm}^{-3}$  @ $\frac{0.1 \times 22}{\text{Mb} \times 25} = \frac{1}{2}$	[1] [1] [1]  [1] [1]  [1]
	(c) To identify $\text{Mg}^{2+}$ ion -Magnesium nitrate solution is poured into a test tube -NaOH solution is added until excess -white precipitate insoluble in excess and -test with $\text{NH}_3$ solution -same step and same result will obtained when test with $\text{NH}_3$ solution  $\text{NO}_3^-$ ion -Magnesium nitrate solution is poured into a test tube -dilute sulfuric acid is added -followed by iron(II) sulphate solution -shake the test tube -concentrated sulphuric acid is added slowly/through the wall of the test tube -brown ring formed	[1] [1] [1]  [1]   [1] [1] [1] [1] [1]
	Total marks	[20]

Q		Answer	Mark
8	(a)	Reaction II is a redox reaction	[1]
		Oxidation number of magnesium atom changes from 0 to +2,	[1]
		Oxidation number of zinc ion changes from +2 to 0	[1]
	(b)	Test tube A: $2\text{Fe}^{2+} + \text{Br}_2 \rightarrow 2\text{Fe}^{3+} + 2\text{Br}^-$	
		Correct formulae of reactants	[1]
		Correct formulae of products	[1]
		Balance equation	[1]
		Test tube B: $2\text{I}^- + \text{Br}_2 \rightarrow \text{I}_2 + 2\text{Br}^-$	
		Correct formulae of reactants	[1]
		Correct formulae of products	[1]
		Balance equation	[1]
	(c)	<u>Experiment I</u> Reaction between carbon and oxide of metal P occurs	[1]
		Carbon is more reactive than metal P	[1]
		<u>Experiment II</u> Reaction between carbon and oxide of metal Q does not occur	[1]
		Metal Q is more reactive than carbon	[1]
		<u>Experiment III</u> Reaction between carbon and oxide of metal R occurs.	[1]
		Carbon is more reactive than metal R	[1]
		Reaction between carbon and oxide of metal P produces flame whereas reaction between carbon and oxide of metal R produces glow.	[1]
		Metal P is less reactive than metal R.	[1]
		Reactivity of metals in descending order is Q, carbon, R, P	[1]
		Q is Aluminium // Magnesium	[1]
		Total marks	[20]



Q. no	Answer	Marks								
9	<p>(a)</p> <table border="1" data-bbox="402 327 1425 772"> <thead> <tr> <th data-bbox="402 327 1045 365">Reaction I</th> <th data-bbox="1045 327 1425 365">Reaction II</th> </tr> </thead> <tbody> <tr> <td data-bbox="402 365 1045 443">Endothermic//heat absorbed from the surrounding</td> <td data-bbox="1045 365 1425 443">Exothermic//heat released to the surrounding</td> </tr> <tr> <td data-bbox="402 443 1045 699">The total energy of content of calcium nitrate and potassium carbonate/reactant is lower than the total energy content of calcium carbonate and potassium nitrate/product</td> <td data-bbox="1045 443 1425 699">The total energy of the content of zinc and copper(II) sulphate/reactants is higher than the total energy content of zinc sulphate and copper/product</td> </tr> <tr> <td data-bbox="402 699 1045 772">Heat absorbed during the reaction is 12.4 kJ mol<sup>-1</sup></td> <td data-bbox="1045 699 1425 772">Heat released during the reaction is 210 kJ mol<sup>-1</sup></td> </tr> </tbody> </table>	Reaction I	Reaction II	Endothermic//heat absorbed from the surrounding	Exothermic//heat released to the surrounding	The total energy of content of calcium nitrate and potassium carbonate/reactant is lower than the total energy content of calcium carbonate and potassium nitrate/product	The total energy of the content of zinc and copper(II) sulphate/reactants is higher than the total energy content of zinc sulphate and copper/product	Heat absorbed during the reaction is 12.4 kJ mol <sup>-1</sup>	Heat released during the reaction is 210 kJ mol <sup>-1</sup>	<p>[1]</p> <p>[1]</p> <p>[1]</p>
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Endothermic//heat absorbed from the surrounding	Exothermic//heat released to the surrounding									
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Heat absorbed during the reaction is 12.4 kJ mol <sup>-1</sup>	Heat released during the reaction is 210 kJ mol <sup>-1</sup>									
	<p>(b)</p> <p>Heat of combustion of propane is higher  The molecular size/number of carbon atom per molecule propane is bigger/higher  Produce more carbon dioxide and water molecules//released more heat energy</p>	<p>[1]</p> <p>[1]</p> <p>[1]</p>								
	<p>(c)</p> <p>Methanol/ethanol/ propanol,</p> <p>Diagram:  -labelled diagram  -arrangement of apparatus is functional</p> 	<p>[1]</p> <p>[1] + [1]</p>								

	<p>Procedure :</p> <ul style="list-style-type: none"> <li>- (100-250 cm<sup>3</sup>) of water is measured and poured into a copper can and the copper can is placed on a tripod stand [1]</li> <li>the initial temperature of the water is measured and recorded [1]</li> <li>- a spirit lamp with ethanol is weighed and its mass is recorded [1]</li> <li>- the lamp is then placed under the copper can and the wick of the lamp is lighted up immediately [1]</li> <li>- the water in the can is stirred continuously until the temperature of the water increases by about 30°C. [1]</li> <li>- the flame is put off and the highest temperature reached by the water is recorded.</li> <li>The lamp and its content is weighed and the mass is recorded</li> </ul> <p>Data</p> <p>The highest temperature of water = <math>t_2</math>  The initial temperature of water = <math>t_1</math>  Increase in temperature, <math>\theta</math> = <math>t_2 - t_1 = \theta</math> [1]</p> <p>Mass of lamp after burning = <math>m_2</math>  Mass of lamp before burning = <math>m_1</math>  Mass of lamp ethanol burnt, m = <math>m_2 - m_1 = m</math></p> <p>Calculation :</p> <p>Number of mole of ethanol, C<sub>2</sub>H<sub>5</sub>OH, n = <math>\frac{m}{46}</math> [1]</p> <p>The heat energy given out during combustion by ethanol  = the heat energy absorbed by water  = <math>100 \times c \times \theta</math> J [1]</p> <p>Heat of combustion of ethanol  = <math>\frac{m \times c \times \theta}{n}</math> Jmol<sup>-1</sup> [1]  = p/1000 kJoule</p>	<p>Max=4</p>
(c)	<p>No. of mol of H<sup>+</sup> ion/OH<sup>-</sup> = <math>1 \times 50 / 1000 // 0.05</math> [1]</p> <p>Heat change = <math>100 \times 4.2 \times 7 // 2940</math> Joule // 2.94 kJ [1]</p> <p>Heat of neutralization = <math>-2940 / 0.05 // 58800</math> J mol<sup>-1</sup> // <math>2.94 / 0.05 // 58.8</math> kJ mol<sup>-1</sup> [1]  = -58800 J mol<sup>-1</sup> // -58.8 kJ mol<sup>-1</sup></p>	
	Total marks	[20]

Question no		Answer	Marks
10.	(a)	<p>Materials: palm oil/corn oil/olive oil/any vegetable oil, concentrated sodium hydroxide</p> <p>Procedure:</p> <ol style="list-style-type: none"> <li>1. Pour (5-10 cm<sup>3</sup>) of palm oil/corn oil/olive into a beaker.</li> <li>2. Add 50 cm<sup>3</sup> of (5-6) mol dm<sup>-3</sup> sodium hydroxide/ NaOH / Concentrated sodium hydroxide</li> <li>3. Stir and heat the mixture until it boils</li> <li>4. Add 50 cm<sup>3</sup> of distilled water and 3 spatulas of sodium chloride / NaCl / Add 50 cm<sup>3</sup> NaCl solution</li> <li>5. Boil the mixture for another 5 minutes. Filter out the soap</li> <li>6. The soap is put into a test tube</li> <li>7. the water is added and shake the test tube</li> <li>8. foam is form</li> </ol>	<p>[1] [1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p>
	(b)	<p>-detergent is more effective</p> <p>-Hard water contains Mg<sup>2+</sup> ion and Ca<sup>2+</sup> ions</p> <p>-In Expt 1, soap react with Ca<sup>2+</sup> ion and Mg<sup>2+</sup> ion to form insoluble salt//precipitate /scum</p> <p>-no foam</p> <p>-In Expt II, detergent react with Ca<sup>2+</sup> ions and Mg<sup>2+</sup> ion form soluble salt/ no precipitate/no scum</p> <p>-foam is formed</p>	<p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p>
	(c)	<p>Antibiotic</p> <p>-the patient must complete the whole course</p> <p>-follow the instructions concerning the dosage and method of taking</p> <p>-do not prescribe medicines for another people//do not the medicine after the expiry date</p>	<p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p>
		Total marks	[20]

END OF SCHEME MARKS