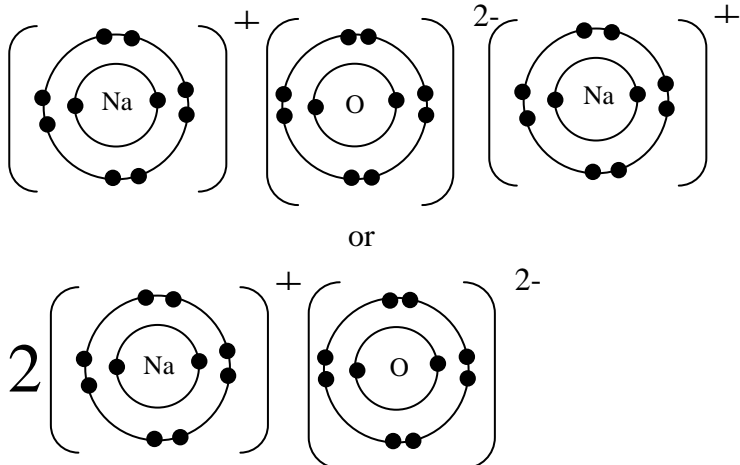


MARKING SCHEME – PAPER 2

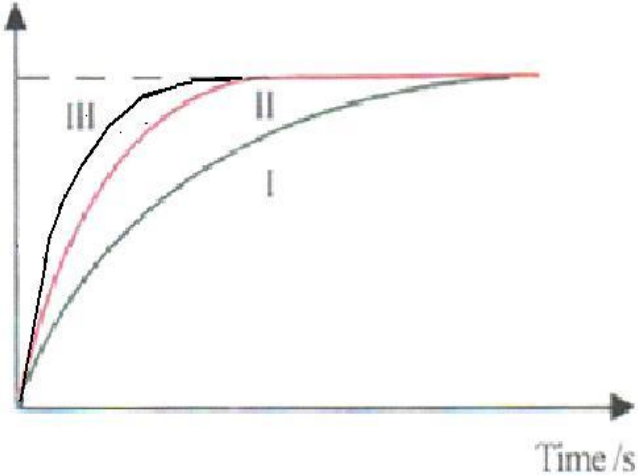
NO		ANSWER	MARKS
1	a (i)	Ester	1
	(ii)	Saponification	1
	(iii)	-COONa	1
	(iv)	Ca <sup>2+</sup> and Mg <sup>2+</sup>	1
	b (i)	B	1
	(ii)	Biological enzymes//fragrances//Whitening agent//drying agent//Stabiliser//Perfume//Builder//Foam control agent (Any other suitable answers)	1
	c (i)	P Aspirin / paracetamol / codeine	1
		Q Psychotherapeutic	1
	(ii)	To relieve anxiety/ restlessness / nervous feeling	1
<b>TOTAL</b>			<b>9</b>

NO		ANSWER	MARKS
2	(a) (i)	Argon	1
	(ii)	2.8.8	1
	(iii)	1. Period 3	1
		2. It has 3 shell occupied/consist with electrons	1
	(b) (i)	The sum of / The total number of protons and neutrons in the nucleus of an atom	1
	(ii)	6	1
	(iii)	Estimate the age of fossils / artifacts	1
		1. Show all the number of electron of sodium ion and oxide ion correctly	1
		2. show the nucleus and correct ratio of atom	1
		Sample answer:	
			
<b>TOTAL</b>			<b>9</b>

NO	ANSWER		MARKS
3	(a)	Voltaic cell	1
	(b)	Na <sub>2</sub> SO <sub>4</sub>	1
	(c) (i)	From magnesium plate to copper plate in the external circuit	1
	(ii)	Magnesium electrode : oxidation	1
		Copper electrode : reduction	1
	(d)	$Mg + Cu^{2+} \rightarrow Mg^{2+} + Cu$	1
	(e) (i)	Brown colour solution formed	1
	(ii)	$2Br^- \rightarrow Br_2 + 2e$	1
	(f)(i)	Fe <sup>2+</sup> ion is oxidized to Fe <sup>3+</sup> ion	1
		Bromine acts as oxidizing agent / Bromine receive electron from Fe <sup>2+</sup>	1
		<b>TOTAL</b>	<b>10</b>

NO	ANSWER		MARKS
4	(a) (i)	Method B	1
		Method A	1
	(a)(ii)	$CuO + H_2SO_4 \rightarrow CuSO_4 + H_2O$	1+1
	(a)(iii)	A white precipitate is formed	1
	(b) (i)	Deliver the gas produced to a test tube containing lime water, Lime water turns chalky/milky	1 1
	(b)(ii)	Number of moles of zinc carbonate - $7.5 / 125 = 0.06$ mol, Hence Number of moles of zinc sulphate = 0.06 mol Mass = $0.06 \times 161$ = 7.696 g ( with unit)	1 1 1
		<b>TOTAL</b>	<b>10</b>

NO	ANSWER		MARKS
5	(a)	* draw stopper on the mouth of conical flask	1
	(b)	$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$	1
	(c)(i)	Rate = $30/20 \text{ cm}^3\text{s}^{-1}$ // $1.5 \text{ cm}^3\text{s}^{-1}$	1
	(c)(ii)	Rate = $30/32 \text{ cm}^3\text{s}^{-1}$ // $0.94 \text{ cm}^3\text{s}^{-1}$	1
	(c)(iii)	Rate = $30/12 \text{ cm}^3\text{s}^{-1}$ // $2.5 \text{ cm}^3\text{s}^{-1}$	1
	(d)(i)	<ol style="list-style-type: none"> <li>The rate of reaction in Expt I is higher than Expt II</li> <li>The total surface area of zinc is larger / bigger in Expt I</li> <li>The frequency of collision between zinc atom and hydrogen ion / H<sup>+</sup> is higher</li> <li>The frequency of effective collision is higher.</li> <li>The rate of reaction is higher</li> </ol> <ul style="list-style-type: none"> <li>Point 1 – 1 mark</li> <li>Point 2 – 1 mark</li> <li>Point 3/ 4/ 5 – 1 mark</li> </ul>	Max 3

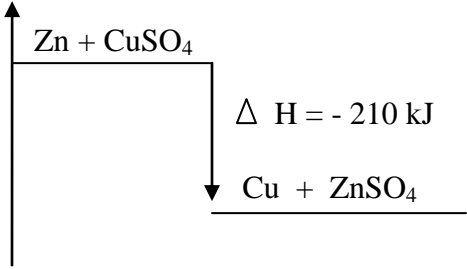
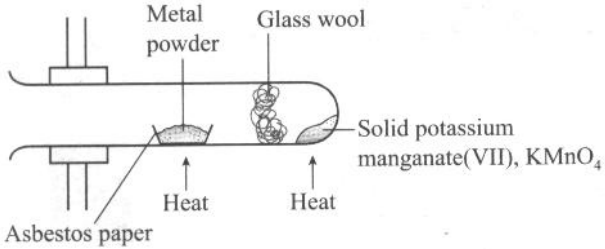
	(d)(ii)	<p>* draw three curves with different gradient * the total volume of gas release for the curves are the same</p> <p>Volume of gas /cm<sup>3</sup></p>  <p>Time /s</p>	3
<b>TOTAL</b>			<b>11</b>

NO	ANSWER	MARKS						
6								
(a)	$C_nH_{2n+1}OH$	1						
(b) (i)	Ethanoic acid	1						
(ii)	1. Add Magnesium / zinc / marble chips / calcium carbonate into compound P in a test tube,	1						
	2. Gas bubbles produced	1						
(iii)	Sodium hydroxide	1						
(c) (i)	Esterification							
(ii)	Colourless liquid // sweet fruity smell //less dense than water // does not dissolve in water .	1 + 1						
	( any 2 )							
(iii)	$\begin{array}{c} O \\    \\ CH_3 - C - O - CH_2 - CH_2 - CH_3 \end{array}$	1						
(d)	<table border="1" data-bbox="407 1633 1284 1875"> <thead> <tr> <th data-bbox="407 1633 846 1669">Physical properties</th> <th data-bbox="846 1633 1284 1669">Uses</th> </tr> </thead> <tbody> <tr> <td data-bbox="407 1669 846 1801">Colourless / volatile/ miscible with water / good organic solvent</td> <td data-bbox="846 1669 1284 1801">As a solvent in perfumes / cosmetics / toiletries// As a thinner in varnish/ink // As a cleaner for compact disk/ video cassette // As</td> </tr> <tr> <td data-bbox="407 1801 846 1875">Volatile / highly flammable /high heat content</td> <td data-bbox="846 1801 1284 1875">As a fuel</td> </tr> </tbody> </table>	Physical properties	Uses	Colourless / volatile/ miscible with water / good organic solvent	As a solvent in perfumes / cosmetics / toiletries// As a thinner in varnish/ink // As a cleaner for compact disk/ video cassette // As	Volatile / highly flammable /high heat content	As a fuel	
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Colourless / volatile/ miscible with water / good organic solvent	As a solvent in perfumes / cosmetics / toiletries// As a thinner in varnish/ink // As a cleaner for compact disk/ video cassette // As							
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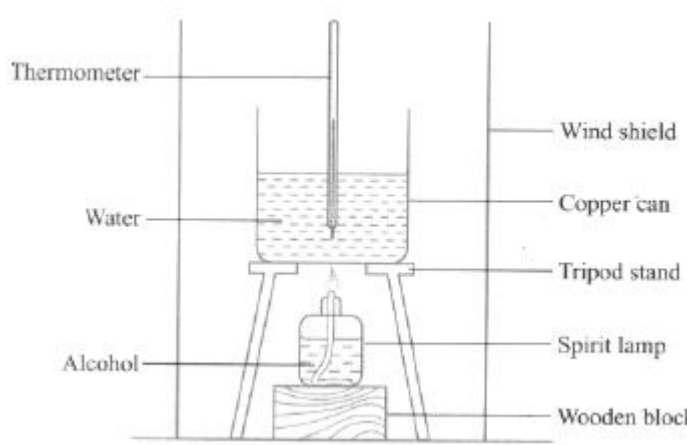
		Volatile/ miscible with covalent compound / antiseptic	As a raw material to make pharmaceutical products in antiseptic/ cough syrup/ rubbing alcohols.	1 + 1
		Chemically reactive	As a raw material in the manufacture of vinegar/ fibre/ explosive	
Any pair - correct				
<b>TOTAL</b>				<b>10</b>

NO		ANSWER	MARKS
7	(a)	1. Helium atom achieve stable duplet electron arrangement. 2. Do not donate, receive or share electron.	1 1
	(b)	1. Size of the atom becomes bigger. 2. Force of attraction between nucleus and electron valence become weaker. 3. Atom become easier to donate electron	1 1 1
	(c)	1. Chlorine atom has electron arrangement 2.8.7. 2. Unstable atom. 3. Need one more electron. achieve stable octet electron arrangement 4. Two chlorine atoms share one pair of electrons to form single covalent bond.	1 1 1 1
	(d)(i)	1. Write chemical formula of reactant and product correctly. 2. Balance chemical equation.  Answer : $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$	1 1
	(ii)	1. Calculate the number of mole of magnesium.  Answer : $18/24 // 0.75$  2. Calculate the mass of magnesium oxide.  Answer : $0.75 \times 40 // 30 \text{ g}$	1   1
	(iii)	1. Electron arrangement of magnesium atom is 2.8.2 2. Magnesium atoms donate 2 electrons to achieve stable octet electron arrangement. 3. Form magnesium ion. 4. Electron arrangement of oxygen atom is 2.6 5. Oxygen atoms receive 2 electrons to achieve stable octet electron arrangement. 6. Form oxide ion. 7. Between magnesium ion and oxygen ion there are electrostatic force to form ionic compound.	1 1 1 1 1 1 1
<b>TOTAL</b>			<b>20</b>

NO		ANSWER	MARKS
8	(a)	<ul style="list-style-type: none"> <li>- Nitrogen gas and hydrogen gas are heated together</li> <li>- At temperature of 450 °C and pressure of 200 atm</li> <li>- With iron catalyst</li> <li>- Chemical equation  <math display="block">\text{N}_2 + 3 \text{H}_2 \rightarrow 2\text{NH}_3</math> </li> </ul>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
	(b) (i)	<ul style="list-style-type: none"> <li>Highly resistance to heat</li> <li>-Inert to chemicals</li> <li>-Transparent except to ultra violet light</li> <li>-Undergoes small expansion and contraction even with great temperature changes.</li> </ul>	
	(ii)	<ul style="list-style-type: none"> <li>-A good heat insulator</li> <li>-Inert to chemical</li> <li>-Hard and strong</li> </ul>	6
	(c) (i)	Polymer is a long- chained molecules, which is consists of repeating units of monomers	2
	(ii)	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <math display="block">\begin{array}{c} \text{H} \quad \text{Cl} \\   \quad   \\ \text{H}-\text{C}=\text{C}-\text{H} \\ \text{Monomer} \end{array}</math> </div> <div style="text-align: center;"> <math display="block">\left[ \begin{array}{c} \text{H} \quad \text{Cl} \\   \quad   \\ -\text{C}-\text{C}- \\   \quad   \\ \text{H} \quad \text{H} \end{array} \right]_n</math> <p>PVC</p> </div> </div>	2
	(iii)	<p>non-biodegradable</p> <ul style="list-style-type: none"> <li>- disposal into soil can retard the development of root and also hinder the flow of water</li> <li>- hinder the flow of water into the underground streams that cause of flood { Any one explanation }</li> </ul> <p>released toxic gases</p> <ul style="list-style-type: none"> <li>- when they are burnt, they released toxic gases such as hydrogen cyanide, hydrogen chloride and carbon monoxide. Cause deseases .</li> <li>- released carbon dioxide that cause green house effect { Any one explanation }</li> </ul> <p>Stable and resistant to oxidation</p> <ul style="list-style-type: none"> <li>- become breeding ground for mosquitoes</li> <li>- suffocate some of the aquatic animal { Any one explanation }</li> </ul>	<p>2</p> <p>2</p> <p>2</p>
<b>TOTAL</b>			<b>20</b>

NO	ANSWER	MARKS
9	<p>(a)</p> <ul style="list-style-type: none"> <li>• zinc // magnesium // Aluminium // iron</li> <li>• Blue solution turns colourless, Brown solid deposited,</li> <li>• <math>\text{Zn} + \text{CuSO}_4 \rightarrow \text{Cu} + \text{ZnSO}_4</math></li> </ul> <p>O/N 0 +2 0 +2</p> <ol style="list-style-type: none"> <li>1. the oxidation number of zinc increase from 0 to +2</li> <li>2. zinc oxidized to zinc ion</li> <li>3. the oxidation number of copper(II) ion decreases from +2 to 0</li> <li>4. Copper(II) ion reduced to copper</li> </ol> <p>//Zinc replaced by any metal above copper, reject Na/K /Ca</p> <p>Energy</p> 	<p>1 1 1 1 1 1 1 1</p> <p>1 + 1</p>
	<p>(b)</p> <p>Apparatus set-up</p>  <p>Correct labell and functional diagram.</p>	<p>1+1</p>

	<p>Procedure:</p> <ol style="list-style-type: none"> <li>Put one spatula of solid potassium manganate(VII) in a boiling tube,</li> <li>Then put some glass wool into the boiling tube,</li> <li>Clamp the boiling tube horizontally.</li> <li>Place one spatula of magnesium powder on a piece of asbestos paper and put into the boiling tube,</li> <li>Heat magnesium powder strongly then</li> <li>Heat solid potassium manganate(VII)</li> <li>Repeat the experiment using copper powder, iron fillings, lead powder and zinc powder</li> <li>[Table of observation ]</li> </ol> <p>Eg</p> <table border="1"> <thead> <tr> <th>Reaction</th> <th>Observation</th> </tr> </thead> <tbody> <tr> <td>Magnesium + oxygen // formulae</td> <td>Burns brightly</td> </tr> <tr> <td>Copper + oxygen // formulae</td> <td>Glow dimly</td> </tr> </tbody> </table>	Reaction	Observation	Magnesium + oxygen // formulae	Burns brightly	Copper + oxygen // formulae	Glow dimly	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>[1+1]</p> <p>(max 8 )</p>
Reaction	Observation							
Magnesium + oxygen // formulae	Burns brightly							
Copper + oxygen // formulae	Glow dimly							
	<b>TOTAL</b>	<b>20</b>						

NO	ANSWER	MARKS
10	<p>(a) [able to calculate the percentages of carbon in pentane and pentene correctly]</p> <ol style="list-style-type: none"> <li>% carbon in hexane = 83.72%</li> <li>% carbon in hexene = 85.71%</li> <li>Percentage of in hexene is higher</li> <li>More soot formed</li> </ol>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
	<p>(b) [able to describe an experiment to determine the heat of combustion of named alcohol correctly]</p> 	

		<ol style="list-style-type: none"> <li>1. [named] alcohol, water</li> <li>2. Diagram using suitable apparatus – copper [metal] can, spirit lamp, pipe-clay triangle, thermometer</li> <li>3. [100-300] cm<sup>3</sup> of water is measured using measuring cylinder and poured into a copper can</li> <li>4. The copper can is placed on a tripod stand</li> <li>5. The initial temperature of the water is measured and recorded</li> <li>6. About 50 cm<sup>3</sup> of [named ] alcohol is poured into a spirit lamp and the mass of the lamp and its contents is recorded</li> <li>7. The lamp is put under the copper can and the wick of the lamp is lighted immediately</li> <li>8. The water is stirred throughout the experiment</li> <li>9. When the temperature of water increases [20 – 30°C], the flame is put off and the highest temperature reached by the water is recorded.</li> <li>10. The mass of the lamp and its contents is weighed immediately and recorded</li> </ol>	<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>
	(c )	<p>[able to suggest palm oil as the better fats compare to butter] [able to state the advantages of palm oil to our health correctly]</p> <ol style="list-style-type: none"> <li>1. Palm oil</li> <li>2. Highest amount of natural antioxidants such as vitamin E and vitamin A that prevent cancer/ aging/ arteriosclerosis/ Alzheimer’s disease</li> <li>3. Does not contain cholesterol that reduce the risk of heart attack// boost the immune system // fight cancer</li> <li>4. Contains beneficial fat such as omega – 6 fatty acid that reduce cardiovascular risk factors</li> <li>5. Has a healthy mixture of saturated and unsaturated fats that are easy to digest and absorb, so that can supply energy needed without causing a rise in LDL or insulin levels in the blood</li> <li>6. The ability to withstand heat and resist oxidation that makes palm oil an ideal ingredient in frying oil blends</li> </ol>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
		TOTAL	20