

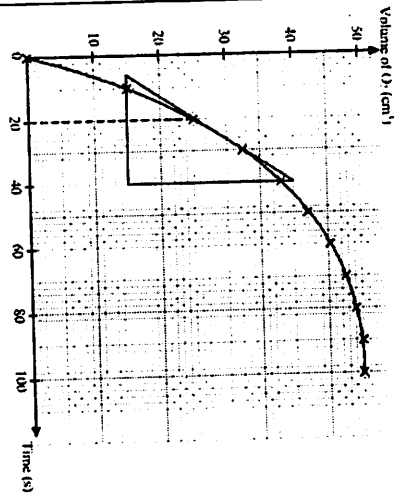
MARK SCHEME PAPER 2  
TRIAL SPM 2011

No.	Answer	Mark
I (a)(i)	Nucleon number is the total number of proton and number of neutron	1
(ii)	X and Y Atoms have same proton number but different nucleon number	1
(iii)	4	1
(iv)	8	1
(v)	Group 16 Period 2	1
(b)	$(\text{CH}_2\text{O})_n = 180$ // $n[12 + 2(1) + 16] = 180$ $n = 6$ $\text{C}_6\text{H}_{12}\text{O}_6$	1 1 1
TOTAL		9

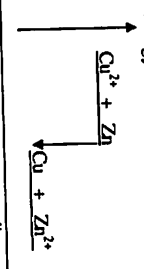
NO	Answer	MARK	
		SUB	TOTAL
2	(a) Answer : Group 16 Period 2	1	
	(b) Answer: Q	1	
(c)	(i) $\text{DG}_2$	1	
	(ii) Low melting and boiling points//Insoluble in water//Soluble in organic solvents//Cannot conduct electricity in any states.//High volatility. <i>cannot conduct electricity</i>	1	✓
(d)	(i) J	1	
	(ii) 1. Atomic size of J is larger.//Distance between nucleus and valence electron is further. 2. Attractive force between nucleus and valence electron is	1	

	weaker.//Atom J is easier to donate electron.	1	
(e)	(i) H	1	
	(ii) H atom has achieved stable/octet electron arrangement.	1	
TOTAL		9	

No.	Answer	Mark
3 (a)	Copper(II) ion , hydrogen ion // $\text{Cu}^{2+}$ , $\text{H}^+$	1
(b)	Experiment I: Cathode: Brown solid deposited	1
	Experiment II: Cathode: Brown solid deposited	1
(c)(i)	Oxygen	1
(ii)	Insert a glowing splinter into the test tube. The glowing splinter relights.	1
(d)(i)	Chloride ion // $\text{Cl}^-$ ion	1
	Concentration of $\text{Cl}^-$ ion is higher than $\text{OH}^-$ ion	1
(ii)	Correct formulae of reactant and products Balance equation	1
	$2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$	1
(iii)	Chlorine// $\text{Cl}_2$	1
TOTAL		10

NO	Answer	MARK	
		SUB	TOTAL
4	(a) [Able to plot the graph of total volume of gas against time correctly.] Answer : 		
	(b) [Able to calculate the rate of reaction at 20s.] Answer : Correct tangent at t = 20 s is shown in the graph Calculation: $\frac{(40 - 15) \text{ cm}^3}{(40 - 6) \text{ s}}$ = $0.735 \text{ cm}^3 \text{ s}^{-1}$ (r: if not/wrong unit)	1 1	
		1 + 1+ 1	

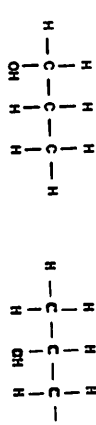
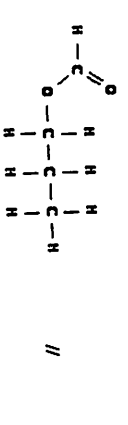
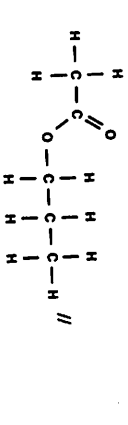
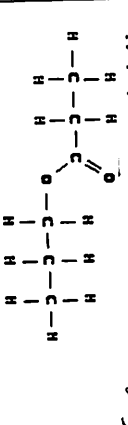
(c)	[Able to give the reason why the decomposition of hydrogen peroxide decreases with time.] Answer : Concentration of hydrogen peroxide decreases.	1	
(d)(i)	[Able to suggest a name of catalyst used in the reaction.] Answer : Manganese(IV) oxide/MnO <sub>2</sub> (r: Manganese oxide)	1	
(ii)	[Able to related the affect of catalyst in the rate of reaction with reference to the collision theory] Answer : 1. Catalyst provides an alternative path which requires lower activation energy//Catalyst reduces the activation energy. 2. More hydrogen peroxide molecules achieve/overcome the energy. 3. Frequency of effective collision between molecules increases. 4. The rate of decomposition/reaction increases	1 1 1 1 Max : 3	
	TOTAL		10

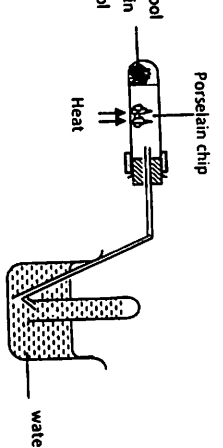
No.	Answer	Mark
5 (a)	Heat change/released when 1 mol of copper is displaced by zinc.	1
(b)	Higher rate of reaction // Reaction is faster	1
(c)	Correct formulae of reactants Correct formulae of products $Cu^{2+} + Zn \rightarrow Cu + Zn^{2+}$	1
(d)(i)	$Q = 50 \times 4.2 \times 5 \text{ J} // 1050 \text{ J} // 1.05 \text{ kJ}$ (r: without unit)	1
(ii)	$n = \frac{0.5 \times 50}{1000} // 0.025$	1
(iii)	$\Delta H = \frac{1050}{0.025} // 1.05 \times 10^5$ $= -42000 \text{ J mol}^{-1} // -42 \text{ kJ mol}^{-1}$ (r: without unit)	1
(e)	Arrow upward with label energy and two levels Correct position of reactants and products 	1
(f)	Reduce heat loss to surrounding. <i>prevent</i> ✓	1
TOTAL		11

NO	Answer	MARK	
		SUB	TOTAL
6 (a)	The reaction that involves oxidation and reduction that occur simultaneously.	1	
(b)	To allow the flow of ions in order to complete the electric circuit.	1	
(c)	From P to Q through connecting wire.	1	
(d)	Correct formulae of reactant and product Balance equation $2I^- \rightarrow I_2 + 2e^-$	1	
(e)	Brown/Orange/Yellow turns dark blue.	1	
(f)	$2x + 7(-2) = -2 // 2x - 14 = -2 // 2x = -2 + 14$ $x = +6$ (r: without '+')	1	
(ii)	Reduction	1	
(iii)	C: +6 B: +3 Oxidation number decreases.	1	
(iv)	Acidified potassium manganate(VII) solution/chlorine water/bromine water. <i>Oxidizing agent</i>	1	
TOTAL			11

No.	Answer	Sub Mark	Mark
7 (a)(i)	[Label of axes with units] [All points are transferred correctly] [Correct shape of the graph and constant scale]	1 1 1	3
(ii)	2.5 cm <sup>3</sup> (r: without unit) moles of Pb <sup>2+</sup> ions = $\frac{1.0 \times 2.5}{1000}$ // 0.0025 moles of I <sup>-</sup> ions = $\frac{1.0 \times 5}{1000}$ // 0.005 Pb <sup>2+</sup> : I <sup>-</sup> 0.0025 : 0.005 1 : 2 Correct formulae of reactants and product Balanced equation Pb <sup>2+</sup> + 2I <sup>-</sup> → PbI <sub>2</sub>	1 1 1 1 1 1	7
(b)(i)	Salt J : lead(II) nitrate // Pb(NO <sub>3</sub> ) <sub>2</sub> X oxide : lead(II) oxide // PbO Gas Y : nitrogen dioxide // NO <sub>2</sub> Gas Z : oxygen // O <sub>2</sub> Yellow precipitate : lead(II) iodide // PbI <sub>2</sub>	1 1 1 1 1	5
(ii)	Nitrate ion Add sulphuric acid Add iron(II) sulphate solution Slowly and carefully add concentrated sulphuric acid Brown ring formed	1 1 1 1	5
TOTAL			20

No	Answer	mark		
		Sub mark	total	
8	(a)(i)	1.synthetic polymer does not biodegradable/degrade easily/ not easily degraded by bacteria/microorganism	1	6
		2. synthetic polymer product are disposed into drainage system cause blockage	1	
		3.Release carbon dioxide/sulphur dioxide / toxic gas / acidic gas when burns.	1	
		4.gas released / carbon dioxide gas causes greenhouse effect/increase global temperature.	1	
		5.sulphur dioxide/carbon dioxide / acidic gas causes acid rain	1	
		6.acid rain corrodes buildings/increase acidity of soil/water	1	
(a)(ii)		1.recycle	1	4
		2.reduce usage	1	
		3.reuse	1	
		4.produce biodegradable synthetic polymer product	1	
		5.burn in special incinerators	1	
		6.sort/separate garbage	max 4	
(b)		1.made of silica, sodium carbonate and calcium carbonate	1	4
		2.good heat insulator	1	
		3.electric insulator	1	
		4.manufacturing special outfit for astronauts/fireman	1	
(c)(i)		1. main component of glass is silica/silicon dioxide	1	
		2. ceramic cannot be recycle but glass can	1	
(c)(ii)		1.Construction: manufacture of construction products / bricks / cement / tiles / underground piping	1	6
		2.electronic field: manufactured of computer/microchips	1	
		3.medical field: manufacture of dentures/porcelain enamels	1	
		4.astronomy field: manufactured of space shuttle	1	
		TOTAL		

No.	Answer	Sub Mark	Mark
9(a)		1 + 1	2
(b)	<p>Propyl methanoate</p>  <p>Propyl ethanoate</p>  <p>Propyl propanoate</p>  <p>Handwritten formula: <math>C_9H_{18}O_2</math></p>	1 + 1	2
(c)(i)	<ol style="list-style-type: none"> <li>Put glass wool into a combustion/boiling tube // Soak glass wool in propanol.</li> <li>Add propanol to the glass wool // Put soaked glass wool into combustion/boiling tube.</li> <li>Put porcelain chips into the boiling tube</li> <li>Heat strongly the porcelain chips</li> <li>Heat/warm the propanol</li> </ol>	1 1 1 1 1	

6. Functional apparatus	1	
7. Label		
		
8. Chemical equation	1	8
$C_2H_5OH \rightarrow C_2H_4 + H_2O$		
(ii) Propanoic acid Carboxyl group // -COOH	1 1	2
(iii) Test for alkene	1 1 1	
<ol style="list-style-type: none"> <li>Add bromine water into propene and compound R respectively</li> <li>Brown colour of bromine change to colourless in propene</li> <li>No change in compound R. (If bromine water is replaced by acidified potassium manganate(VII) solution, purple turns colourless)</li> </ol>		
Test for carboxylic acid	1	
4. Add zinc / magnesium / aluminium / any metal carbonate powder into propene and compound R respectively.	1	
5. No change in propene.	1	
6. Gas bubbles are released/Effervescence in compound R.	1	6
TOTAL		20

10	(a)	(i)	[table to name solvent X and Y] 1:Solvent X : tetrachloromethane/methylbenzene/ name any organic solvent 2 :Solvent Y : water	1 1 .....2
		(ii)	[table to describe an experiment to differentiate HCl in solvent X and Y]  Procedure 1. Add 1 spatula of zinc/magnesium/aluminium. (solid metal carbonate can be used to replace metals above) 2. into the beakers containing hydrogen chloride in solvent X and solvent Y 3. No changes in beaker A 4. Gas bubbles formed in beaker B 5. Hydrogen chloride in solvent X/ tetrachloromethane/methylbenzene does not show acidic property/ $H^+$ is absent. 6. Hydrogen chloride in water shows acidic property/ $H^+$ is present.	1 1 1 1 1 1 .....6
	(b)	(i)	[Able to identify the correct solution and give reasons] 1. hydrogen chloride in solvent Y/ water 2. dissociate/ ionize into ions	1 1 .....2
		(ii)	[Able to describe an experiment to prepare soluble salt from hydrogen chloride solution and a suitable compound ]  Procedure 1. Pour (50 – 250) cm <sup>3</sup> of hydrochloric acid in a beaker 2. Heat hydrochloric acid. 3. Add zinc oxide/zinc carbonate/zinc 4. until in excess 5. stir the mixture // labeled diagram 6. filter the mixture // labeled diagram 7. the filtrate is heated until saturated / 1/3 of the initial	1 1 1 1 1 1 1

		1
	volume	1
	8. the saturated solution is cooled at room temperature	1
	9. Filter the crystals formed	1
	10. Dry the crystals with filter paper	1
	Note: If zinc is used but P2 not mentioned. 2 marks given to P3	1
	TOTAL	.....10
		20