

Peraturan Permarkahan
CHEMISTRY 4541
Kertas 1,2 dan 3
Ogos
2010



BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KLUSTER
KEMENTERIAN PELAJARAN MALAYSIA

PERATURAN PERMARKAHAN

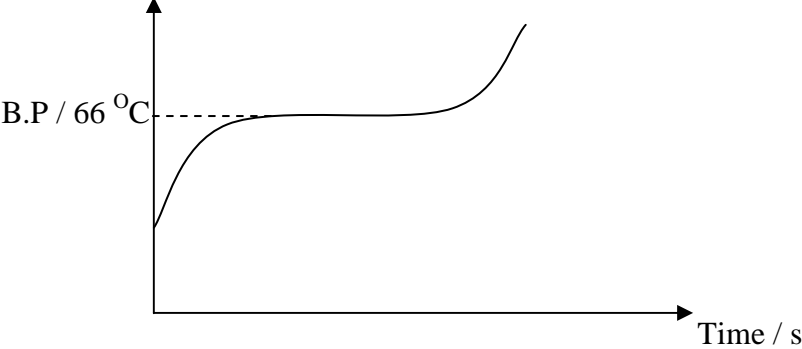
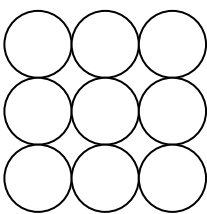
PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2010

**CHEMISTRY
TRIAL-EXAM
SPM 2010
MARKING SCHEME
PAPER 1
PAPER 2
PAPER 3**

**SKEMA KERTAS 1
CHEMISTRY 4541/1**

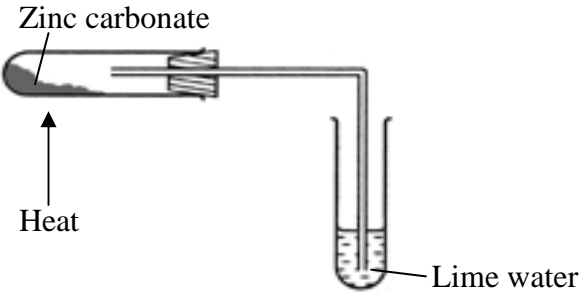
1	C	26	C
2	A	27	B
3	A	28	D
4	B	29	C
5	C	30	B
6	B	31	D
7	A	32	C
8	C	33	D
9	D	34	C
10	C	35	B
11	A	36	C
12	A	37	C
13	C	38	D
14	A	39	A
15	D	40	D
16	C	41	C
17	A	42	D
18	D	43	C
19	D	44	B
20	B	45	C
21	C	46	A
22	B	47	A
23	B	48	A
24	B	49	B
25	D	50	C

MARKING SCHEME FOR CHEMISTRY PAPER 2

No	Rubric	Mark
1(a)(i)	Gas	1
(ii)	The melting point and boiling point of substance X is lower than room temperature	1
(b)(i)	1. - X and Y axes are labelled and have unit - correct curve	1
	2. Boiling point / 66°C is marked on the graph.	1
	<p style="text-align: center;">Temperature / $^{\circ}\text{C}$</p>  <p style="text-align: right;">Time / s</p>	
(ii)	Liquid and gas	1
(c)	1. The attraction force between particle in Z is stronger than Y	1
	2. More heat energy is needed to overcome the attraction force between the particle	1
(d)	Melting point is the temperature at which solid change into liquid	1
(e)		1
	TOTAL	9

No	Rubric	Mark
2(a)(i)	Contact process	1
(ii)	sulphuric acid	1
(iii)	1. Formula of reactant and product correct 2. Balanced $2\text{SO}_2 + \text{O}_2 \rightarrow 2\text{SO}_3$	1 1
(b)(i)	1. Sulphonation 2. Neutralisation	1 1
(ii)	$\begin{array}{c} \text{O} \\ \\ \text{CH}_3(\text{CH}_2)_{11} - \text{O} - \text{S} - \text{O}^- \\ \\ \text{O} \end{array}$ <p style="text-align: center;"> ⏟ ⏟ hydrophobic part hydrophilic part </p>	1
(iii)	1. Hard water contains calcium ions and magnesium ions 2. React with soap to form scum // React with detergent to form soluble substance/ do not form scum	1 1
TOTAL		9

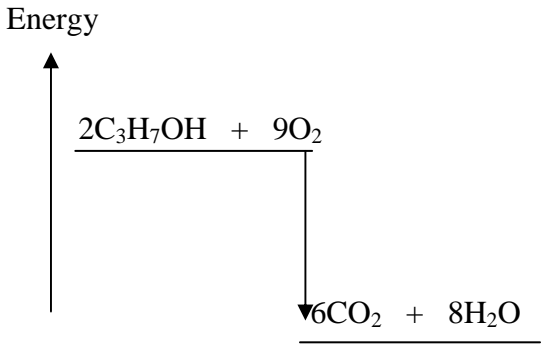
No	Rubric	Mark
3(a)(i)	Solvent P: Water Solvent Q: methyl benzene / propanone / suitable organic solvent	1 1
(ii)	Effervescence / gas released // magnesium ribbon dissolved	1
(iii)	1. Ethanoic acid is weak acid 2. Ethanoic acid dissociate / ionise partially in water 3. produce low concentration of H^+ ion	1 1 1
(b)(i)	1. pH value increase / bigger 2. The lower the concentration of acid the higher the pH value	1 1
(ii)	$(0.5)(V) = (0.04)(250) // \quad V = \frac{0.04 \times 250}{0.5}$ $V = 20 \text{ cm}^3$	1
TOTAL		10

No	Rubric	Mark
4(a)	Zinc sulphate / nitrate and sodium / potassium / ammonium carbonate // carbonic acid	1 1
(b)(i)	Zinc oxide	1
(ii)	Yellow when hot, white when cold	1
(iii)	1. Functional diagram 2. Label 	1 1
(c)(i)	$\text{ZnO} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2\text{O}$	1
(ii)	1. Heat the solution until saturated. 2. Cool the saturated solution. 3. Filter and dry by pressing between two filter papers.	1 1 1
	TOTAL	10

No	Rubric	Mark
5(a)(i)	Colourless solution of potassium bromide change to brown	1
(ii)	Potassium bromide / bromide ion	1
(iii)	1. Correct formula of reactant and product 2. Balanced $2\text{Br}^- \rightarrow \text{Br}_2 + 2\text{e}^-$	1 1
(b)	Purple	1
(c)	1. Chlorine water 2. Chlorine accept / receive electron	1 1
(d)	0 to -1	1
(e)	Acidified potassium manganate(VII) solution // any oxidising agent	1

(f)	1. Functional apparatus	1
	2. Label	1
<p>Iron(II) sulphate <i>Ferum(II) sulfat</i></p> <p>Bromine water <i>Air bromin</i></p> <p>Sulphuric acid <i>Asid sulfurik</i></p>		
TOTAL		11

No	Rubric	Mark
6(a)	1. Functional apparatus	1
	2. Label	1
<p>thermometer</p> <p>Copper can</p> <p>water</p> <p>Spirit lamp</p> <p>propanol</p>		
(b)	1. Correct formula of reactant and product	1
	2. Balanced	1
$2C_3H_7OH + 9O_2 \rightarrow 6CO_2 + 8H_2O$		
(c)(i)	Heat release = $200 \times 4.2 \times 31 = 26040 \text{ J}$	1

(ii)	Mole = $\frac{0.84}{060}$ // 0.014	1
(iii)	$\Delta H = \frac{26040}{0.014}$ = - 1860 kJmol ⁻¹	1 1
(iv)	1. arrow upward with energy label and two level 2. exothermic reaction and correct formula of reactant and product 	1 1
(d)	Use wind shield // weight the spirit lamp right after the flame is put off // stir the water continuously	1
TOTAL		11

Num.	Answer	Mark	Total Mark
7(a)(i)	1. Electron arrangement 2.8.2 2. Group 2 3. Period 3	1 1 1	3
(a)(ii)	1. Correct formula of reactants 2. Correct formula of product $X + Y_2 \rightarrow XY_2$ 3. Electron arrangement of atom Y is 2.8.7 4. Atom X loses two electron to form X ²⁺ ion 5. Atom Y gains one electron to form Y ⁻ ion 6. to achieve octec electron arrangement 7. X ²⁺ ion and Y ⁻ ion attracted to each other by strong electrostatic force / ionic bond	1 1 1 1 1 1 1	7

(b)	1. Lead(II) bromide cannot conduct electricity in the solid state	1	
	2. Ions do not move freely	1	
	3. Lead(II) bromide can conduct electricity in molten state	1	
	4. Ions can move freely	1	
	5. Naphthalene cannot conduct electricity in solid and molten state	1	
	6. No free moving ions // exist as molecules	1	
	<u>Catode</u>		
	7. Formula of reactants and product correct	1	
	8. Balanced	1	
	$\text{Pb}^{2+} + 2\text{e} \rightarrow \text{Pb}$		
<u>Anode</u>			
9. Formula of reactant and products correct	1		
10. Balanced	1		
$2\text{Br}^- \rightarrow \text{Br}_2 + 2\text{e}$			
	TOTAL		10
			20

Num.	Answer	Mark	Total Mark
8(a)	<p><u>Compound X</u></p> $\begin{array}{ccccccc} & \text{H} & & \text{H} & & \text{H} & \\ & & & & & & \\ \text{H} & - \text{C} & = & \text{C} & - & \text{C} & - \text{H} \\ & & & & & & \\ & & & & & \text{H} & \end{array}$ <p style="text-align: right;">Propene</p>	1 + 1	
	<p><u>Compound Y</u></p> $\begin{array}{ccccccc} & \text{H} & & \text{H} & & \text{O} & \\ & & & & & // & \\ \text{H} & - \text{C} & - & \text{C} & - & \text{C} & \\ & & & & & \backslash & \\ & \text{H} & & \text{H} & & \text{OH} & \end{array}$ <p style="text-align: right;">Propanoic acid</p>	1 + 1	

	<p><u>Compound Z</u></p> <p style="text-align: right;">Propyl ethanoate</p>	1 + 1	6
(b)	<ol style="list-style-type: none"> 1. Dehydration reaction 2. Add bromine // potassium manganate (VII) solution 3. Brown colour of bromine decolourised // purple colour of KMnO₄ change to colourless 	1 1 1	3
(c)	<ol style="list-style-type: none"> 1. Correct formula of reactant 2. Correct formula of product $\text{C}_3\text{H}_6 + \text{H}_2\text{O} \rightarrow \text{C}_3\text{H}_7\text{OH}$ 3. Condition needed for the reaction: <ul style="list-style-type: none"> - Phosphoric acid - Temperature 300 °C - Pressure 60 atm 	1 1 1	3
(d)	<ol style="list-style-type: none"> 1. Pour 2 cm³ of glacial ethanoic acid in a boiling tube 2. Add 2 cm³ of propan-1-ol to the acid 3. Slowly and carefully add concentrated sulphuric acid 4. Heat the mixture 	1 1 1 1	4
(e)	<ol style="list-style-type: none"> 1. Functional group : carboxyl group / - COOH 2. General formula: C_nH_{2n+1}COOH 3. Correct formula of reactant and product 4. Balanced $2\text{C}_2\text{H}_5\text{COOH} + \text{CaCO}_3 \rightarrow \text{Ca}(\text{C}_2\text{H}_5\text{COO})_2 + \text{CO}_2 + \text{H}_2\text{O}$ 	1 1 1 1	4
	TOTAL		20

Num.	Answer	Mark	Total Mark
9(a)(i)	1. Clean the metals with sand paper. 2. Pour copper(II) sulphate solution / any suitable electrolyte into a beaker. 3. Dip a pair of Q and R strips into the beaker. 4. Connect the metals by using connecting wires to a voltmeter. 5. Record the voltmeter reading 6. Determine the negative terminal of the cell. 7. Repeat steps 1 – 6 by replacing the pair of Q and R strips with other pairs of metals as shown in the table. 8. The negative terminal metal located higher than the other metal.in the electrochemical series // Q is placed higher than R, R is placed higher than S and P is placed higher than S in the electrochemical series 9. Pair of metals which produced the biggest potential difference located the furthest in electrochemical series // P and S has the biggest potential difference indicate the pair of metal located furthest apart in the Electrochemical series. 10 $\begin{array}{c} \text{P, Q, R, S} \\ \xrightarrow{\hspace{2cm}} \\ \text{Electropositivity decrease} \end{array}$	1 1 1 1 1 1 1 1 1 1	10
(a)(ii)	1. Value of $x = 1.6 \text{ V}$ 2. $y = \text{P}$ 3. P is magnesium / metals that is higher than zinc in electrochemical series 4. P / Mg is more electropositive than Q / Zn // P / Mg is higher than Q / Zn in electrochemical series	1 1 1 1	4
(b)	<u>1.0 mol dm⁻³ sodium chloride</u> 1. Chloride / Cl ⁻ ions discharged at the anode	1	

	2. Concentration of Cl ⁻ ions is higher than H ⁺ ions	1	
	3. Chlorine gas is released	1	
	<u>0.0001 mol dm⁻³ sodium chloride</u>		
	4. H ⁺ ions discharged at the anode	1	
	5. H ⁺ ions is lower than Cl ⁻ ions in electrochemical series	1	
	6. Hydrogen gas which is colourless released	1	6
	TOTAL		20

Num.	Answer	Mark	Total Mark
10(a)(i)	1. Experiment I, Experiment III, Experiment II $\xrightarrow{\text{Rate of reaction increase}}$	1	
	2. Experiment I and II: Temperature	1	
	3. Experiment II and III: Concentration	1	
	4. Correct formula of reactant and product	1	
	5. Balanced $2 \text{HCl} + \text{Na}_2\text{S}_2\text{O}_3 \rightarrow 2 \text{NaCl} + \text{SO}_2 + \text{S} + \text{H}_2\text{O}$	1	5
(a)(ii)	1. The concentration of hydrochloric acid in Exp III is higher	1	
	2. The number of particles per unit volume in Exp III is higher compare to Exp II	1	
	3. The frequency of collision between hydrogen ions and thiosulphate ions increases in Exp III	1	
	4. Frequency of effective collision increases	1	
	5. The rate of reaction increases in Exp III compare to Exp II	1	5
(b)	Temperature Factor [Experiment II] Procedure: 1. 50cm ³ of 0.2mol dm ⁻³ sodium thiosulphate solution is poured into conical flask	1	

2. The initial temperature of the solution is recorded	1	
3. The conical flask is placed on top of white paper with mark 'X' at the centre	1	
4. 5cm ³ of 0.2mol dm ⁻³ hydrochloric acid is poured quickly into conical flask	1	
5. The stopwatch is started immediately	1	
6. The conical flask is swirled	1	
7. The stopwatch is stopped immediately once the mark 'X' disappeared from sight and the time is recorded	1	
8. The experiment is repeated using 50cm ³ of 0.2mol dm ⁻³ sodium thiosulphate solution using different temperature, 35 ⁰ C, 40 ⁰ C, 45 ⁰ C and 50 ⁰ C	1	
Observation:		
9. Yellow precipitate	1	
Ionic equation:		
10. $2\text{H}^+ + \text{S}_2\text{O}_3^{2-} \longrightarrow \text{SO}_2 + \text{S} + \text{H}_2\text{O}$	1	10
<u>OR</u>		
Concentration Factor [Experiment III]		
Procedure:		
1. 50cm ³ of 0.2mol dm ⁻³ sodium thiosulphate solution is poured into conical flask		
2. The conical flask is placed on top of white paper with mark 'X' at the centre		
3. 5cm ³ of 2.0 mol dm ⁻³ hydrochloric acid is poured quickly into conical flask		
4. The stopwatch is started immediately		
5. The conical flask is swirled		
6. The stopwatch is stopped immediately once the mark 'X' disappeared from sight		

	<p>7. The time required for mark 'X' disappeared from sight is recorded</p> <p>8. The experiment is repeated using different volume of 0.2mol dm^{-3} sodium thiosulphate solution with different volume of distilled water</p> <p>Observation:</p> <p>9. Yellow precipitate</p> <p>Ionic equation:</p> <p>10. $2\text{H}^+ + \text{S}_2\text{O}_3^{2-} \longrightarrow \text{SO}_2 + \text{S} + \text{H}_2\text{O}$</p>		
	TOTAL		20

Marking Scheme Paper 3

Qn. No.	Marking Scheme	Marks								
1(a)	Able to state the hypothesis accurately. Sample answer. Metal which is lower down in Group 1 is more reactive towards oxygen// X is more reactive than sodium and lithium towards oxygen.	3								
	Able to state the inference less accurately. Sample answer. Reactivity towards oxygen increases when going down Group 1 //Sodium is more reactive than lithium towards oxygen.	2								
	Able to state the idea of inference. Sample answer. Metal can react with oxygen	1								
	Wrong or no response	0								
(b)	Able to record the observation correctly. Sample answer. Metal X burns more vigorously and produces white fumes.	3								
	Able to record the observation less correctly. Sample answer. Metal X burns vigorously and produces white fumes.	2								
	Able to state an idea of the observation. Sample answer Metal X burns in oxygen/produces white fumes.	1								
	Wrong or no response	0								
(c)	Able to construct a table with the following aspects correctly 1. Title 2. Observations Sample answer: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Set</th> <th>Observations</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>Lithium burns slowly and produces white fumes.</td> </tr> <tr> <td>II</td> <td>Sodium burns vigorously and produces whites fumes.</td> </tr> <tr> <td>III</td> <td>Metal X burns vigorously and produces whites fumes.</td> </tr> </tbody> </table>	Set	Observations	I	Lithium burns slowly and produces white fumes.	II	Sodium burns vigorously and produces whites fumes.	III	Metal X burns vigorously and produces whites fumes.	3
Set	Observations									
I	Lithium burns slowly and produces white fumes.									
II	Sodium burns vigorously and produces whites fumes.									
III	Metal X burns vigorously and produces whites fumes.									
	Able to construct a table less accurately Sample answer: <table border="1" style="margin-left: 20px;"> <tbody> <tr> <td>I</td> <td>Lithium burns slowly and produces white fumes.</td> </tr> <tr> <td>II</td> <td>Sodium burns vigorously and produces whites fumes.</td> </tr> <tr> <td>III</td> <td>Metal X burns vigorously and produces whites fumes.</td> </tr> </tbody> </table>	I	Lithium burns slowly and produces white fumes.	II	Sodium burns vigorously and produces whites fumes.	III	Metal X burns vigorously and produces whites fumes.	2		
I	Lithium burns slowly and produces white fumes.									
II	Sodium burns vigorously and produces whites fumes.									
III	Metal X burns vigorously and produces whites fumes.									
	Able to state an idea to construct a table. Sample answer: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Set</th> <th>Observations</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> </tbody> </table>	Set	Observations			1				
Set	Observations									

Qn. No	Marking Scheme	Marks						
1(d)	Able to predict metal X accurately. Potassium	3						
	Able to predict metal X less accurately Rubidium	2						
	Able to give an idea to predict metal X. Francium//Caesium	1						
	Wrong or no response	0						
1(e)	Able to record the pH meter readings to one decimal place. Set I: 12.1 Set II: 12.7 Set III: 12.9	3						
	Able to record the pH meter readings or at least 2 pH readings accurately. Set I: 12.145 Set II: 12.651 Set III: 12.912	2						
	Able to record at least 2 pH meter readings accurately.	1						
	Wrong or no response	0						
1(f)	Able to give six statements correctly. Sample answers <table border="1" style="margin-left: 40px;"> <tr> <td>Manipulated variable: Types of solution//Lithium hydroxide, Sodium hydroxide, Potassium hydroxide.</td> <td>Method to manipulate the variable: Use different solution for each reading/experiment</td> </tr> <tr> <td>Responding variable: pH meter readings//pH values</td> <td>How the variable is responding: pH meter shows different readings with different solutions.</td> </tr> <tr> <td>Fixed variable: pH meter</td> <td>Method to maintain the fixed variable: Use same pH meter for each solution.</td> </tr> </table>	Manipulated variable: Types of solution//Lithium hydroxide, Sodium hydroxide, Potassium hydroxide.	Method to manipulate the variable: Use different solution for each reading/experiment	Responding variable: pH meter readings//pH values	How the variable is responding: pH meter shows different readings with different solutions.	Fixed variable: pH meter	Method to maintain the fixed variable: Use same pH meter for each solution.	6
Manipulated variable: Types of solution//Lithium hydroxide, Sodium hydroxide, Potassium hydroxide.	Method to manipulate the variable: Use different solution for each reading/experiment							
Responding variable: pH meter readings//pH values	How the variable is responding: pH meter shows different readings with different solutions.							
Fixed variable: pH meter	Method to maintain the fixed variable: Use same pH meter for each solution.							
	Able to give five statements correctly.	5						
	Able to give four statements correctly.	4						
	Able to give three statements correctly.	3						
	Able to give two statements correctly.	2						
	Able to give one statement correctly.	1						
	Wrong or no response.	0						

Qn No.	Marking Scheme	Marks
2(a)	Able to state the inference correctly. Sample answer: Iron nail coiled with magnesium does not rust//Iron nail coiled with copper will rust	3
	Able to state the inference less accurately. Sample answer Metals in contact with iron nail caused rusting	2
	Able to state an idea of inference. Iron nail rusts/does not rust.	1
	Wrong or no response.	0
2(b)	Able to give the operational definition of rusting correctly. Sample answer. When iron nail coiled with a less electropositive metal /copper is dipped in gelatine added with potassium hexacyanoferrate(III) and phenolphthalein, dark colouration formed.	3
	Able to give the operational definition of rusting less accurately. Sample answer. Iron nail coiled with a less electropositive metal/copper gives blue coloration// When iron nail coiled with a less electropositive metal is dipped in gelatine added with potassium hexacyanoferrate(III) and phenolphthalein will rust.	2
	Able to give an idea of operational definition of rusting. Sample answer. Iron nail coiled with copper undergoes rusting.	1
	Wrong or no response.	0
2(c)	Able to give all four correct answers Oxidation: 2 Reduction: 2, 4, 4	3
	Able to give three correct answers	2
	Able to give two correct answers	1
	Wrong or no response.	0
2(d)	Able to classify the four metals correctly. Metals that make iron to rust: Zinc, Aluminium Metals that do not make/prevent iron to rust: Tin, silver	3
	Able to classify three metals correctly	2
	Able to classify correctly but wrong headings// Able to classify two metals correctly.	1
	Wrong or no response.	0

Qn. No.	Marking Scheme	Marks
3 (a)	Able to state the problem statement correctly. Sample answer Does size of zinc affects the rate of reaction with sulphuric acid?	3
	Able to state the problem statement less accurately. Sample answer Does size of zinc affects rate of reaction?// To investigate the effect of size of zinc on the rate of reaction with sulphuric acid.	2
	Able to give an idea of problem statement. Sample answer. Size affects rate of reaction	1
3(b)	Able to make a hypothesis correctly. Sample answer When the size of zinc is smaller, the rate of reaction increases	3
	Able to make a hypothesis less accurately. Sample answer Rate of reaction increases when size of zinc decreases.//Smaller zinc particles affects rate of reaction	2
	Able to give an idea of making a hypothesis. Sample answer Size affects rate of reaction	1
	Wrong or no response	0
3(c)	Able to state all the three variables correctly Manipulated variable: size of zinc //zinc granules and zinc powder Responding variable: rate of reaction// time taken to collect a fixed volume of hydrogen gas Fixed variable: volume /concentration of sulphuric acid//sulphuric acid	3
	Able to state two variables correctly	2
	Able to state one variable correctly	1
	Wrong or no response	0
3(d)	Able to list the apparatus and materials completely Apparatus: conical flask 250 ml, burette, basin, delivery tube with stopper, stop watch, triple beam balance, measuring cylinder Materials: zinc granules, zinc powder, [0.1- 1.0] mol dm ⁻³ sulphuric acid	3
	Able to list the apparatus and materials less completely Apparatus: conical flask, burette, basin, stop watch Materials: zinc granules/powder, sulphuric acid	2
	Able to list an idea of the apparatus and materials Sample answer Zinc, [any container], sulphuric acid, stop watch	1
	Wrong or no response	0

Qn. No.	Marking Scheme	Marks															
3(e)	<p>Able to list the steps of the procedures correctly</p> <p>Sample answers</p> <ol style="list-style-type: none"> 1. 50 cm³ of sulphuric acid is measured using a measuring cylinder and poured into a conical flask. 2. A burette filled with water is inverted over in a basin of water 3. Record the initial reading of the burette. 4. Put in 5 g of zinc granules into the conical flask 5. Attach the delivery tube with the end of the tube inserted into the burette. 6. Immediately start the stop watch. 7. Swirl the conical flask and record the burette reading at every 30 s intervals. 8. Repeat steps 1 – 6 by replacing the zinc granules with zinc powder 	3															
	<p>Able to list the steps of the procedures less accurately</p> <p>Sample answer</p> <p>Steps 1, 2,4,6,7,8</p>	2															
	<p>Able to list an idea of procedures</p> <p>Sample answer</p> <p>Steps 1</p> <ol style="list-style-type: none"> 1. Sulphuric acid is poured into [any container] 2. Zinc is added into acid. 	1															
	Wrong or no response	0															
3(f)	<p>Able to tabulate data correctly with the following aspects:</p> <ol style="list-style-type: none"> 1. Title with correct units 2. At least 4 time intervals <p>Sample answer</p> <table border="1"> <tr> <td>Time/s</td> <td>0</td> <td>30</td> <td>60</td> <td>90</td> </tr> <tr> <td>Initial burette reading/cm³</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Volume of gas/cm³</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Time/s	0	30	60	90	Initial burette reading/cm ³					Volume of gas/cm ³					2
Time/s	0	30	60	90													
Initial burette reading/cm ³																	
Volume of gas/cm ³																	
	<p>Able to tabulate data less accurately with the following aspects:</p> <p>Sample answer</p> <table border="1"> <tr> <td>Time</td> <td></td> <td></td> </tr> <tr> <td>Volume of gas</td> <td></td> <td></td> </tr> </table>	Time			Volume of gas			1									
Time																	
Volume of gas																	
	Wrong or no response	0															

END OF MARKING SCHEME