

NAMA :
 TINGKATAN :



JABATAN PELAJARAN NEGERI TERENGGANU

Ujian Pengesahan TOV

SIJIL PELAJARAN MALAYSIA 2012

CHEMISTRY

Kertas 3

Jan/Feb

1 ½ jam

4541/3

Satu jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. Tulis nama dan tingkatan anda pada ruangan yang disediakan di atas.
2. Kertas soalan ini adalah dalam dwibahasa.
3. Soalan dalam Bahasa Inggeris mendahului soalan yang sepadan dalam Bahasa Melayu.
4. Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam Bahasa Inggeris atau Bahasa Melayu.
5. Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini

| Untuk Kegunaan Pemeriksa | | |
|--------------------------|--------------|------------------|
| Soalan | Markah Penuh | Markah Diperoleh |
| 1 | 18 | |
| 2 | 15 | |
| 3 | 17 | |
| Jumlah | 50 | |

Disediakan oleh:
 Guru AKRAM Terengganu

Dengan kerjasama
 MPSM Negeri Terengganu

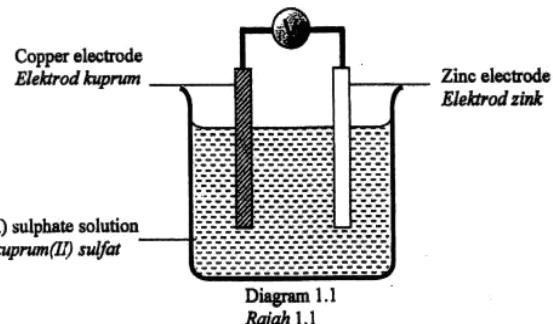
Dibayai oleh:
 Kerajaan Negeri Terengganu

TERENGGANU NEGERI ANJUNG ILMU

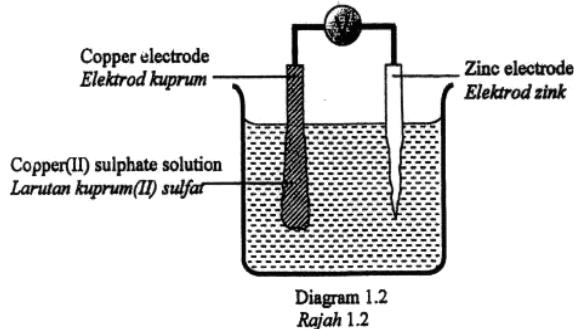
Kertas soalan ini mengandungi 11 halaman bercetak

Answer all questions.
 Jawab semua soalan.

- 1 Diagram 1.1 shows the set-up of apparatus used in an experiment to construct the electrochemical series by referring to the potential difference of four pairs of metals. Rajah 1.1 menunjukkan susunan radas yang digunakan dalam satu eksperimen untuk membina siri elektrokimia dengan merujuk kepada beza keupayaan bagi empat pasangan logam.



- Diagram 1.2 shows the result obtained from the experiment after 30 minutes. Rajah 1.2 menunjukkan keputusan yang diperoleh daripada eksperimen selepas 30 minit.



The experiment is repeated by replacing zinc with metals P, Q and R. Copper electrode remains as the positive terminal in each of the experiments. Copper (II) sulphate solution is used in each of the experiments.

Eksperimen diulangi dengan menggantikan zink dengan logam P, Q dan R. Elektrod kuprum kekal sebagai terminal positif bagi setiap eksperimen. Larutan kuprum (II) sulfat digunakan bagi setiap eksperimen.

Diagram 1.3 shows the voltmeter readings of the experiments.

Rajah 1.3 menunjukkan bacaan voltmeter bagi semua eksperimen.

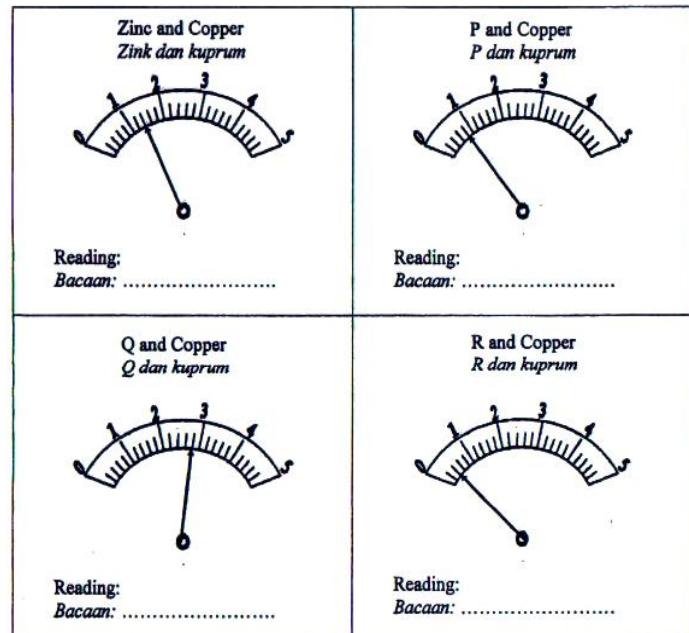
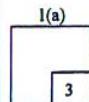


Diagram 1.3
Rajah 1.3

- (a) Record the voltmeter readings in the spaces provided in Diagram 1.3.
Catatkan bacaan voltmeter pada ruang yang disediakan dalam Rajah 1.3.

[3 marks]



For
examiner's
use

- (b) Construct a table to record the voltmeter readings for four pairs of metals.
Bina satu jadual untuk merekodkan bacaan voltmeter untuk empat pasangan logam.

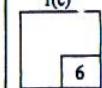
[3 marks]

- (c) Based on Diagram 1.1 and 1.2, state three different observations and the corresponding inferences in Table 1.1.
Berdasarkan Rajah 1.1 dan 1.2, nyatakan tiga pemerhatian yang berbeza dan inferensi yang sepadan dalam Jadual 1.1.

| Observation Pemerhatian | Inference Inferensi |
|----------------------------|------------------------|
| (i) | |
| (ii) | |
| (iii) | |

Table 1.1
Jadual 1.1

[6 marks]



(d) State:
Nyatakan :

(i) the manipulated variable:
pemboleh ubah di manipulasi

.....

(ii) the responding variable:
pemboleh ubah bergerak balas

.....

(iii) the constant variable:
pemboleh ubah dimalarkan

.....

(e) State the hypothesis for this experiment.
Nyatakan hipotesis bagi eksperimen ini.

.....

.....

[3 marks]

[3 marks]

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examiner's
use

1(d)

| |
|---|
| 3 |
|---|

1(e)

| |
|---|
| 3 |
|---|

Total 1

| |
|----|
| 18 |
|----|

- 2 Diagram 2 shows the set-up of apparatus for experiment to investigate the effect of temperature on the rate of reaction between sodium thiosulphate and hydrochloric acid. 50 cm^3 of 0.1 mol dm^{-3} of sodium thiosulphate solution is poured into a conical flask and is heated to 30°C . 5 cm^3 of 2 mol dm^{-3} of hydrochloric acid is added immediately to the sodium thiosulphate solution. The conical flask is then placed on a paper with 'X' mark. The time taken for the 'X' mark to disappear from sight is recorded.

Rajah 2 menunjukkan susunan radas bagi eksperimen untuk mengkaji kesan suhu ke atas kadar tindak balas antara natrium tiosulfat dan asid hidroklorik. 50 cm^3 larutan natrium tiosulfat 0.1 mol dm^{-3} dimasukkan ke dalam sebuah kelang kon dan dipanaskan sehingga 30°C . 5 cm^3 asid hidroklorik 2 mol dm^{-3} ditambah dengan cepat kepada larutan natrium tiosulfat itu. Kelang kon itu diletakkan di atas kertas yang bertanda 'X'. Masa untuk tanda 'X' tidak kelihatan dicatakan.

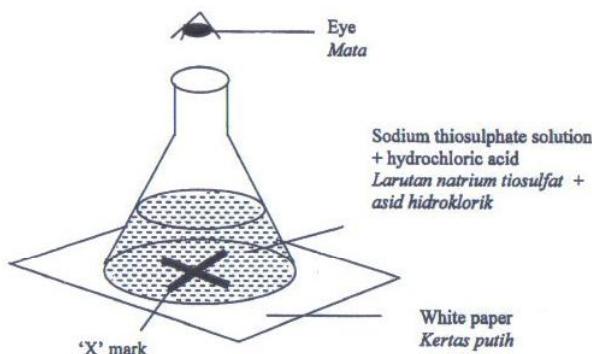


Diagram 2
Rajah 2

The experiment is repeated with sodium thiosulphate solutions at 35°C , 40°C , 45°C , 50°C , and 55°C .

Eksperimen itu diulangi dengan larutan natrium tiosulfat pada suhu 35°C , 40°C , 45°C , 50°C dan 55°C .

(a) Table 2 shows the reading of the stopwatch in each experiment.

Complete the Table 2 by calculating $\frac{1}{\text{time}}$.

Jadual 2 menunjukkan bacaan jam randik dalam setiap eksperimen.

Lengkapkan Jadual 2 dengan mengira $\frac{1}{\text{masa}}$

| Temperature/ $^{\circ}\text{C}$ Suhu $^{\circ}\text{C}$ | Time / s Masa / s | $\frac{1}{\text{time}} / \text{s}^{-1}$ $\frac{1}{\text{masa}} / \text{s}^{-1}$ |
|--|----------------------|--|
| 30 | 43.0 | 0.023 |
| 35 | 26.0 | |
| 40 | 19.0 | |
| 45 | 15.0 | |
| 50 | 12.0 | |
| 55 | 10.5 | |

Table 2

Jadual 2

[3 marks]

(b) Based on Table 2, plot a graph of temperature of sodium thiosulphate against $\frac{1}{\text{time}}$.

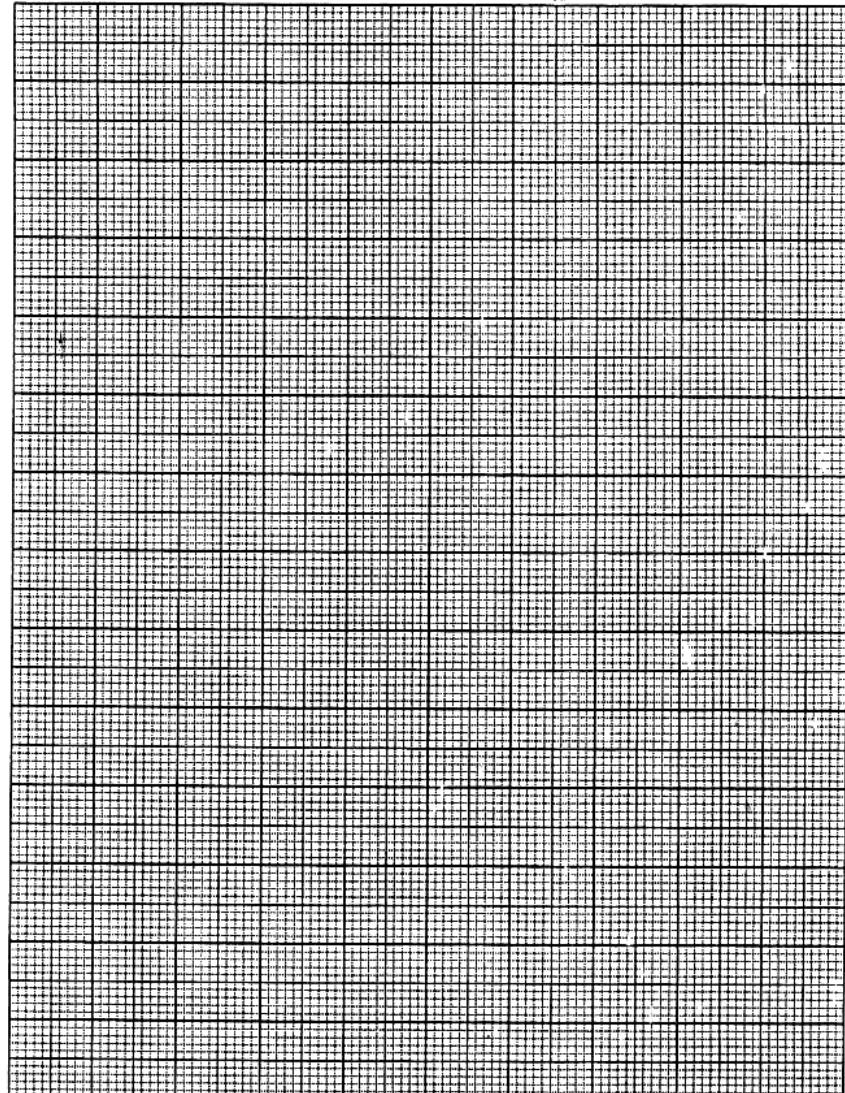
Berdasarkan Jadual 2, plotkan graf suhu larutan natrium tiosulfat melawan $\frac{1}{\text{masa}}$.

[3 marks]

For
examiner's
use

Graph of temperature of sodium thiosulphate solution against $\frac{1}{\text{time}}$

Graf suhu larutan natrium tiosulfat melawan $\frac{1}{\text{masa}}$



2(a)

3

2(b)

3

- (c) State the operational definition for the rate of reaction in this experiment.
Nyatakan definisi secara operasi bagi kadar tindak balas dalam eksperimen ini.

.....
.....
.....
.....
.....

[3 marks]

- (d) Predict the time taken for the 'X' mark to disappear from sight if the experiment is repeated at 46°C.

Show on the graph how you determine the time taken.

Ramalkan masa yang diambil bagi tanda 'X' tidak kelihatan jika eksperimen dilakukan pada 46°C.

Tunjukkan pada graf bagaimana anda menentukan masa yang diambil.

Time / Masa : [3 marks]

- (e) Classify the following reactions into fast reaction and slow reaction.
Kelasakan tindak balas berikut kepada tindak balas cepat dan tindak balas lambat.

| | | | | |
|-----------------------|---------------------------|-------------------------------|--------------------------|----------------------------|
| Rusting Pengaratan | Fermentation Penapaian | Neutralization Peneutralan | Combustion Pembakaran | Displacement Penyesaran |
|-----------------------|---------------------------|-------------------------------|--------------------------|----------------------------|

| Fast reaction Tindak balas cepat | Slow reaction Tindak balas lambat |
|-------------------------------------|--------------------------------------|
| | |

[3 marks]

- 3 Diagram 3 shows two different beakers containing glacial ethanoic acid in water and methylbenzene.
Rajah 3 menunjukkan dua bekas berbeza yang mengandungi asid etanoik glasial dalam air dan dalam metilbenzena.

For
examiner's
use

2(c)
3

2(d)
3

2(e)
3

Total 2
15

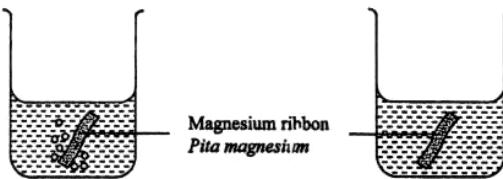


Diagram 3
Rajah 3

Based on the Diagram 3, plan one laboratory experiment to investigate the role of water in showing the properties of acid.
Berdasarkan Rajah 3, rancang satu eksperimen dalam makmal untuk mengkaji peranan air dalam menunjukkan sifat asid.

Your planning must include the following items:
Perancangan anda hendaklah mengandungi perkara-perkara berikut:

- (a) Statement of the problem
Pernyataan masalah
- (b) All the variables
Semua pembolehubah
- (c) Statement of the hypothesis
Pernyataan hipotesis
- (d) List of materials and apparatus
Senarai bahan dan radas
- (e) Procedure of the experiment
Prosedur eksperimen
- (f) Tabulation of data
Penjadualan data

[17 marks]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

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UJIAN PENGESANAN TOV 2012
4541/3 CHEMISTRY
Paper 3

| Question | Rubric | Score |
|----------|--|-------|
| 1(a) | Able to write all the voltmeter readings accurately with correct unit and one decimal point. Answer: Zinc and copper : 1.4 V P and copper : 0.8 V Q and copper : 2.8 V R and copper : 0.4 V | 3 |
| | Able to write any 3 readings accurately with unit // All readings correctly but without unit | 2 |
| | Able to write any 2 readings correctly. | 1 |
| | No response or wrong response | 0 |

| Question | Rubric | Score | | | | | | | | | | |
|-----------------|--|----------------|-------------|-----------------|-----|--------------|-----|--------------|-----|--------------|-----|---|
| 1(b) | Able to construct a table to record the data that contain: 1. Correct titles 2. Correct readings // ecf from 1(a) 3. Unit Sample answer: <table border="1"> <tr> <th>Pair of metals</th> <th>Voltage / V</th> </tr> <tr> <td>Zinc and copper</td> <td>1.4</td> </tr> <tr> <td>P and copper</td> <td>0.8</td> </tr> <tr> <td>Q and copper</td> <td>2.8</td> </tr> <tr> <td>R and copper</td> <td>0.4</td> </tr> </table> | Pair of metals | Voltage / V | Zinc and copper | 1.4 | P and copper | 0.8 | Q and copper | 2.8 | R and copper | 0.4 | 3 |
| Pair of metals | Voltage / V | | | | | | | | | | | |
| Zinc and copper | 1.4 | | | | | | | | | | | |
| P and copper | 0.8 | | | | | | | | | | | |
| Q and copper | 2.8 | | | | | | | | | | | |
| R and copper | 0.4 | | | | | | | | | | | |
| | Able to construct a less accurate table that contains: 1. Titles 2. Readings | 2 | | | | | | | | | | |
| | Able to construct a table with at least one title / reading | 1 | | | | | | | | | | |
| | No response or wrong response | 0 | | | | | | | | | | |

| Question | Rubric | Score | | | | | | | | |
|---|--|-------------|-----------|----------------------------------|--|---|---|---|--|---|
| 1(c) | Able to state three observations related inferences correctly Sample answer: <table border="1"> <tr> <th>Observation</th> <th>Inference</th> </tr> <tr> <td>1. Zinc electrode become thinner</td> <td>Zinc becomes to zinc ions// zinc ionises</td> </tr> <tr> <td>2. Brown deposit at copper electrode// copper / cathode / (positive terminal) thicker</td> <td>Copper atom formed // copper(II) ion discharged</td> </tr> <tr> <td>3. Blue solution turns colourless/ (become paler) / light blue // The intensity of blue solution decrease</td> <td>The concentration /number of copper(II) ions, Cu^{2+} decreases</td> </tr> </table> | Observation | Inference | 1. Zinc electrode become thinner | Zinc becomes to zinc ions// zinc ionises | 2. Brown deposit at copper electrode// copper / cathode / (positive terminal) thicker | Copper atom formed // copper(II) ion discharged | 3. Blue solution turns colourless/ (become paler) / light blue // The intensity of blue solution decrease | The concentration /number of copper(II) ions, Cu^{2+} decreases | 6 |
| Observation | Inference | | | | | | | | | |
| 1. Zinc electrode become thinner | Zinc becomes to zinc ions// zinc ionises | | | | | | | | | |
| 2. Brown deposit at copper electrode// copper / cathode / (positive terminal) thicker | Copper atom formed // copper(II) ion discharged | | | | | | | | | |
| 3. Blue solution turns colourless/ (become paler) / light blue // The intensity of blue solution decrease | The concentration /number of copper(II) ions, Cu^{2+} decreases | | | | | | | | | |
| | Able to state any 5 answers correctly | 5 | | | | | | | | |
| | Able to state any 4 answers correctly | 4 | | | | | | | | |
| | Able to state any 3 answers correctly | 3 | | | | | | | | |
| | Able to state any 2 answers correctly | 2 | | | | | | | | |
| | Able to state any 1 answer correctly | 1 | | | | | | | | |
| | No response or wrong response | 0 | | | | | | | | |

| Question | Rubric | Score |
|----------|---|-------|
| 1(d) | Able to state all the three variables correctly Sample answer: Manipulated variable : Pairs of metals // Negative terminal Responding variable : Voltmeter reading/voltage/potential difference Constant variable : copper electrode // positive terminal // copper(II) sulphate solution// electrolyte // concentration of electrolyte | 3 |
| | Able to state any two variables correctly | 2 |
| | Able to state any one variable correctly | 1 |
| | No response or wrong response | 0 |

| Question | Rubric | Score |
|----------|--|-------|
| 1(e) | Able to state the relationship between the manipulated variable and the responding variable with direction. Sample answer: The further the distance between two/pair of metals in the electrochemical series, the higher/larger/bigger the (voltage) / (potential difference) / voltmeter reading. | 3 |
| | Able to state the relationship between the manipulated variable and responding variable. Sample answer: The further the distance between metals, the higher/larger/bigger the (voltage) / (potential difference) / voltmeter reading // The higher/larger/bigger the (voltage) / (potential difference) / voltmeter reading, the further the distance between two/pair of metals in the electrochemical series | 2 |
| | Able to state the idea of hypothesis Sample answer: Different pair of metals have different voltage value | 1 |
| | No response or wrong response | 0 |

| Question | Rubric | Score | | | | | | | | | | | | | | |
|--|---|------------|---|---|---|----|-------|-----|-------|----|-------|---|-------|----|-------|---|
| 2(a) | Able to calculate the value $\frac{1}{\text{Time}}$ accurately with three decimal places Answer: <table border="1"> <thead> <tr> <th>Experiment</th> <th>$\frac{1}{\text{Time}} / \text{s}^{-1}$</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>-</td> </tr> <tr> <td>II</td> <td>0.038</td> </tr> <tr> <td>III</td> <td>0.053</td> </tr> <tr> <td>IV</td> <td>0.067</td> </tr> <tr> <td>V</td> <td>0.083</td> </tr> <tr> <td>VI</td> <td>0.095</td> </tr> </tbody> </table> | Experiment | $\frac{1}{\text{Time}} / \text{s}^{-1}$ | I | - | II | 0.038 | III | 0.053 | IV | 0.067 | V | 0.083 | VI | 0.095 | 3 |
| Experiment | $\frac{1}{\text{Time}} / \text{s}^{-1}$ | | | | | | | | | | | | | | | |
| I | - | | | | | | | | | | | | | | | |
| II | 0.038 | | | | | | | | | | | | | | | |
| III | 0.053 | | | | | | | | | | | | | | | |
| IV | 0.067 | | | | | | | | | | | | | | | |
| V | 0.083 | | | | | | | | | | | | | | | |
| VI | 0.095 | | | | | | | | | | | | | | | |
| Able to calculate at least 4 values accurately // All readings correctly but without three decimal places. | | | | | | | | | | | | | | | | |
| Able to calculate any 2 values correctly | | | | | | | | | | | | | | | | |
| No response given / wrong response | | | | | | | | | | | | | | | | |

| Question | Rubric | Score |
|----------|---|-------|
| 2(b) | Able to plot a graph correctly which fulfills all the following criteria 1) Both axes are labeled and with units X axis : $\frac{1}{\text{Time}}$ / s^{-1} Y axis : Temperature of sodium thiosulphate / $^{\circ}\text{C}$ | 3 |
| | 2) Uniform scale | |
| | 3) All the points are transferred correctly | |
| | 4) Best fit straight line 5) The size of the graph must be half of the graph paper | |
| | Able to plot a graph which fulfills at least 3 criteria | 2 |
| | Able to have an idea to plot a graph 1) Graph axes 2) Straight line | 1 |
| | No response or wrong response | 0 |

| Question | Rubric | Score |
|----------|--|-------|
| 2(c) | Able to describe all the following aspects 1) Time taken 2) 'X' mark disappear / (not seen) | 3 |
| | Sample answer: Time taken for 'X' mark disappear / (not seen) | |
| | Able to state any one of the aspects | |
| | Sample answer: Time taken // 'X' mark disappear / (not seen) | |
| | Able to state an idea of the rate of reaction. | 2 |
| | Sample answers: Measure of how quickly a chemical reaction happens// The change/ increase/decrease in the amount of products/reactant per unit time // Formation of sulphur/ precipitate | 1 |
| | No response given / wrong response | 0 |

| Question | Rubric | Score |
|----------|---|-------|
| 2(d) | Able to fulfill all the following criteria : (1) Show on the graph the way to obtain the value (2) State the time with correct unit | |
| | <u>Sample answer :</u> $14 \leq t \leq 16$ | 3 |
| | Able to fulfill any 1 criteria | 2 |
| | Able to give an idea | 1 |
| | <u>Sample answer :</u> $15.6 // 0.069$ | 0 |
| | No response given / wrong response | |

| Question | Rubric | Score |
|----------|---|-------|
| 3(a) | Able to give the problem statement of the experiment correctly | |
| | <u>Sample answer :</u> Does an acid/glacial ethanoic acid need water to show its acidic properties? // | 3 |
| | Is water needed for an acid/ glacial ethanoic acid to show its acidic properties? | |
| | Able to give the problem statement of the experiment incorrectly | 2 |
| | <u>Sample answer :</u> To investigate/study the role of water in showing the properties of an acid. | |
| | Able to state an idea of problem statement of the experiment | 1 |
| | <u>Sample answer :</u> Water is needed to show the properties of acid. | 0 |
| | No response or wrong response | |

| Question | Rubric | Score |
|----------|---|-------|
| 3(b) | Able to state All variables correctly | |
| | <u>Sample answer :</u> Manipulated variable : Type of solvent // Water and methylbenzene Responding variable : Acidic properties // Gas bubbles produced Constant variable : Acid // glacial ethanoic acid // magnesium r : Volume of acid // Air bubbles | 3 |
| | Able to state any two variables correctly | 2 |
| | Able to state any one variables correctly | 1 |
| | No response or wrong response | 0 |

| Question | Rubric | Score |
|----------|---|-------|
| 3(c) | Able to give the hypothesis correctly | |
| | <u>Sample answers :</u> Water is needed for an acid to show its acidic properties // Presence of water is essential for an acid to show its acidic properties // Water is needed for an acid to react with magnesium to produce gas bubbles. | 3 |
| | Able to give the hypothesis almost correct | 2 |
| | <u>Sample answers :</u> Ethanoic acid/An acid shows its acidic properties when water is present // The presence of water influence the acidic properties of acid | |
| | Able to state an idea of the hypothesis | 1 |
| | <u>Sample answer :</u> The water affect the properties of acid | 0 |
| | No response or wrong response | |

| Question | Rubric | Score |
|----------|--|-------|
| 3(d) | Able to give the list of the apparatus and substances correctly and completely | |
| | <u>Answer :</u> Apparatus dry beaker / (test tube) / (conical flask) | 3 |
| | <u>Substances</u> Glacial ethanoic acid, water, methylbenzene, magnesium | |
| | Able to give the list of the apparatus and substances correctly but not completely | 2 |
| | <u>Apparatus</u> beaker / (test tube) / (conical flask) <u>Substances</u> Glacial ethanoic acid, water, magnesium | |
| | Able to give an idea about the list of the apparatus and substances correctly | 1 |
| | <u>Apparatus</u> Any suitable container <u>Substances</u> Ethanoic acid, magnesium | 0 |
| | No response or wrong response | |

| Question | Rubric | Score |
|----------|---|-------|
| 3(e) | Able to state all procedures correctly <u>Sample answer :</u> 1. Glacial ethanoic acid is poured into dry test tube. 2. Water is poured into glacial ethanoic acid in test tube. 3. A piece of magnesium is put into the test tube. 4. The observation is recorded. 5. Repeat steps 1 to 4 by replacing water with methylbenzene. | 3 |
| | Able to list down steps 1, 2, 3 and 5 | 2 |
| | Able to list down steps 1 and 3 or 2 and 3 | 1 |
| | <u>Sample answer :</u> Acid mix with magnesium | |
| | No response or wrong response | 0 |

| Question | Rubric | Score | | | | | | |
|--|---|----------------------|----------------------------|---------------------------------|--|---|---|---|
| 3(f) | Able to tabulate the data with the following aspects 1. Correct title 2. Complete list of substance/solvent <u>Sample answer :</u> <table border="1"> <thead> <tr> <th>Substance // Solvent</th> <th>Observation // Gas bubbles</th> </tr> </thead> <tbody> <tr> <td>Glacial ethanoic acid and water</td> <td></td> </tr> <tr> <td>Glacial ethanoic acid and methylbenzene</td> <td></td> </tr> </tbody> </table> | Substance // Solvent | Observation // Gas bubbles | Glacial ethanoic acid and water | | Glacial ethanoic acid and methylbenzene | | 2 |
| Substance // Solvent | Observation // Gas bubbles | | | | | | | |
| Glacial ethanoic acid and water | | | | | | | | |
| Glacial ethanoic acid and methylbenzene | | | | | | | | |
| Able to tabulate the data with the following aspects 1. one suitable title 2. at least 2x2 table. <u>Sample answer :</u> <table border="1"> <thead> <tr> <th>Acid/test tube</th> <th>Effect//Result</th> </tr> </thead> <tbody> <tr> <td>Glacial ethanoic acid</td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table> | Acid/test tube | Effect//Result | Glacial ethanoic acid | | | | 1 | |
| Acid/test tube | Effect//Result | | | | | | | |
| Glacial ethanoic acid | | | | | | | | |
| | | | | | | | | |
| No response or wrong response | 0 | | | | | | | |

END OF MARKING SCHEME