**1.** Diagram 1.1 shows the set-up of apparatus for an experiment of Set I, Set II and Set III to construct the electrochemical series based on the potential difference between two different metals in a voltaic cell. Metal X acts as a positive terminal.

*For examiner’s*

*use*

*Rajah* 1.1 *menunjukkan susunan radas satu eksperimen bagi Set* I*, Set* II *dan Set* III *untuk membina siri elektrokimia berdasarkan beza keupayaan antara dua logam berbeza dalam sel voltan. Logam* X *bertindak sebagai terminal positif.*

|  |  |
| --- | --- |
| Set  *Set* | Set-up of apparatus  *Susunan radas* |
| I | Metal X  *Logam* X    *Elektrod magnesium*  Tin  *Stanum*  Sodium chloride solution  *Larutan natrium klorida*  Voltmeter reading  *Bacaan voltmeter* : |
| II | Metal X  *Logam* X  Zinc  *Zink*  Sodium chloride solution  *Larutan natrium klorida*  Voltmeter reading  *Bacaan voltmeter* : |
| III | Metal X  *Logam* X  *Elektrod magnesium*  Magnesium  *Magnesium*  Sodium chloride solution  *Larutan natrium klorida*  Voltmeter reading  *Bacaan voltmeter* : |

Diagram 1.1

*Rajah* 1.1

1. Record the voltmeter readings in the spaces provided in Diagram 1.1.

*Rekod bacaan voltmeter pada ruang yang disediakan dalam Rajah* 1.1*.*

[3 *marks*]

1(a)

3

[3 *markah*]

1. For this experiment, state:

*For examiner’s*

*use*

*Bagi eksperimen ini, nyatakan:*

* 1. manipulated variable

*pembolehubah dimanipulasikan*

…………………………………………………………………………………….

* 1. responding variable

*pembolehubah bergerak balas*

……………………………………………………………………………………..

* 1. fixed variable

*pembolehubah dimalarkan*

1(b)

3

………………………………………………………………………………………

[3 *marks*]

[3 *markah*]

1. State one hypothesis for this experiment.

*Nyatakan satu hipotesis bagi eksperimen ini.*

……………………………………………………………………………………………

1(c)

3

……………………………………………………………………………………………

……………………………………………………………………………………………

[3 *marks*]

[3 *markah*]

(d) Based on the voltmeter readings in Diagram 1.1, arrange metal X, zinc , magnesium and tin in ascending order of electropositivity of metals in electrochemical series.

*Berdasarkan bacaan voltmeter dalam Rajah* 1.1, *susunkan logam* X*, zink, magnesium dan stanum dalam tertib menaik keelektropositifan logam dalam siri elektrokimia.*

1(d)

3

…………………………………………………………………………..…………………

[3 *marks*]

[3 *markah*]

(e) State the operational definition for potential difference of metals.

*Nyatakan definisi secara operasi bagi beza keupayaan logam.*

…………………………………………………………………………..…………………

…………………………………………………………………………..…………………

1(e)

3

…………………………………………………………………………..…………………

[3 *marks*]

[3 *markah*]

(f) Diagram 1.2 shows the result of the experiment for Set II after 40 minutes.

*For examiner’s*

*use*

*Rajah* 1.2 *menunjukkan keputusan eksperimen bagi Set* II *selepas* 40 *minit.*

Metal X

*Logam* X

Zinc

*Zink*

Sodium chloride solution

*Larutan natrium klorida*

Sodium chloride solution

*Larutan natrium klorida*

Metal X

*Logam* X

Zinc

*Zink*

After 40 minutes

*Selepas* 40 *minit*

Diagram 1.2

*Rajah* 1.2

(i) State one observation at negative terminal in Diagram 1.2 after 40 minutes.

*Nyatakan satu pemerhatian pada terminal negatif dalam Rajah* 1.2 *selepas* 40 *minit*.

1(f)(i)

3

…………………………………………………………………..…………………..

[3 *marks*]

[3 *markah*]

(ii) State the inference based on your answer in 1(f)(i).

*Nyatakan inferens berdasarkan jawapan anda dalam* 1(f)(i).

1(f)(ii)

3

…………………………………………………………………..………………….

…………………………………………………………………..…………………..

[3 *marks*]

[3 *markah*]

1(f)(i)

3

(iii) State the relationship between the number of gas bubbles released at metal X with time.

*Nyatakan hubungan antara bilangan gelembung gas terbebas pada logam* X *dengan masa.*

…………………………………………………………………..…………………..

…………………………………………………………………..…………………..

1(f)(iii)

3

…………………………………………………………………..…………………..

[3 *marks*]

[3 *markah*]

*For examiner’s*

*use*

(g) Metal Q is placed between tin and metal X in the electrochemical series. Predict the voltage produced and positive terminal if metal X in Set I is replaced by metal Q.

*Logam* Q *terletak di antara stanum dan logam* X *dalam siri elektrokimia. Ramalkan voltan yang terhasil dan terminal positif apabila logam* X *dalam Set* I *digantikan dengan logam* Q*.*

(i) Voltage

*Voltan* : …………………………………………….

(ii) Positive terminal

1(g)

3

*Terminal positif* : …………………………………………….

[3 *marks*]

[3 *markah*]

(h) Write half equation for the reaction occurs at negative terminal and positive terminal in Set III.

*Tulis setengah persamaan bagi tindak balas yang berlaku pada terminal negatif dan terminal positif dalam Set* III.

At negative terminal

*Pada terminal negatif* : ……………………………………………….............

1(h)

3

At positive terminal

*Pada terminal positif* : ……………………………………………….............

[3 *marks*]

[3 *markah*]

(i) Classify all the ions present in sodium chloride solution into cations and anions.

*Kelaskan semua ion yang hadir di dalam larutan natrium klorida kepada kation dan anion.*

1(i)

3

|  |  |
| --- | --- |
| **Cation**  ***Kation*** | **Anion**  ***Anion*** |
|  |  |

[3 *marks*]

[3 *markah*]

**Total 1**

**33**

1. Diagram 2 shows a result from experiment to study the different characteristic of rubber strip P and rubber strip Q.

*Rajah* 2 *menunjukkan keputusan eksperimen untuk mengkaji perbezaan sifat jalur getah* P *dan jalur getah* Q*.*

|  |  |  |
| --- | --- | --- |
| Length  *Panjang* (cm) | Rubber strip P  *Jalur getah* P | Rubber strip Q  *Jalur getah* Q |
| Initial length before a weight is hung  *Panjang asal sebelum pemberat digantung* | *D:\Rajah Kimia\chem diagram\Rubber strip.png* | *D:\Rajah Kimia\chem diagram\Rubber strip.png* |
| Length with weight  *Panjang dengan pemberat* | *D:\Rajah Kimia\chem diagram\Rubber strip.png*  Weight  *Pemberat* | *D:\Rajah Kimia\chem diagram\Rubber strip.png*  Weight  *Pemberat* |
| Length after weight is released  *Panjang selepas pemberat dilepaskan* | *D:\Rajah Kimia\chem diagram\Rubber strip.png* | *D:\Rajah Kimia\chem diagram\Rubber strip before.png* |

Diagram 2

*Rajah* 2

Referring to Diagram 2, plan a laboratory experiment to study the elasticity of vulcanized rubber and unvulcanized rubber.

*Merujuk kepada Rajah* 2*,rancang satu eksperimen dalam makmal untuk mengkaji kekenyalan getah tervulkan dan getah tak tervulkan.*

Your planning should include the following aspects:

*Perancangan anda hendaklah mengandungi aspek-aspek berikut*:

(a) Problem statement

*Pernyataan masalah*

(b) All the variables

Semua pembolehubah

(c) Statement of hypothesis

*Pernyataan hipotesis*

(d) List of materials and apparatus

*Senarai bahan dan radas*

(e) Procedure for the experiment

*Prosedur eksperimen*

(f) Tabulation of data

*Penjadualan data*

[17 *marks*]

[17 *markah*]

**END OF QUESTION PAPER**

***KERTAS SOALAN TAMAT***