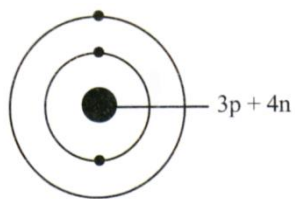


- 1 The following information is about atom T.
Maklumat berikut adalah mengenai atom T.

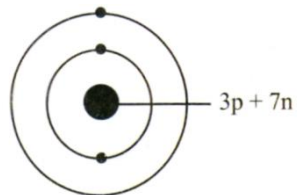
- Number of proton is 3
Bilangan proton ialah 3
- Nucleon number is 7
Nombor nukleon ialah 7

Which diagram shows the structure of atom T?
Rajah yang manakah menunjukkan struktur bagi atom T?

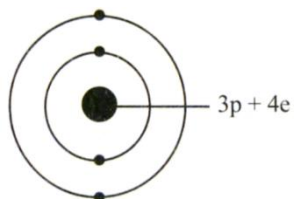
A



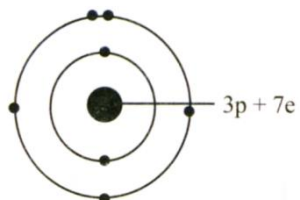
B



C



D



- 2 Which compound has the empirical formula of CH_2O ?
Sebatian manakah yang mempunyai formula empirik CH_2O ?

- A HCOOH
- B CH_3COOH
- C $\text{CH}_3\text{COOCH}_3$
- D HCOOC_2H_5

3. Diagram 1 shows an air balloon filled with gas X.
Rajah 1 menunjukkan sebiji belon udara berisi gas X.

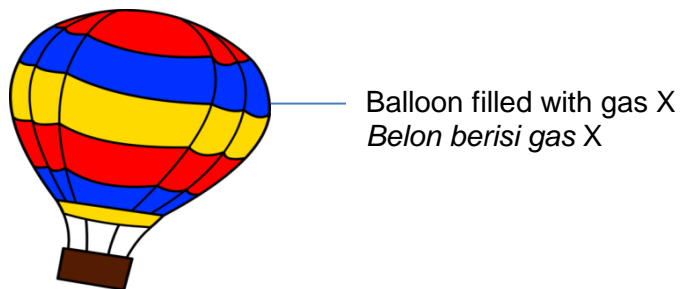


Diagram 1
Rajah 1

- In which group is X located in the Periodic Table?
Dalam kumpulan manakah X terletak dalam Jadual Berkala?

- A Group 15
Kumpulan 15
- B Group 16
Kumpulan 16
- C Group 17
Kumpulan 17
- D Group 18
Kumpulan 18

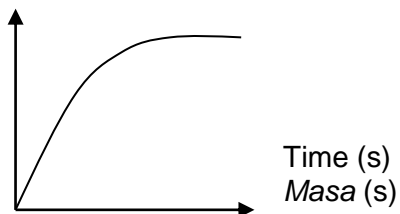
- 4 Which of the following pairs of elements form an ionic compound ?
Antara pasangan unsur berikut, yang manakah membentuk sebatian ion ?
- A Carbon and hydrogen
Karbon dan hidrogen
 - B Nitrogen and oxygen
Nitrogen dan oksigen
 - C Hydrogen and chlorine
Hidrogen dan klorin
 - D Potassium and iodine
Kalium dan iodin
- 5 The ions that are present in copper(II) sulphate solution are
Ion-ion yang wujud dalam larutan kuprum(II) sulfat ialah
- A Cu^{2+} , SO_4^{2-}
 - B Cu^{2+} , SO_4^{2-} , H^+
 - C Cu^{2+} , SO_4^{2-} , OH^-
 - D Cu^{2+} , SO_4^{2-} , H^+ , OH^-
- 6 Which of the following is a strong acid?
Antara yang berikut, yang manakah asid kuat?
- A Ethanoic acid
Asid etanoik
 - B Nitric acid
Asid nitrik
 - C Carbonic acid
Asid karbonik
 - D Phosphoric acid
Asid fosforik

- 7 Which of the following is a salt ?
Antara berikut, yang manakah merupakan garam?
- A Lead(II) oxide
Plumbum(II) oksida
 - B Barium hydroxide
Barium hidroksida
 - C Aluminium nitrate
Aluminium nitrat
 - D Hydrogen sulphate
Hidrogen sulfat
- 8 Which of the following is the uses of sulphuric acid?
Antara berikut yang manakah adalah kegunaan asid sulfurik?
- I Production of fertilizers
Penghasilan baja
 - II Manufacture of soap
Penghasilan sabun
 - III Production of baking powder
Penghasilan serbuk penaik
 - IV Making electrolyte for car batteries
Membuat elektrolit untuk bateri kereta
- A I and II
I dan II
 - B II and III
II dan III
 - C I and IV
I dan IV
 - D III and IV
III dan IV

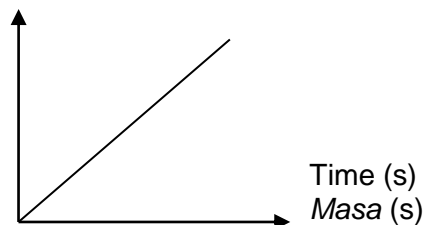
- 9 An experiment was conducted to investigate the rate of reaction between calcium carbonate and hydrochloric acid. The volume of gas produced was recorded at every 30 second intervals. Which of the following graphs will be obtained?

Satu eksperimen telah dijalankan untuk mengkaji kadar tindak balas antara kalsium karbonat dengan asid hidroklorik. Isipadu gas yang terhasil direkodkan setiap 30 saat. Manakah graf berikut akan diperolehi?

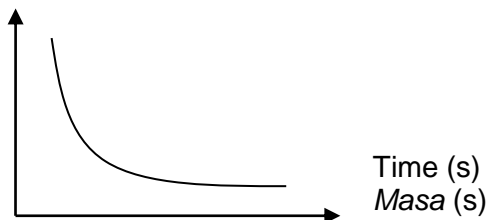
- A Volume of carbon dioxide (cm^3)
Isipadu gas karbon dioksida (cm^3)



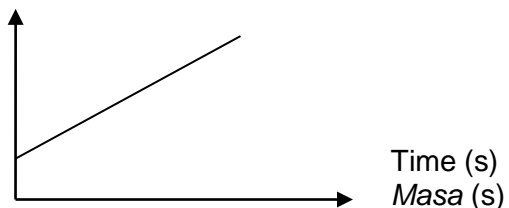
- B Volume of carbon dioxide (cm^3)
Isipadu gas karbon dioksida (cm^3)



- C Volume of carbon dioxide (cm^3)
Isipadu gas karbon dioksida (cm^3)



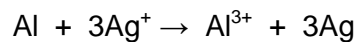
- D Volume of carbon dioxide (cm^3)
Isipadu gas karbon dioksida (cm^3)



- 10 Which of the following substances can coagulate the latex?
Antara berikut yang manakah boleh menggumpalkan lateks?

- A Sulphur
Sulfur
- B Ethanol
Etanol
- C Ethanoic acid
Asid etanoik
- D Ammonia solution
Larutan ammonia

- 11 The following ionic equation represents a redox reaction.
Persamaan ion berikut mewakili satu tindak balas redoks.



Which statement is correct?
Penyataan manakah yang betul?

- A Silver ion is oxidized
Ion argentum dioksidakan
- B Silver ion is a reducing agent
Ion argentum adalah satu agen penurunan
- C Aluminium atom undergoes oxidation
Atom aluminium mengalami pengoksidaan
- D Aluminium atom receives electrons
Atom aluminium menerima elektron

- 12 Diagram 2 represents energy level of an endothermic reaction.
Rajah 2 mewakili aras tenaga satu tindak balas endotermik.

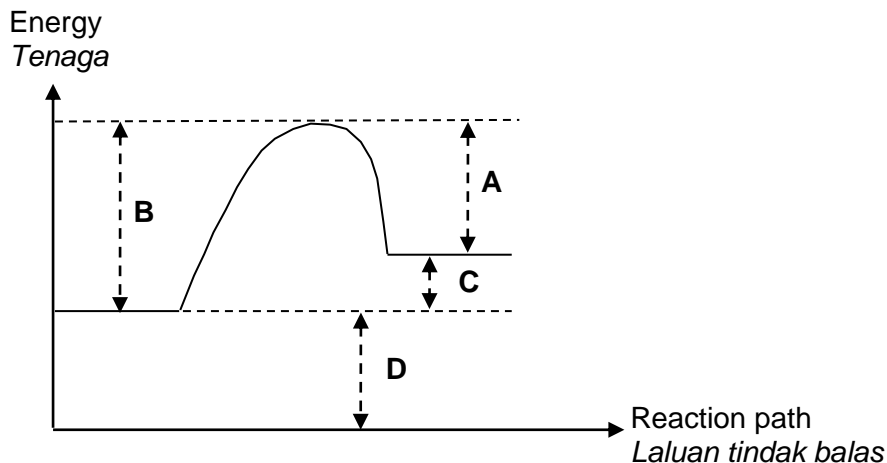


Diagram 2
Rajah 2

Which of the following **A**, **B**, **C** and **D**, represents the heat change?

*Antara **A**, **B**, **C** dan **D** yang manakah menunjukkan perubahan tenaga?*

- 13 Which statements is correct about cleansing action of detergent?
Antara yang berikut, pernyataan manakah betul tentang tindakan pencucian detergen?
- A** The hydrophilic part of detergent molecule dissolves in water
Bahagian hidrofilik molekul detergen larut dalam air
 - B** Increases the surface tension of water
Menambah tegangan permukaan air
 - C** Detergen molecules emulsify water
Molekul detergen mengemulsikan air
 - D** Reacts with acid to form salt
Bertindak balas dengan asid untuk membentuk garam

- 14 Rate of diffusion depends on the mass of the gas particles.

Which gas has the highest rate of diffusion?

[Molar mass: $\text{CH}_4 = 16 \text{ g mol}^{-1}$, $\text{NH}_3 = 17 \text{ g mol}^{-1}$, $\text{CO} = 28 \text{ g mol}^{-1}$, $\text{SO}_2 = 64 \text{ g mol}^{-1}$]

Kadar resapan bergantung kepada jisim zarah-zarah gas.

Gas manakah mempunyai kadar resapan paling tinggi?

[Jisim molar : $\text{CH}_4 = 16 \text{ g mol}^{-1}$, $\text{NH}_3 = 17 \text{ g mol}^{-1}$, $\text{CO} = 28 \text{ g mol}^{-1}$, $\text{SO}_2 = 64 \text{ g mol}^{-1}$]

- A CO
- B SO_2
- C NH_3
- D CH_4
- 15 What is the percentage composition by mass of water in hydrated iron(II) sulphate, $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$?
- [Relative atomic mass: H = 1, O = 16, S = 32, Fe = 56]

Berapakah peratus komposisi jisim bagi air dalam ferum(II) sulfat terhidrat, $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$?

[Jisim atom relatif: H = 1, O = 16, S = 32, Fe = 56]

- A 9.00%
- B 14.12%
- C 45.32%
- D 71.20%

- 16** Diagram 3 shows the symbols for elements X and Y.
Rajah 3 menunjukkan simbol bagi unsur X dan Y.

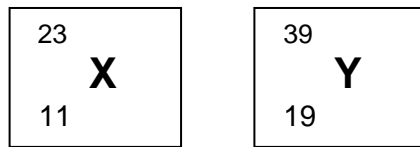


Diagram 3
Rajah 3

Which of the following is true about elements X and Y?
Antara berikut, yang manakah adalah benar bagi unsur X dan Y?

- A** Element X is less reactive than element Y
Unsur X kurang reaktif daripada unsur Y
- B** Both elements X and Y are monoatomic gas
Kedua-dua unsur X dan Y adalah gas monoatom
- C** Both elements X and Y are non metal
Kedua-dua unsur X dan Y adalah bukan logam
- D** Element X react with element Y to form an ionic compound
Unsur X bertindakbalas dengan unsur Y untuk membentuk sebatian ion
- 17** Which of the following gases have a single covalent bond?
[Proton number ; H=1, C=6, N=7, O=8]

Antara berikut, gas yang manakah mempunyai ikatan kovalen tunggal ?

[Nombor proton ; H=1, C=6, N=7, O=8]

- A** Oxygen
Oksigen
- B** Hydrogen
Hidrogen
- C** Nitrogen
Nitrogen
- D** Carbon dioxide
Karbon dioksida

- 18** Diagram 4 shows the set up of the apparatus of chemical cell using electrode pair of zinc and copper.

Rajah 4 menunjukkan susunan radas sel kimia menggunakan pasangan elektrod zink dan kuprum.

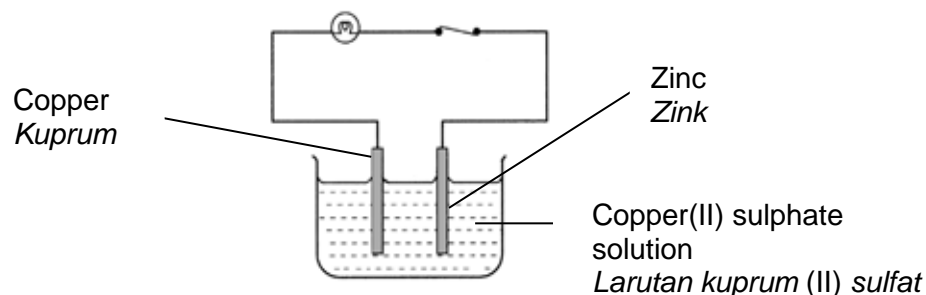


Diagram 4
Rajah 4

The blue copper(II) sulphate solution becomes fade.

Warna biru larutan kuprum(II) sulfat didapati menjadi pudar

Which of the following explains the observation?

Antara pernyataan berikut pernyataan yang manakah menerangkan pemerhatian itu?

- A** Zinc atom ionizes
Atom zink mengion
- B** Sulphate ion is discharged
Ion sulfat dinyahscas
- C** Copper atom ionizes
Atom kuprum mengion
- D** Copper(II) ion is discharged
Ion kuprum(II) dinyahcas

- 19 A colourless solution reacts with zinc carbonate to produce a gas that turns lime-water cloudy. The substance in the solution probably has the molecular formula of

Satu larutan tidak berwarna bertindak balas dengan zink karbonat membebaskan gas yang mengeruhkan air kapur.

Bahan kimia di dalam larutan tersebut berkemungkinan mempunyai formula molekul

- A $\text{CH}_3\text{COOC}_7\text{H}_{15}$
 B $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$
 C CH_3COOH
 D $\text{C}_2\text{H}_5\text{OH}$
- 20 Diagram 5 shows the set of apparatus of an experiment.
Rajah 5 menunjukkan susunan radas bagi satu eksperimen.

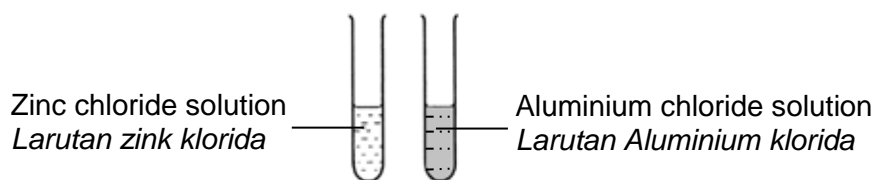


Diagram 5
Rajah 5

Which of the following can be used to differentiate these solutions?
Antara berikut, yang manakah boleh digunakan untuk membezakan larutan-larutan tersebut ?

- A Ammonia solution
Larutan ammonia
 B Barium nitrate solution
Larutan barium nitrat
 C Silver nitrate solution
Larutan argentum nitrat
 D Sodium hydroxide solution
Larutan natrium hidroksida

- 21 Which of the following is true about alloy and its major component?
Antara berikut yang manakah benar tentang aloi dan jujuk utamanya?

	Alloy <i>Aloi</i>	Major component <i>Komponen utama</i>
A	Duralumin <i>Duralumin</i>	Magnesium <i>Magnesium</i>
B	Steel <i>Keluli</i>	Tin <i>Stanium</i>
C	Bronze <i>Gangsa</i>	Copper <i>Kuprum</i>
D	Pewter <i>Piuter</i>	Zinc <i>Zink</i>

- 22 The following equation shows a reaction between hydrochloric acid and granulated marble to produce carbon dioxide gas.
Persamaan berikut menunjukkan tindak balas antara asid hidroklorik dengan ketulan marmar untuk menghasilkan gas karbon dioksida.



- Which of the following will increase the rate of gas release?
Antara berikut, yang manakah akan meningkatkan kadar pembebasan gas?

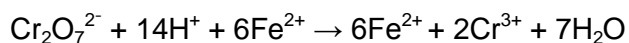
- A** Increase the time of reaction
Menambahkan masa tindak balas
- B** Increase the volume of acid
Menambahkan isipadu asid
- C** Use the marble powder
Gunakan serbuk marmar
- D** Decrease the temperature of the mixture
Merendahkan suhu campuran

- 23** Which of the following process will produce ethanol from ethene?
Antara proses berikut yang manakah akan menghasilkan etanol daripada etena?

- A** Hydration
Penghidratan
- B** Dehydration
Pendehidratan
- C** Hydrogenation
Penghidrogenan
- D** Polymerisation
Pempolimeran

- 24** The following ionic equation represents the reaction between acidified potassium dichromate(VI) solution and iron(II) sulphate solution.

Persamaan ion berikut mewakili tindak balas antara larutan kalium dikromat (VI) berasid dengan larutan ferum(II) sulfat.



What is the change of oxidation number of chromium in the reaction?

Apakah perubahan nombor pengoksidaan kromium dalam tindak balas itu?

- A** +6 to +2
+6 kepada +2
- B** +6 to +3
+6 kepada +3
- C** +7 to +2
+7 kepada +2
- D** +7 to +3
+7 kepada +3

25 Which of the following is true of an exothermic reaction?
Antara berikut, yang manakah benar tentang tindak balas eksotermik?

- A** The container becomes hotter.
Bekas itu menjadi panas.
- B** The temperature of the mixture decreases.
Suhu campuran tindak balas menurun.
- C** Heat energy is absorbed from the surroundings.
Tenaga haba diserap dari persekitaran.
- D** The heat energy is converted to kinetic energy.
Tenaga haba ditukar kepada tenaga kinetik

26 The sting of an ant contains methanoic acid. Which of the following substances is the most suitable to be applied to treat ant sting?

Sengat semut mengandungi asid metanoik. Antara bahan berikut, yang manakah paling sesuai untuk merawat gigitan semut ?

- A** Vinegar
Cuka
- B** Tooth paste
Ubat gigi
- C** Ethanol
Etanol
- D** Cooking oil
Minyak masak

- 27 Diagram 6 is a graph of temperature-time for the heating of substance Q.
Rajah 6 adalah graf suhu-masa bagi pemanasan bahan Q.

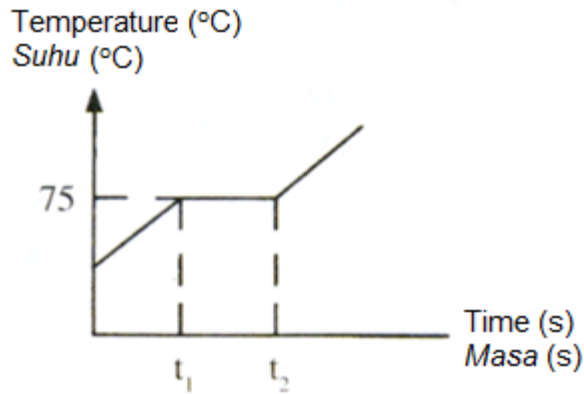


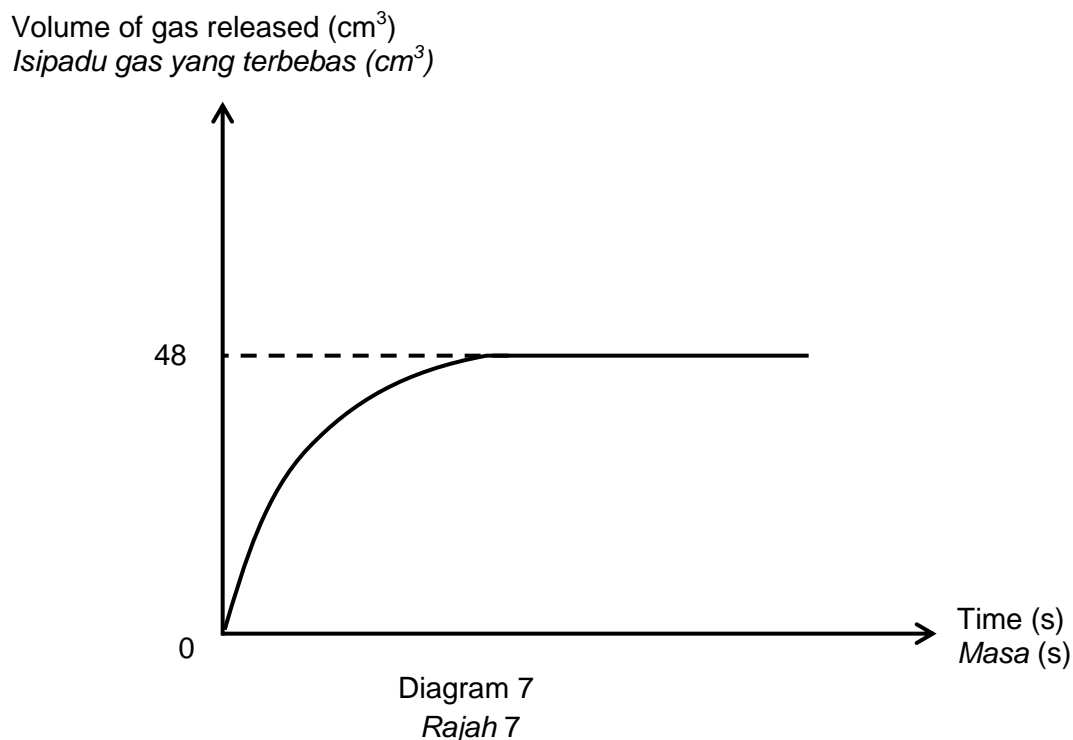
Diagram 6
Rajah 6

Which statement is correct about the property of substance Q based on the graph?
Pernyataan manakah yang betul mengenai sifat bahan Q berdasarkan graf itu?

- A A gas at the room temperature
Adalah gas pada suhu bilik
- B Experiences physical changes at temperature 75 °C
Mengalami perubahan keadaan fizik pada suhu 75 °C
- C Releases heat at time interval t_1 and t_2
Membebaskan haba pada sela masa t_1 dan t_2
- D Only in liquid condition at time interval t_1 and t_2
Berada dalam keadaan cecair sahaja pada sela masa t_1 dan t_2 .

- 28** Diagram 7 shows a graph of the volume of gas released against time for a reaction between calcium carbonate, CaCO_3 and hydrochloric acid, HCl .

Rajah 7 menunjukkan graf isi padu gas yang terbebas melawan masa bagi tindak balas antara kalsium karbonat, CaCO_3 dan asid hidroklorik, HCl .



What is the mass of calcium carbonate used in the reaction?

[Molar volume of gas = $24 \text{ dm}^3 \text{ mol}^{-1}$ at room conditions;

Relative atomic mass: C = 12, O = 16, Ca = 40]

Berapakah jisim kalsium karbonat yang digunakan dalam tindak balas itu?

[Isi padu molar gas = $24 \text{ dm}^3 \text{ mol}^{-1}$ pada keadaan bilik;

Jisim atom relatif: C = 12, O = 16, Ca = 40]

- A** 0.14 g
- B** 0.20 g
- C** 0.40 g
- D** 2.00 g

- 29** Which elements dissolve in water to produce solution that turns blue litmus paper to red and then decolourised ?

Unsur manakah yang larut dalam air untuk menghasilkan larutan yang menukarkan kertas litmus biru ke merah dan kemudian dinyahwarnakan ?

I Chlorine
Klorin

II Bromine
Bromin

III Sulphur
Sulfur

IV Oxygen
Oksigen

A I and II
I dan II

B I and III
I dan III

C II and IV
II dan IV

D III and IV
III dan IV

- 30** Compound Y has the following properties.
Sebatian Y mempunyai sifat-sifat berikut.

- Melting point 800 °C
Takat lebur pada 800 °C
- Soluble in water
Larut dalam air
- Conducts electricity in aqueous solution
Mengkonduksi arus elektrik dalam larutan akueus

What is Y?

Apakah Y?

- A** Glucose
Glukosa
- B** Naphthalene
Naftalena
- C** Lead(II) bromide
Plumbum(II) bromida
- D** Sodium chloride
Natrium klorida

31 Table 1 shows information about three chemical cell.

Jadual 1 menunjukkan maklumat tentang tiga sel kimia.

Chemical cell <i>Sel kimia</i>	Pair of metal electrodes <i>Pasangan elektrod logam</i>	Voltage/V <i>Voltan/V</i>	Negative terminal <i>Terminal negatif</i>
I	P,Q	0.15	Q
II	R,Q	1.55	R
III	R,S	2.45	R

Table 1

Jadual 1

What is the voltage of the pair of metal electrodes P and S?

Apakah nilai voltan bagi pasangan elektrod logam P dan S?

- A 0.75
- B 1.40
- C 1.70
- D 2.30

32

The pH value of 0.1 mol dm^{-3} hydrochloric acid, HCl is smaller than the pH value of 0.1 mol dm^{-3} ethanoic acid, CH_3COOH

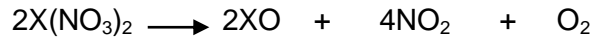
Nilai pH bagi 0.1 mol dm^{-3} asid hidroklorik, HCl adalah lebih kecil berbanding dengan nilai pH bagi 0.1 mol dm^{-3} asid etanoik, CH_3COOH

Which of the following explains the above statement?

Antara berikut, yang manakah menerangkan pernyataan di atas?

- A** Hydrochloric acid is a weak acid while ethanoic acid is a strong acid
Asid hidroklorik ialah asid lemah sementara asid etanoik ialah asid kuat
- B** Hydrochloric acid dissociates partially while ethanoic acid dissociates completely in water
Asid hidroklorik bercerai separa sementara asid etanoik bercerai sempurna di dalam air
- C** The number of hydrogen atom in hydrochloric acid is smaller than in ethanoic acid
Bilangan atom hidrogen di dalam asid hidroklorik lebih kecil berbanding di dalam asid etanoik
- D** The concentration of hydrogen ion in hydrochloric acid is higher than in ethanoic acid
Kepekatan ion hidrogen di dalam asid hidroklorik adalah lebih tinggi berbanding di dalam asid etanoik

- 33** The equation shows the decomposition of a nitrate salt of metal X
Persamaan menunjukkan penguraian garam nitrat bagi logam X



Calculate the volume of nitrogen dioxide, NO_2 gas at room condition if 18.8 g of $X(NO_3)_2$ salt is heated.

Hitung isipadu gas nitrogen dioksida, NO_2 pada keadaan bilik jika 18.8 g garam $X(NO_3)_2$ dipanaskan

[Relative atomic mass: X = 64 ; N = 14 ; O = 16. Molar volume = $24 \text{ dm}^3 \text{ mol}^{-1}$ at room conditions]

[Jisim atom relatif: X = 64 ; N = 14 ; O = 16. Isipadu molar = $24 \text{ dm}^3 \text{ mol}^{-1}$ pada suhu bilik]

- A** 0.6 dm^3
B 1.2 dm^3
C 4.8 dm^3
D 9.6 dm^3
- 34** The manufacturing of sulfuric acid involves several reactions.
Pembuatan asid sulfurik melibatkan beberapa tindak balas.

Which of the following equations represents the sulfuric acid reaction that uses a catalyst?

Antara persamaan berikut, yang manakah mewakili tindak balas asid sulfurik yang menggunakan mangkin?

- A** $S + O_2 \rightarrow SO_2$
B $2SO_2 + O_2 \rightarrow 2SO_3$
C $SO_3 + H_2SO_4 \rightarrow H_2S_2O_7$
D $H_2S_2O_7 + H_2O \rightarrow 2H_2SO_4$

35 The following statements are related to the collision theory of a reaction.

Pernyataan berikut adalah berkaitan dengan teori perlanggaran bagi satu tindak balas.

Which of the following combinations is true about the effect of the rise in temperature on the reactant particles?

Antara kombinasi berikut, yang manakah benar tentang kesan peningkatan suhu ke atas zarah bahan tindak balas ?

- I The total surface area of the reactant particles increase.
Jumlah luas permukaan zarah bahan tindak balas bertambah
 - II The kinetic energy of the reactant particles increases
Tenaga kinetik zarah bahan tindak balas bertambah
 - III The frequency of the collision between the reactant particles increases.
Frekuensi perlanggaran antara zarah bahan tindak balas bertambah.
 - IV The number of the reactant particles per one unit of volume increses.
Bilangan zarah bahan tindak balas dalam satu unit isipadu bertambah
- A** I and II
I dan II
- B** I and III
I dan III
- C** II and III
II dan III
- D** III and IV
III dan IV

- 36** Diagram 8 is a structural formulae of an organic compound.
Rajah 8 ialah formula struktur satu sebatian organik.

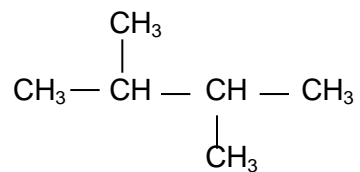


Diagram 8
Rajah 8

What is the name of the organic compound?
Apakah nama sebatian organik itu ?

- A** n-hexane
n-hexana
- B** 2,2 methyl butane
2,2 metil butana
- C** 2,3 dimethyl butane
2,3 dimetil butana
- D** 1,3 trimethyl propane
1,3 trimetil propana

- 37** Diagram 9 shows the chemical formula of a compound.
Rajah 9 menunjukkan formula kimia bagi satu sebatian.

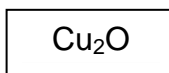


Diagram 9
Rajah 9

What is the IUPAC name and oxidation number of copper element in the compound?
Apakah nama IUPAC dan nombor pengoksidaan bagi unsur kuprum dalam sebatian itu?

	Name of compound <i>Nama sebatian</i>	Oxidation number of copper element <i>Nombor pengoksidaan unsur kuprum</i>
A	Copper(I) oxide <i>Kuprum(I) oksida</i>	+1
B	Copper(I) oxide <i>Kuprum(I) oksida</i>	+2
C	Copper(II) oxide <i>Kuprum(II) oksida</i>	+1
D	Copper(II) oxide <i>Kuprum(II) oksida</i>	+2

- 38** Diagram 10 is the energy level diagram for the decomposition of calcium carbonate.
Rajah 10 adalah gambar rajah aras tenaga bagi penguraian kalsium karbonat.

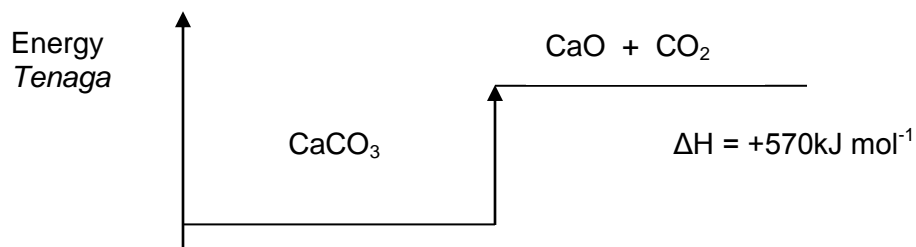


Diagram 10
Rajah 10

Which statement can be deduced from the Diagram 10?

Pernyataan manakah yang boleh dirumuskan daripada Rajah 10 ?

- A** Heat is absorbed in the reaction
Haba diserap dalam tindak balas tersebut
- B** The reaction is exothermic
Tindak balas tersebut adalah eksotermik
- C** Total energy of the reactant and the products is 570 kJ
Jumlah tenaga bagi bahan tindak balas dan hasil tindak balas adalah 570 kJ
- D** The reactant has more energy than the products
Bahan tindak balas mempunyai lebih tenaga daripada hasil tindak balas

- 39 A baker would like to make his cake last longer and free from fungus. Which of the following should be added to his cake?

Seorang pembuat kek ingin membuat keknya tahan lebih lama dan bebas daripada kulat. Antara berikut, yang manakah patut ditambahkan ke dalam keknya?

- A Antioxidants
Pengantioksida
- B Colouring
Pewarna
- C Preservative
Pengawet
- D Emulsifier
Pengemulsi
- 40 Diagram 11 shows the electron arrangements of atoms X and Y
Rajah 11 menunjukkan susunan elektron bagi atom X dan Y

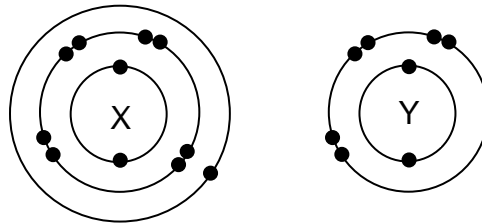


Diagram 11
Rajah 11

Which of the following is true when X react with Y?

Antara berikut, yang manakah benar apabila X bertindak balas dengan Y?

- A Atom X receives electrons
Atom X menerima elektron
- B Atom Y receives electrons
Atom Y menerima elektron
- C The compound formed has a formula of XY_2
Sebatian terbentuk mempunyai formula XY_2
- D The compound formed is made up of molecules
Sebatian terbentuk terdiri daripada molekul

- 41 Diagram 12 shows the apparatus set up for the electrolysis of copper(II) sulphate solution using copper electrode.

Rajah 12 menunjukkan susunan radas bagi elektrolisis larutan kuprum(II) sulfat menggunakan elektrod kuprum.

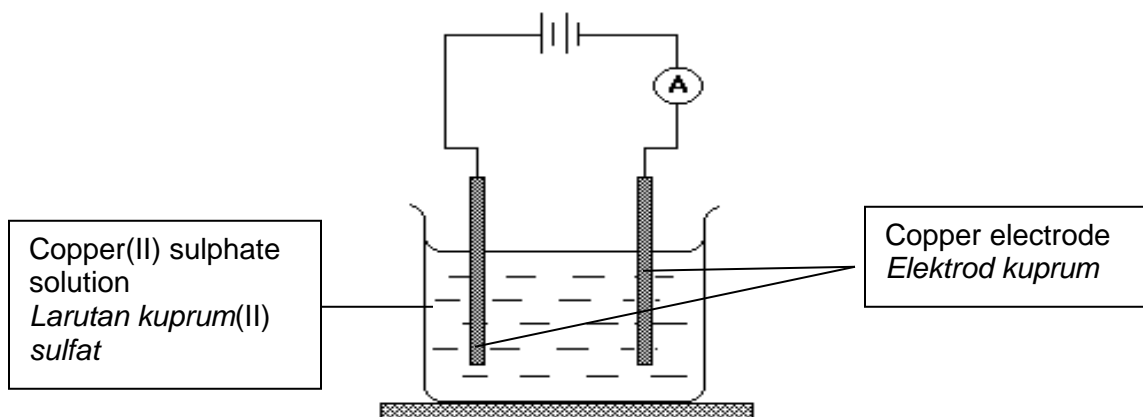


Diagram 12
Rajah 12

Which of the following is observed when the current is passed on for 10 minutes?
Antara berikut manakah yang diperhatikan apabila arus dialirkan selama 10 minit?

- A Brown deposit at electrode anode
Enapan perang pada elektrod anod
- B Electrode anode become smaller
Elektrod anod semakin kecil
- C Bubbles of gas evolve at anode
Gelembung gas terbebas di anod
- D The intensity of blue colour is decreasing
Keamatan warna biru berkurang

- 42** Diagram 13 shows the set-up of apparatus for the titration of sodium hydroxide solution with sulphuric acid.

Rajah 13 menunjukkan susunan radas bagi titratan larutan natrium hidroksida dengan asid sulfurik

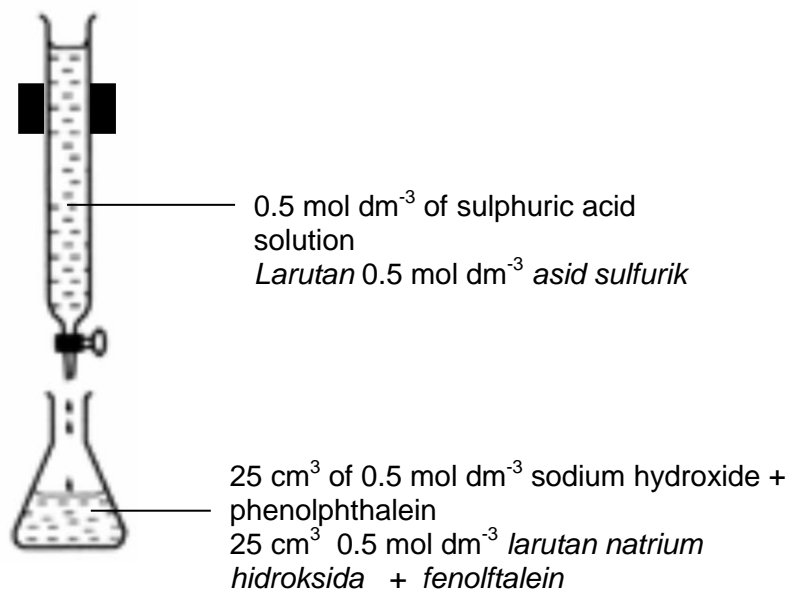


Diagram 13

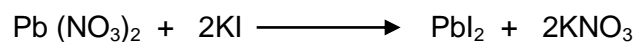
Rajah 13

What is the volume of 0.5 mol dm⁻³ of sulphuric acid solution required to completely neutralize 25 cm³ of 0.5 mol dm⁻³ sodium hydroxide solution?

Berapakah isi padu 0.5 mol dm⁻³ asid sulfurik diperlukan untuk meneutralkan lengkap 25 cm³ 0.5 mol dm⁻³ larutan natrium hidroksida?

- A** 12.50 cm³
- B** 25.00 cm³
- C** 50.00 cm³
- D** 75.50 cm³

- 43** The following chemical equation shows the reaction of preparation lead(II) iodide salt.
Persamaan kimia berikut menunjukkan tindak balas penyediaan garam plumbum(II) iodida.



What is the volume of potassium iodide 0.5 mol dm^{-3} solution needed to produce 4.61 g lead(II) iodide salt?

Berapakah isipadu larutan kalium iodida 0.5 mol dm^{-3} yang diperlukan untuk menghasilkan 4.61 g garam plumbum(II) iodida?

[Relative atomic mass of Pb= 207, I= 127]

Jisim atom relatif P= 207, I= 127

- A** 20 cm^3
- B** 40 cm^3
- C** 400 cm^3
- D** 1440 cm^3

- 44 Three experiments were conducted by a group of students to investigate the reaction between excess zinc and the acids as shown in the table below.

Tiga eksperimen telah dilakukan oleh sekumpulan pelajar untuk menyiasat tindak balas di antara zink yang berlebihan dengan asid-asid seperti yang ditunjukkan dalam jadual.

Experiment <i>Eksperimen</i>	Hydrochloric acid <i>Asid hidroklorik</i>
I	25 cm ³ hydrochloric acid 2.0 mol dm ⁻³ 25 cm ³ <i>asid hidroklorik</i> 2.0 mol dm ⁻³
II	50 cm ³ hydrochloric acid 1.5 mol dm ⁻³ 50 cm ³ <i>asid hidroklorik</i> 1.5 mol dm ⁻³
III	15 cm ³ sulphuric acid 1.5 mol dm ⁻³ 15 cm ³ <i>asid sulfurik</i> 1.5 mol dm ⁻³

Diagram 14 shows the graph of volume carbon dioxide gas against time for the above experiments

Rajah 14 menunjukkan graf isi padu gas karbon dioksida melawan masa bagi eksperimen di atas.

Volume of carbon dioxide gas /cm³
Isipadu gas karbon dioksida /cm³

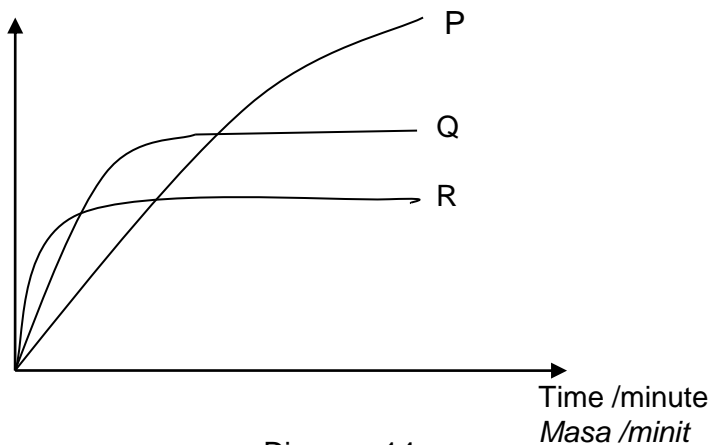


Diagram 14
Rajah 14

Which of the following represents the results of the experiments correctly?

Manakah di antara berikut mewakili keputusan-keputusan eksperimen dengan betul?

	I	II	III
A	P	Q	R
B	Q	P	R
C	P	R	Q
D	R	Q	P

- 45 Diagram 15 shows the process of producing compound Y
Rajah 15 menunjukkan proses penghasilan sebatian Y.

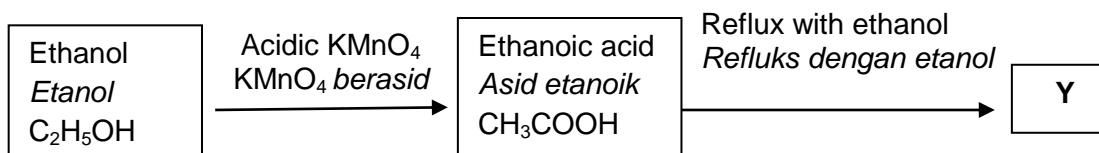


Diagram 15
Rajah 15

Which of the following is the structural formula of compound Y?
Antara berikut yang manakah formula struktur bagi sebatian Y?

- A
$$\text{CH}_3 - \overset{\text{O}}{\parallel}{\text{C}} - \text{O} - \text{CH}_3$$
- B
$$\text{CH}_3 - \overset{\text{O}}{\parallel}{\text{C}} - \text{O} - \text{CH}_2 - \text{CH}_3$$
- C
$$\text{CH}_3 - \overset{\text{O}}{\parallel}{\text{C}} - \text{O} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$$
- D
$$\text{CH}_3 - \text{CH}_2 - \overset{\text{O}}{\parallel}{\text{C}} - \text{O} - \text{CH}_2 - \text{CH}_3$$

- 46 Diagram 16 is a molecular formula which represents an organic compound.
Rajah 16 ialah formula molekul yang mewakili satu sebatian organik.

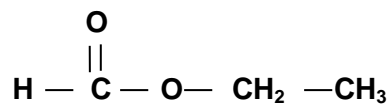


Diagram 16
Rajah 16

What is the name of the organic compound ?
Apakah nama sebatian organik itu ?

- A Ethyl ethanoate
Etil etanoat
- B Ethyl methanoate
Etil metanoat
- C Methyl ethanoate
Metil etanoat
- D Methyl methanoate
Metil metanoat

- 47 Diagram 17 shows the apparatus set-up to study the transfer reaction of electron at a distance.

Rajah 17 menunjukkan susunan radas untuk mengkaji tindak balas pemindahan elektron pada suatu jarak.

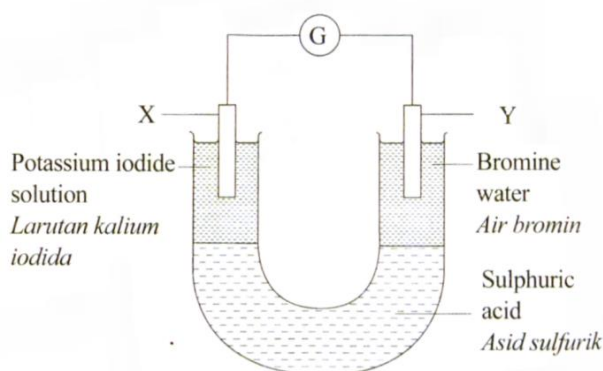


Diagram 17

Rajah 17

Which of the following occur at X and Y?

Antara yang berikut, yang manakah berlaku di X dan Y?

	X	Y
A	Oxidation number of iodine changes from 0 to +2 <i>Nombor pengoksidaan iodin berubah dari 0 ke +2</i>	Oxidation number of bromine changes from -1 to 0 <i>Nombor pengoksidaan bromin berubah dari -1 ke 0</i>
B	Brown solution turns colourless <i>Larutan perang menjadi tidak berwarna</i>	No change in colour <i>Tiada perubahan warna</i>
C	Iodide ion is oxidised <i>Ion iodida dioksidakan</i>	Bromine is reduced <i>Bromin diturunkan</i>
D	Mass of X increases <i>Jisim X bertambah</i>	Mass of Y decreases <i>Jisim Y berkurang</i>

48 Diagram 18 shows a chemical cell. The electrons move from electrode L to electrode M through the circuit.

Rajah 18 menunjukkan satu sel kimia. Elektron bergerak dari elektrod L ke elektrod M melalui litar.

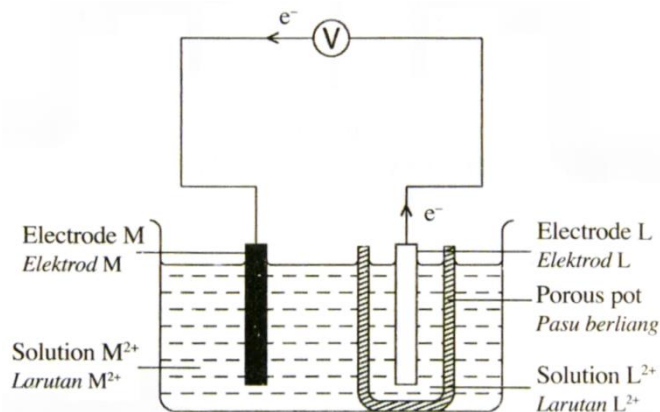


Diagram 18

Rajah 18

Which statement is correct about the reaction in the chemical cell?

Penyataan manakah yang betul tentang tindak balas dalam sel kimia itu?

- A** Ion M^{2+} is oxidised
Ion M^{2+} dioksidakan
- B** L is more electropositive than M
L lebih elektropositif daripada M
- C** Reduction occurs at electrode L
Penurunan berlaku di elektrod L
- D** L is zinc and M is magnesium
L ialah zink dan M ialah magnesium

- 49 Diagram 19 shows an energy level for the reaction $P + Q \rightarrow S$.
Rajah 19 menunjukkan aras tenaga untuk tindak balas $P + Q \rightarrow S$

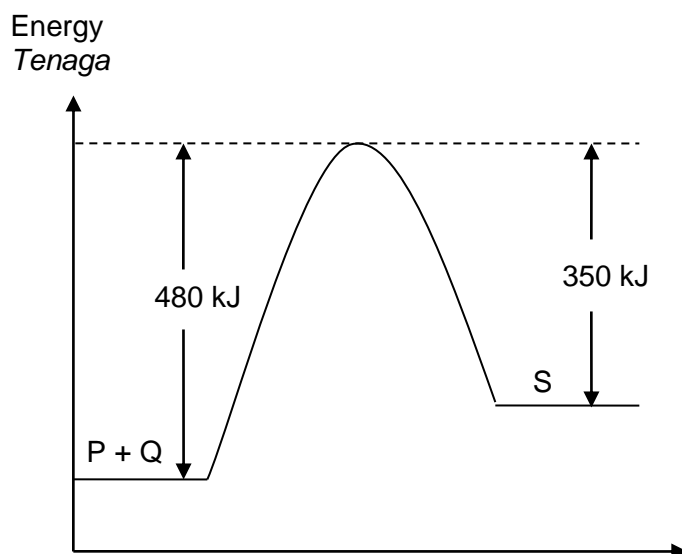


Diagram 19
Rajah 19

What is the activation energy for this reaction?

Apakah tenaga pengaktifan untuk tindak balas in?

- A 480 kJ mol⁻¹
- B 350 kJ mol⁻¹
- C 130 kJ mol⁻¹
- D 830 kJ mol⁻¹

- 50** The heat of combustion of ethanol is 1371 kJ mol^{-1} . The chemical reaction is given in the equation below.

Haba pembakaran etanol adalah 1371 kJ mol^{-1} . Tindak balas kimia ditunjukkan seperti persamaan di bawah.



If 6.9 g of ethanol is burnt in excess oxygen, how much is the heat released?

Jika 6.9 g etanol terbakar dalam oksigen berlebihan, berapakah tenaga haba yang dibebaskan?

[Relative atomic mass : C = 12; H = 1, O = 16]

[*Jisim atom relatif* : C = 12; H = 1, O = 16]

- A 9459.9 kJ
- B 205.65 kJ
- C 198.69 kJ
- D 0.15 kJ

Section A
Bahagian A

[60 marks]

[60 markah]

Answer **all** questions in this section.
Jawab **semua** soalan dalam bahagian ini.
<https://cikguadura.wordpress.com/>

- 1 Diagram 1 show stages of chemical reactions that involved in the Process Y in producing of sulphuric acid.
Rajah 1 menunjukkan peringkat-peringkat tindakbalas kimia yang terlibat dalam Proses Y bagi penghasilan asid sulfurik.

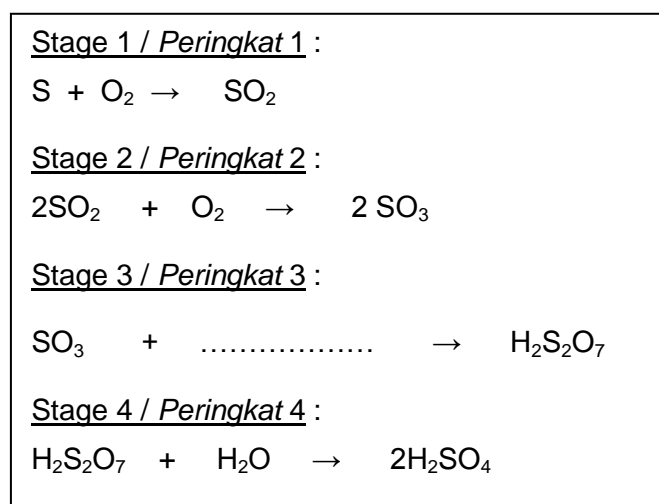


Diagram 1 / Rajah 1

- (a) (i) State the name of process Y
Nyatakan nama bagi proses Y.
-
[1 mark]
- (ii) Complete the chemical equation for Stage 3 in the Diagram 1.
Lengkapkan persamaan kimia untuk Peringkat 3 dalam Rajah 1.
-
[1 mark]
- (b) (i) State one substance from Process Y that gives the effect to environment.
Nyatakan satu bahan daripada Proses Y yang memberi kesan kepada alam sekitar.
-
[1 mark]

- (ii) Explain how the substance that you have stated in question (b) (i) can pollute the environment.
Terangkan bagaimana bahan yang anda nyatakan dalam soalan b(i) boleh mencemarkan alam sekitar.

.....

[2 marks]

- (c) Fertilizer ammonium sulphate, $(\text{NH}_4)_2\text{SO}_4$ can be produced from sulphuric acid.
Baja ammonium sulfat, $(\text{NH}_4)_2\text{SO}_4$ boleh dihasilkan daripada asid sulfurik.

- (i) State the chemical formula of substance that added to sulphuric acid to produced ammonium sulphate.
Nyatakan formula kimia bahan yang ditambah kepada asid sulfurik untuk menghasilkan ammonium sulfat.

.....

[1 mark]

- (ii) Urea, $(\text{NH}_2)_2\text{CO}$ and ammonium sulphate, $(\text{NH}_4)_2\text{SO}_4$ are two types of fertilizer. Calculate the percentage of nitrogen by mass in both fertilizers. Then, which substance is a better fertilizer for the growth of plants.
 [Relative atomic mass : H=1 ; C=12 ; N=14 ; O=16 ; S=32]

Urea, $(\text{NH}_2)_2\text{CO}$ dan ammonium sulfat, $(\text{NH}_4)_2\text{SO}_4$ merupakan dua jenis baja. Hitungkan peratus nitrogen terhadap jisim bagi kedua-dua baja tersebut. Seterusnya, tentukan baja yang lebih baik bagi pertumbuhan tumbuhan.

[Jisim atom relatif : H=1 ; C=12 ; N=14 ; O=16 ; S=32]

% nitrogen by mass of urea
 % nitrogen terhadap jisim bagi urea

% nitrogen by mass of ammonium sulphate
 % nitrogen terhadap jisim bagi ammonium sulfat

Better fertilizer :

Baja terbaik :

[3 marks]

- 2 Diagram 2 shows the position of five elements; C, D, E, F, and G in the Periodic Table. These letters are not the actual symbols of the elements.

Rajah 2 menunjukkan kedudukan lima unsur; C, D, E, F, dan G dalam Jadual Berkala. Huruf-huruf yang digunakan bukan simbol sebenar unsur-unsur tersebut.

	1															18
1		2														
2																
3	A	B													C	
4							D								E	
5																

Diagram 2 / Rajah 2

Base on Diagram 2, answer the following questions :

Berdasarkan Rajah 2, jawab soalan-soalan berikut :

- (a) What is the basic principle used in arranging the elements in Periodic Table of Elements?

Apakah prinsip asas yang digunakan dalam penyusunan unsur-unsur dalam Jadual Berkala Unsur?

.....
[1 mark]

- (b) State **two** elements that are placed in the same group.

*Nyatakan **dua** unsur yang terletak dalam kumpulan yang sama.*

.....
[1 mark]

- (c) State the position of element **B** and give a reason.

*Nyatakan kedudukan unsur **B** dan berikan alasan.*

.....
.....
.....
[2 marks]

- (d) Compare the reactivity between element **C** and **E**. Explain your answer.

*Bandingkan kereaktifan antara unsur **C** dan **E**. Jelaskan jawapan anda.*

.....
.....
.....
[3 marks]

- (e) Arrange the atomic size of **A, B, C, D** and **E** in descending order.
Susun saiz atom-atom A, B, C, D dan E mengikut tertib susunan menurun.

.....
[1 mark]

- (f) Nickel is well known as a useful catalyst for hydrogenation reaction in manufacture of margarine. State the element with similar properties with nickel.
Nikel terkenal sebagai mangkin dalam tindak balas penghidrogenan dalam pembuatan marjerin. Nyatakan unsur yang mempunyai sifat yang sama dengan nikel.

.....
[1 mark]

- 3 Diagram 3 shows the structural formula of compound X.
Rajah 3 menunjukkan formula struktur bagi sebatian X.

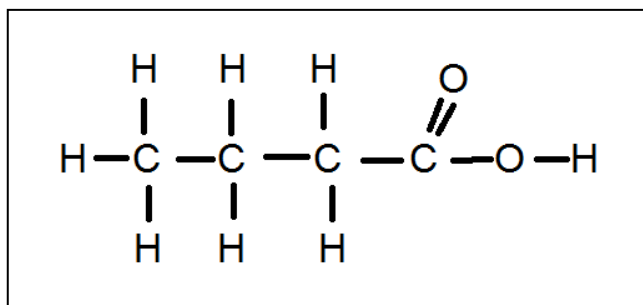


Diagram 3 / Rajah 3

- (a) State the name of the element represented by the symbol C in Diagram 3.
Nyatakan nama bagi unsur yang diwakili dengan simbol C dalam Rajah 3.

.....
[1 mark]

- (b) State the meaning of empirical formula.
Nyatakan maksud bagi formula empirik.

.....
[1 mark]

- (c) (i) Write the molecular formula and the empirical formula of compound X.
Tuliskan formula molekul dan formula empirik bagi sebatian X.

Molecular formula :

Formula molekul :

Empirical formula :

Formula empirik :

[2 marks]

- (ii) State one similarity and one difference between the molecular formula and the empirical formula in (c) (i).
Nyatakan satu persamaan dan satu perbezaan antara formula molekul dan formula empirik dalam (c) (i).

.....
[2 marks]

- (d) (i) Write the chemical equation for the reaction between compound X and magnesium.
Tulis persamaan kimia bagi tindak balas antara sebatian X dengan magnesium.

.....
[2 marks]

- (ii) Calculate the mass of magnesium reacts with 1 mol of compound X.
[Relative atomic mass of Mg = 24]
Hitung jisim magnesium yang bertindak balas lengkap dengan 1 mol sebatian X.
[Jisim atom relatif Mg = 24]

[2 marks]

- 4 A student carried out two experiments to investigate the factor that affects the rate of reaction. Table 4 shows the results of the experiments.

Seorang pelajar telah menjalankan dua eksperimen untuk menyasat faktor-faktor yang mempengaruhi kadar sesuatu tindak balas. Jadual 4 menunjukkan keputusan bagi eksperimen- eksperimen tersebut.

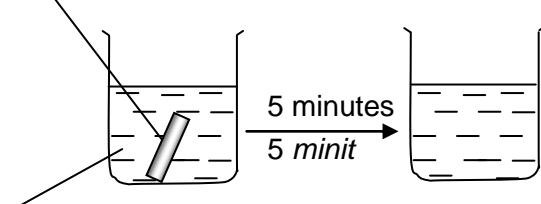
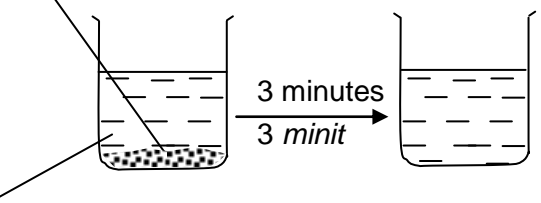
Experiment <i>Eksperimen</i>	Diagram <i>Rajah</i>	Volume of gas collected when magnesium reacted completely /cm ³ <i>Isipadu gas yang dikumpul apabila magnesium lengkap bertindak balas /cm³</i>
I	<p><i>m g of magnesium ribbon</i> <i>m g pita magnesium</i></p>  <p>0.5 mol dm⁻³ hydrochloric acid in excess <i>asid hidroklorik 0.5 mol dm⁻³ berlebihan</i></p>	50
II	<p><i>m g of magnesium powder</i> <i>m g serbuk magnesium</i></p>  <p>0.5 mol dm⁻³ hydrochloric acid in excess <i>asid hidroklorik 0.5 mol dm⁻³ berlebihan</i></p>	50

Table 4 / *Jadual 4*

- (a) From this experiment, state the meaning of rate of reaction.
Daripada eksperimen ini, nyatakan maksud kadar tindak balas.

.....
.....

[1 mark]

- (b) Write a chemical equation for the reaction between magnesium and hydrochloric acid.

Tuliskan persamaan kimia bagi tindak balas antara magnesium dengan asid hidroklorik.

.....
[2 marks]

- (c) State the factor that affects the rate of reaction in this experiment.
Nyatakan faktor yang mempengaruhi kadar tindak balas dalam eksperimen ini :

.....
[1 mark]

- (d) (i) From the information in Table 4, calculate the average rate of reaction for Experiment I and Experiment II.

Daripada maklumat dalam Jadual 4 hitungkan kadar tindak balas purata untuk Eksperimen I dan Eksperimen II.

[2 marks]

- (ii) Rate of reaction in Experiment II is higher than Experiment I. By referring to the Collision Theory, explain why there are differences in the rate of reaction in both experiments.
Kadar tindak balas dalam Eksperimen II lebih tinggi daripada Eksperimen I. Dengan merujuk kepada Teori Perlanggaran, terangkan mengapa terdapat perbezaan dalam kadar tindak balas bagi kedua-dua eksperimen itu.

.....
.....
.....
.....
[3 marks]

- (e) Give **one** reason why the final volume of gas obtained in all experiments are the same.

*Beri **satu** sebab mengapa isipadu akhir gas yang diperolehi dalam semua eksperimen adalah sama.*

.....
[1 mark]

- 5 Table 5 shows the information about four solutions; P, Q, R and S. P, Q, R and S may be acid or alkali.
Jadual 5 menunjukkan maklumat tentang empat larutan P, Q, R dan S. Larutan P, Q, R dan S mungkin asid atau alkali.

Solution Larutan	Information Maklumat	pH value Nilai pH
P	Ionised completely in water <i>Mengion lengkap dalam air</i>	2
Q	Ionised partially in water <i>Mengion separa lengkap dalam air</i>	6
R	Ionised completely in water <i>Mengion lengkap dalam air</i>	13
S	Ionised partially in water <i>Mengion separa lengkap dalam air</i>	8

Table 5 / *Jadual 5*

- (a) State the meaning of alkali.
Nyatakan maksud alkali.

.....

 [1 mark]

- (b) Based on Table 5, state the
Berdasarkan Jadual 5, nyatakan

- (i) strong alkali / *alkali kuat* :
- (ii) weak acid / *asid lemah* :
 [2 marks]

- (c) Diagram 5.1 shows a bottle of powder malic acid.
Rajah 5.1 menunjukkan sebotol serbuk asid malik.



Diagram 5.1 / *Rajah 5.1*

Malic acid is a weak acid which is found naturally in green apples and in a wide variety of unripe fruits.

Asid malik merupakan suatu asid lemah yang wujud secara semula jadi dalam epal hijau dan juga dalam pelbagai jenis buah-buahan yang belum masak.

Describe a chemical test to prove that the malic acid is an acid.

Huraikan satu ujian kimia untuk membuktikan bahawa asid malik merupakan suatu asid.

.....

.....

.....

[3 marks]

- (d) Diagram 5.2 shows a volumetric flask containing 500 cm³ of 2.0 mol dm⁻³ sodium hydroxide solution. This solution is known as a standard solution.
Rajah 5.2 menunjukkan sebuah kelalang volumetrik yang mengandungi 500 cm³ larutan natrium hidroksida 2.0 mol dm⁻³. Larutan ini dikenali sebagai larutan piawai.

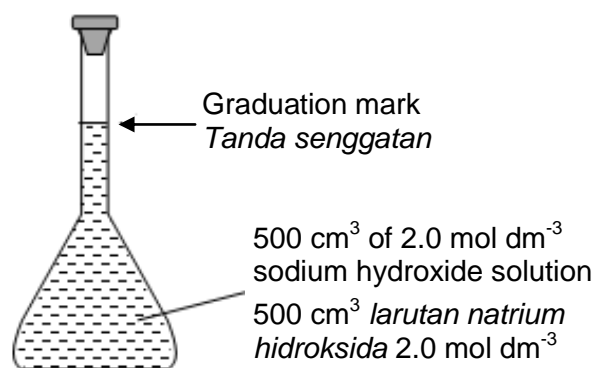


Diagram 5.2 / *Rajah 5.2*

- (i) To prepare the standard solution in Diagram 5.2, a student added x g of solid sodium hydroxide into a 500 cm^3 volumetric flask. Then, distilled water is added until graduation mark is reached.
Untuk menyediakan larutan piawai seperti dalam Rajah 5.2, seorang pelajar telah menambahkan x g pepejal natrium hidroksida ke dalam sebuah kelalang volumetrik 500 cm^3 . Kemudian, air suling ditambahkan sehingga mencapai tanda senggatan.

Calculate the value of x .

Hitungkan nilai x .

[Molar mass of sodium hydroxide, $\text{NaOH} = 40$]

[*Jisim molar bagi natrium hidroksida, $\text{NaOH} = 40$*]

[2 marks]

- (ii) The standard solution in Diagram 5.2 is used to determine the concentration of a sample of sulphuric acid by titration method. Diagram 5.3 shows the apparatus set-up used.
Larutan piawai dalam Rajah 5.2 digunakan untuk menentukan kepekatan satu contoh asid sulfurik menggunakan kaedah pentitratan. Rajah 5.3 menunjukkan susunan alat radas yang digunakan.

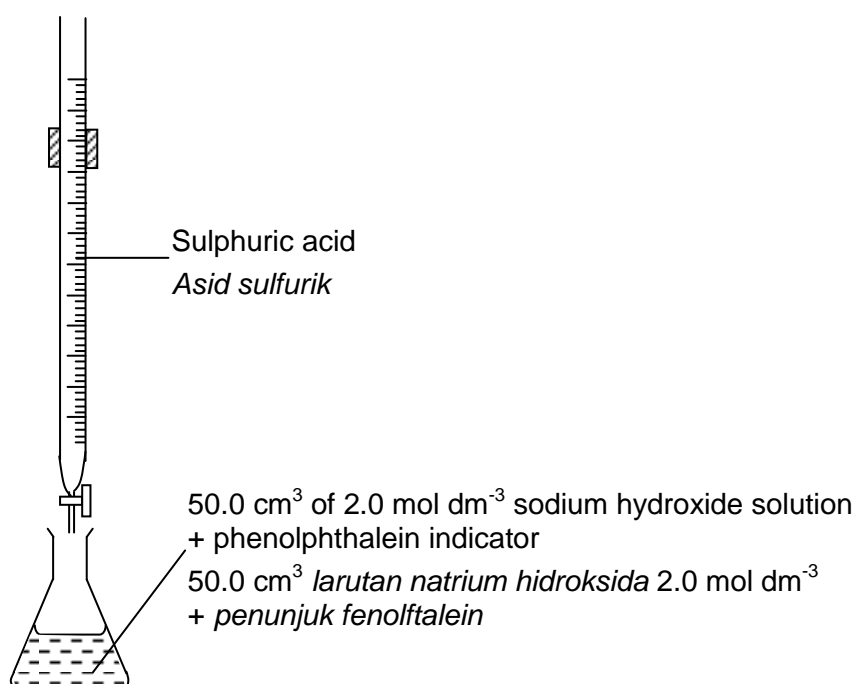


Diagram 5.3 / *Rajah 5.3*

Complete neutralisation of 50.0 cm^3 of 2.0 mol dm^{-3} sodium hydroxide solution required 25.0 cm^3 of the sulphuric acid.

Peneutralan lengkap 50.0 cm^3 larutan natrium hidroksida 2.0 mol dm^{-3} memerlukan 25.0 cm^3 asid sulfurik.

Calculate the concentration of the sulphuric acid in mol dm^{-3} .

Hitungkan kepekatan asid sulfurik tersebut dalam mol dm^{-3} .

[3 marks]

- 6 (a) Table 6.1 shows the set-up of apparatus and observation for two experiments, I and II.
Jadual 6.1 menunjukkan susunan radas dan pemerhatian bagi dua eksperimen, I dan II.

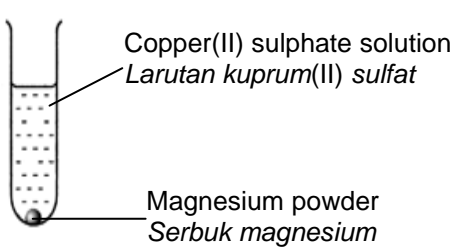
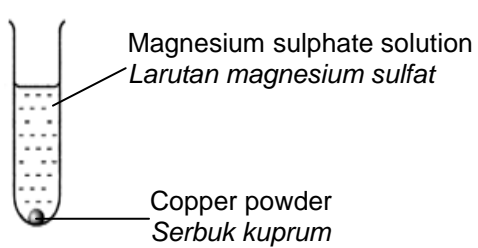
Experiment <i>Eksperimen</i>	I	II
Test tube <i>Tabung uji</i>	 <p>Copper(II) sulphate solution <i>Larutan kuprum(II) sulfat</i></p> <p>Magnesium powder <i>Serbuk magnesium</i></p>	 <p>Magnesium sulphate solution <i>Larutan magnesium sulfat</i></p> <p>Copper powder <i>Serbuk kuprum</i></p>
Observation <i>Pemerhatian</i>	Brown solid formed. Blue solution becomes paler. <i>Pepejal perang terbentuk.</i> <i>Larutan biru menjadi pucat.</i>	No change. <i>Tiada perubahan.</i>

Table 6.1 / *Jadual 6.1*

Based on Table 6.1,
Berdasarkan Jadual 6.1,

- (i) State the name of the brown solid formed.
Nyatakan nama bagi pepejal perang yang terbentuk.
-
 [1 mark]
- (ii) Give a reason for the observation on the solution in Experiment I.
Berikan satu sebab bagi pemerhatian ke atas larutan dalam Eksperimen I.
-
 [1 mark]
- (iii) The reaction is a redox reaction. Explain in term of change in oxidation number.
Tindak balas itu ialah suatu tindak balas redoks. Terangkan dari segi perubahan nombor pengoksidaan.
-

 [2 marks]

- (iv) Write the chemical equation for the reaction occurred.
Tuliskan persamaan kimia bagi tindak balas yang berlaku.

.....
[1 mark]

- (v) Explain the observation in Experiment II
Terangkan pemerhatian dalam Eksperimen II.

.....
.....
[2 marks]

- (b) Iron is a metal that rusts easily.
Besi adalah sejenis logam yang mudah berkarat.

- (i) State the conditions for the rusting of iron
Nyatakan syarat-syarat untuk pengamatan besi.

.....
[1 mark]

- (ii) Draw a labelled diagram to show how the conditions for the rusting of iron involve the ionization of iron and the flow of electron.
Lukis satu gambar rajah berlabel untuk menunjukkan bagaimana syarat untuk pengamatan melibatkan pengionan besi dan pengaliran elektron.

[3 marks]

Section B
Bahagian B

[20 marks]

[20 markah]

Answer any **one** question from this section.
Jawab mana-mana **satu** soalan daripada bahagian ini.
<https://cikguadura.wordpress.com/>

- 7 Diagram 7.1 shows the set-up of the apparatus to study the electrolysis of sodium chloride solution using carbon electrodes.

Rajah 7.1 menunjukkan susunan radas untuk mengkaji elektrolisis larutan natrium klorida menggunakan elektrod-elektrod karbon.

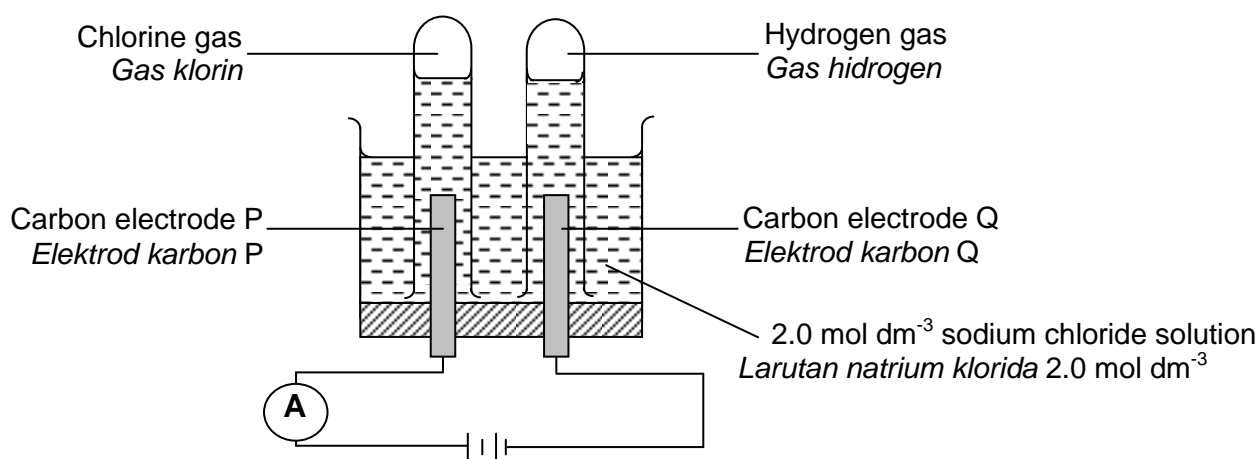


Diagram 7.1 / Rajah 7.1

- (a) Based on Diagram 7.1, state the factors that determine the products formed at electrode P and electrode Q.
Berdasarkan Rajah 7.1, nyatakan faktor yang menentukan hasil yang terbentuk pada elektrod P dan elektrod Q.

[2 marks]

- (b) Explain the reaction at electrodes; P and Q. Include the following in your explanation :
Terangkan tindak balas pada elektrod, P dan Q. Sertakan perkara berikut dalam penerangan :

- List of ions attracted to each of electrodes, P and Q
Senarai ion-ion yang tertarik ke setiap elektrod, P dan Q
- Names of the ions selectively discharged at each electrode
Nama ion-ion yang dipilih untuk dinyahcas di setiap elektrod
- The reason why the ions are selectively discharged
Sebab ion-ion dipilih untuk dinyahcas
- Observation for each electrodes
Pemerhatian bagi setiap elektrod

[8 marks]

- (c) Diagram 7.2 shows two types of cell.
Rajah 7.2 menunjukkan dua jenis sel.

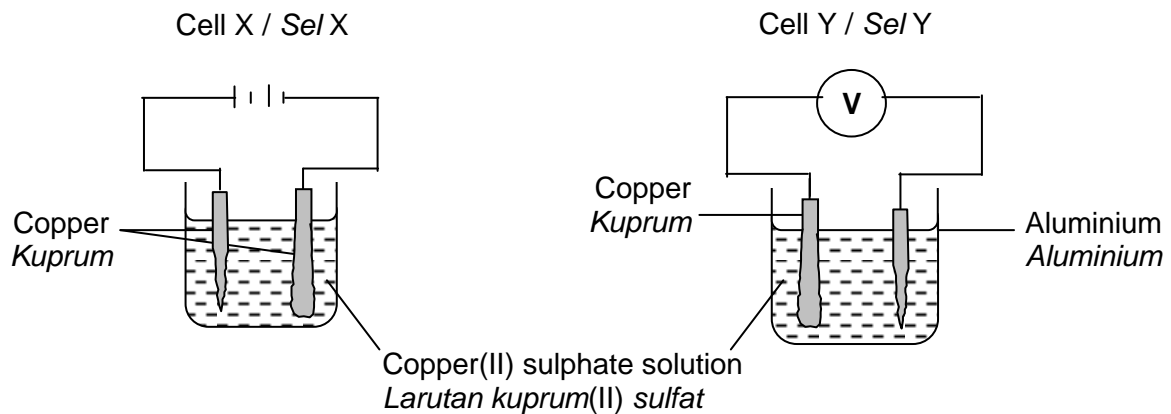


Diagram 7.2 / Rajah 7.2

Compare and contrast cell X and cell Y in term of :
Banding dan beza sel X dan sel Y dari segi :

- Type of cell
Jenis sel
- The energy change
Perubahan tenaga
- The terminals of the cells
Terminal bagi kedua-dua sel
- Ions presence in the electrolyte
Ion-ion yang hadir dalam elektrolit
- Observation
Pemerhatian
- Half equation for both electrodes
Setengah persamaan bagi kedua-dua elektrod
- Name of the processes occurred at the positive terminal of each cell
Nama proses yang berlaku pada terminal positif kedua-dua sel

[10 marks]

- 8 (a) An experiment is carried out to determine the heat of displacement of copper by zinc.

Diagram 8.1 shows the energy level for reaction between zinc and copper(II) sulphate solution.

Satu eksperimen dijalankan untuk menentukan haba penyesaran kuprum oleh zink.

Rajah 8.1 menunjukkan aras tenaga bagi tindak balas antara zink dan larutan kuprum(II) sulfat.

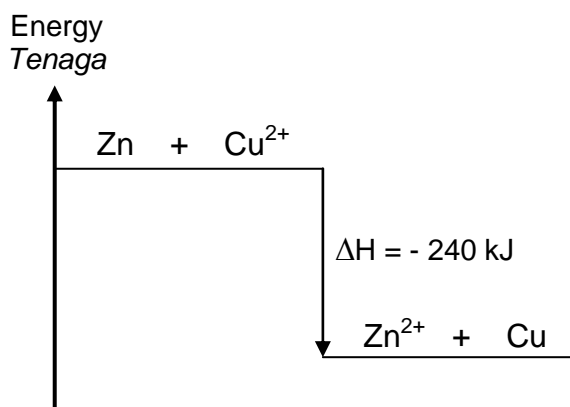


Diagram 8 / Rajah 8

- (i) State **two** observations in the experiment.
*Nyatakan **dua** pemerhatian dalam eksperimen itu.* [2 marks]
- (ii) Write **two** statements that can be concluded from Diagram 8.1.
*Tulis **dua** pernyataan yang boleh dirumus daripada Rajah 8.1.* [2 marks]
- (iii) In another reaction; excessive magnesium is added to 200 cm³ of 0.2 mol dm⁻³ copper(II) sulphate solution. The temperature of the mixture increased by 15.5 °C. Write the chemical equation involves and calculate the heat of displacement of copper by magnesium.
Dalam satu tindak balas lain; magnesium berlebihan ditambah kepada 200 cm³ larutan kuprum(II) sulfat 0.2 mol dm⁻³. suhu campuran telah meningkat sebanyak 15.5 °C. Tulis persamaan kimia yang berlaku dan hitung haba penyesaran kuprum oleh magnesium. [7 marks]

- (b) (i) Table 8.2 shows the heat released when 1 mol of three different acids; P, Q and R reacted with sodium hydroxide solution.

Jadual 8.2 menunjukkan haba yang dibebaskan apabila 1 mol tiga asid yang berlainan; P, Q dan R bertindak balas dengan larutan natrium hidroksida.

Experiment Eksperimen	Reaction Tindak balas	Heat of neutralisation Haba peneutralan (kJ mol⁻¹)
I	Acid P and sodium hydroxide solution <i>Asid P dan larutan natrium hidroksida</i>	- 57
II	Acid Q and sodium hydroxide solution <i>Asid Q dan larutan natrium hidroksida</i>	- 54
III	Sulphuric acid and alkali R <i>Asid sulfurik dan alkali R</i>	- 52

Table 8.2 / *Jadual 8.2*

Based on Table 8.2, suggest one example acid P, Q and alkali R. Explain why there is a difference in the value of the heat release in Experiment I and II.

Berdasarkan Jadual 8.2, cadangkan satu contoh bagi asid P, Q dan alkali R. Jelaskan mengapa terdapat perbezaan nilai haba yang dibebaskan dalam Eksperimen I dan II.

[7 marks]

- (ii) The following thermochemical equation represents the reaction between sulphuric acid and sodium hydroxide solution;



Heat of neutralisation for the reaction is - 57 kJ mol⁻¹ but not - 114 kJ mol⁻¹. Explain why.

Persamaan termokimia berikut mewakili tindak balas antara asid sulfurik dengan natrium hidroksida:



Haba tindak balas peneutralan bagi tindak balas di atas adalah - 57 kJ mol⁻¹ dan bukannya - 114 kJ mol⁻¹. Terangkan.

[2 marks]

Section C
Bahagian C

[20 marks]

[20 markah]

Answer any **one** question from this section.
Jawab mana-mana satu soalan daripada bahagian ini.
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- 9 (a) Diagram 9.1 shows a structural formula of butene.
Rajah 9.1 menunjukkan formula struktur bagi butena.

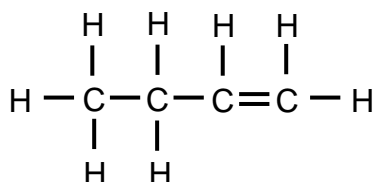


Diagram 9.1 / Rajah 9.1

Draw structural formulae for another two isomers of butene and name each isomer according to the IUPAC nomenclature.

Lukiskan formula struktur bagi dua lagi isomer bagi butena dan nama setiap isomernya mengikut penamaan IUPAC.

[4 marks]

- (b) Diagram 9.2 shows the conversions of several organic compounds.
Rajah 9.2 menunjukkan penukaran bagi beberapa sebatian organik.

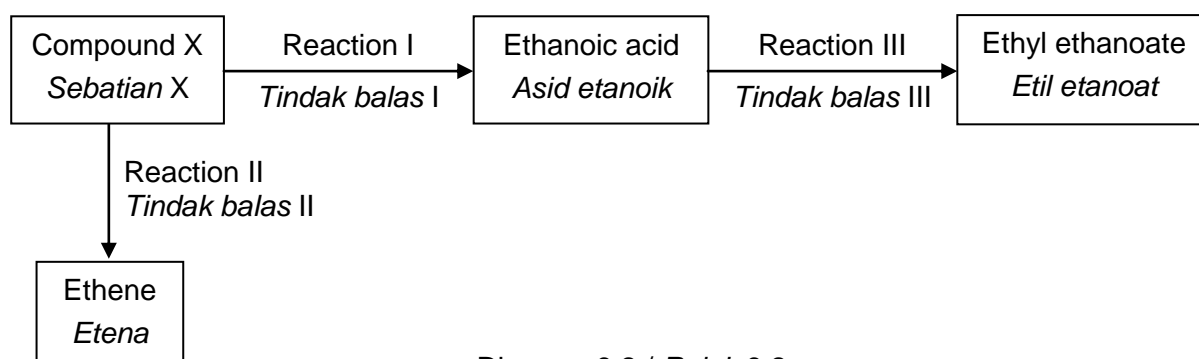


Diagram 9.2 / Rajah 9.2

- (i) State the name of the Reaction I, Reaction II and Reaction III.
What is compound X? State the homologous series and molecular formula of compound X.
*Nyatakan nama bagi Tindak balas I, Tindak balas II dan Tindak balas III.
Apakah sebatian X? Nyatakan siri homolog dan formula molekul sebatian X.*

[6 marks]

- (ii) Describe an experiment to prepare ethyl ethanoate in laboratory through Reaction III. In your description, include the chemical equation for the reaction.

Draw an apparatus set-up for reaction II. Describe a chemical test to verify that the gas collected is ethene.

Huraikan satu eksperimen untuk menyediakan etil etanoat di dalam makmal melalui Tindak balas III. Dalam huraian anda, sertakan persamaan kimia bagi tindak balas itu.

Lukiskan susunan radas untuk Tindak balas II. Huraikan satu ujian kimia untuk menentusahkan bahawa gas yang terkumpul ialah etena.

[10 marks]

- 10 (a) Lead(II) nitrate is a soluble salt and lead(II) sulphate is an insoluble salt.
Plumbum(II) nitrat adalah garam larut dan plumbum(II) sulfat adalah garam tak larut.
- (i) State the method of preparation both of the salts.
Nyatakan kaedah penyediaan kedua-dua garam tersebut.
- (ii) State the reactants for the preparation of lead(II) sulphate.
Nyatakan bahan tindak balas bagi penyediaan plumbum(II) sulfat.
[4 marks]
- (b) By using lead(II) oxide **or** lead(II) carbonate as a reactant, describe how a sample of lead(II) nitrate crystals can be prepared in the laboratory. In your description, include the chemical equation involved.
*Dengan menggunakan plumbum(II) oksida **atau** plumbum(II) karbonat sebagai bahan tindak balas, huraikan bagaimana satu sampel hablur plumbum(II) nitrat dapat disediakan dalam makmal.*
Dalam huraian anda, sertakan persamaan kimia yang terlibat.
[10 marks]
- (b) Two reagent bottles contain colourless solutions. The labelled on the bottles are removed. Each bottle contains whether sodium chloride solution or sodium sulphate solution. Describe chemical tests that can be used to verify the solutions in each test tube.
Dua botol reagen mengandungi larutan tidak berwarna. Label pada botol-botol tersebut telah tertanggal. Setiap botol mengandungi sama ada larutan natrium klorida atau larutan natrium sulfat.
Huraikan ujian kimia yang boleh digunakan untuk menentusahkan larutan dalam setiap botol.
[6 marks]

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END OF QUESTION PAPER
KERTAS SOALAN TAMAT

Answer all questions

Jawab semua soalan

<https://cikguadura.wordpress.com/>

- 1 An experiment was carried out to construct an electrochemical series of metals. Diagram 1.1 shows the set-up apparatus for an experiment to measure the potential difference between magnesium electrode and W electrode. An experiment was repeated by replacing W electrode with X, Y and Z electrodes. The magnesium electrode is the negative terminal in all experiments.

Satu eksperimen telah dijalankan untuk membina siri elektrokimia beberapa logam. Rajah 1.1 menunjukkan susunan radas untuk mengukur beza keupayaan di antara elektrod magnesium dan elektrod W. Eksperimen diulangi dengan menggantikan elektrod W dengan elektrod X, Y dan Z. Elektrod magnesium adalah terminal negatif dalam kesemua eksperimen.

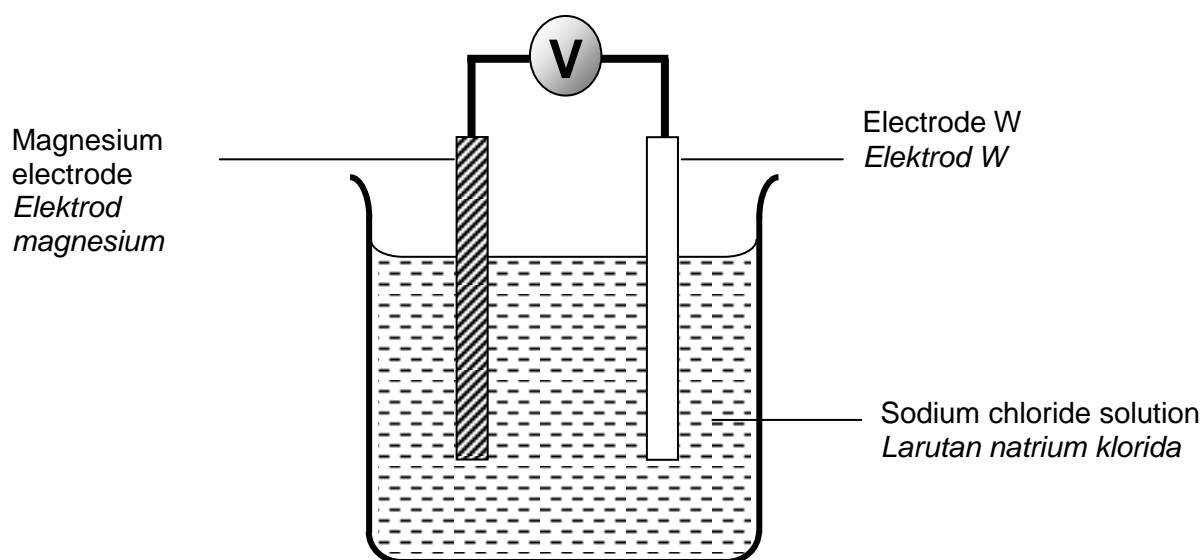


Diagram 1.1
Rajah 1.1

Diagram 1.2 shows the voltmeter readings of all the experiments.
Rajah 1.2 menunjukkan bacaan voltmeter bagi semua eksperimen.

*For
examiner's
use*

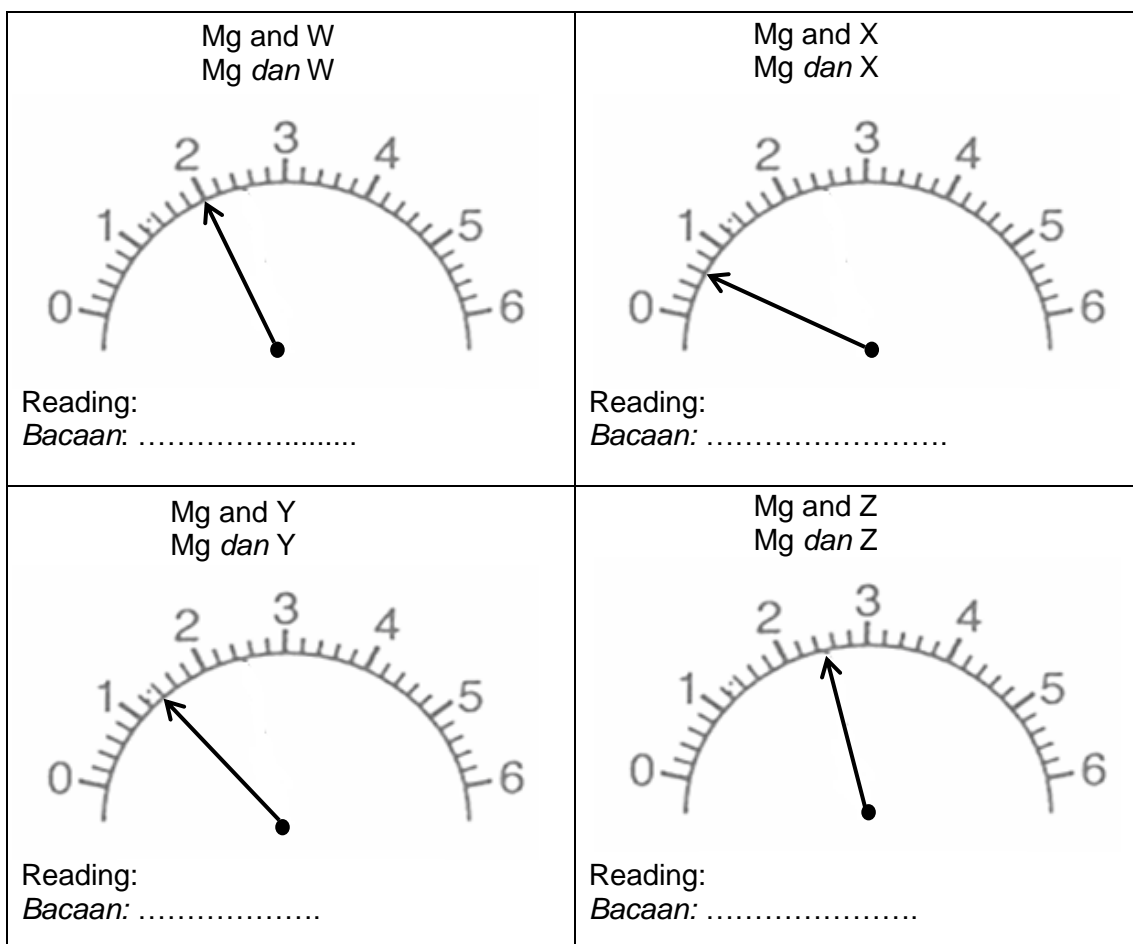


Diagram 1.2
Rajah 1.2

- (a) Record the voltmeter readings in the spaces provided in Diagram 1.2.
Catatkan bacaan voltmeter pada ruang yang disediakan dalam Rajah 1.2.
 [3 marks]
- (b) Construct a table to record the voltmeter reading for the different pair of metal.
Bina satu jadual untuk merekod bacaan voltmeter untuk pasangan logam yang berlainan.

1(a)

3

1(b)

3

[3 marks]

- (c) State one hypothesis for this experiment.
Nyatakan satu hipotesis bagi eksperimen ini.

.....

[3 marks]

*For
 examiner's
 use*

1(c)

	3
--	---

- (d) For this experiment, state:
Bagi eksperimen ini, nyatakan:

- (i) manipulated variable
pembolehubah dimanipulasikan

.....

- (ii) responding variable
pembolehubah bergerak balas

.....

- (iii) constant variable
pembolehubah dimalarkan

.....

[3 marks]

1(d)

	3
--	---

- (e) Based on the voltmeter readings, arrange all the metals in ascending order of their electropositivity.
Berdasarkan bacaan voltmeter, susunkan semua logam dalam susunan menaik keelektropositifan.

.....

[3 marks]

1(e)

	3
--	---

- (f) Suggest the possible voltage if X and Z electrodes is used to construct electrochemical series.
Cadangkan nilai voltan yang mungkin jika elektrod X dan Z digunakan untuk membina siri elektrokimia.

.....

[3 marks]

1(f)

	3
--	---

Total 1

	3
--	---

- 2 Diagram 2 shows two experiments to study the heat of neutralization between sodium hydroxide solution and hydrochloric acid.
Rajah 2 menunjukkan dua eksperimen untuk mengkaji haba peneutralan antara larutan natrium hidroksida dan asid hidroklorik.

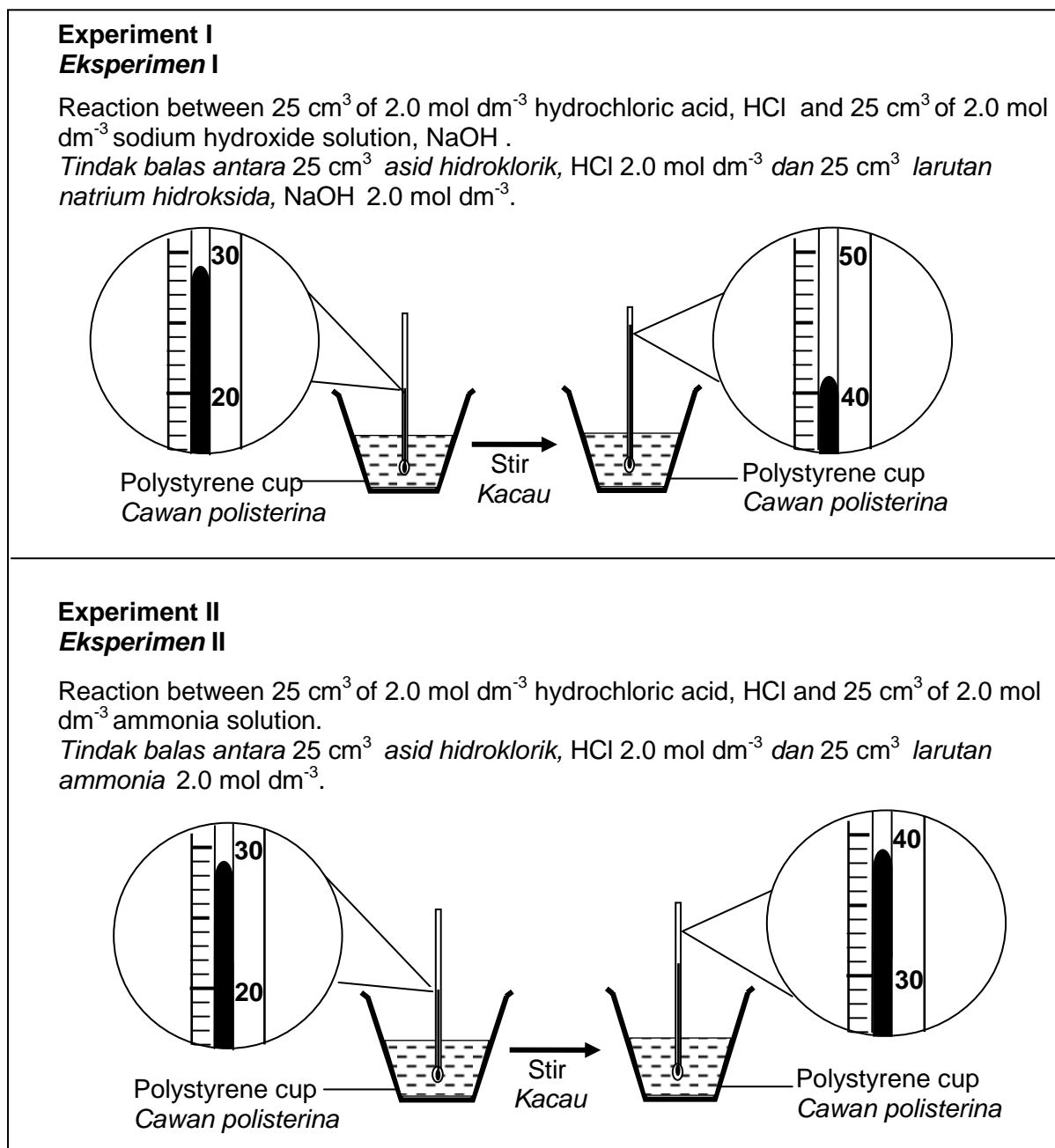


Diagram 2
Rajah 2

- (a) (i) Based on Diagram 2, state **one** observation.
*Berdasarkan Rajah 2, nyatakan **satu** pemerhatian.*

.....

2(a)(i)

3

For
examiner's
use

(ii) State the inference based on the observation.
Nyatakan inferens berdasarkan pemerhatian itu.

[3 marks]

.....
.....

[3 marks]

2(a)(ii)

	3
--	---

(b) Based on the results in Diagram 2, state the relationship between the temperature change and the type of alkali that react with hydrochloric acid.
Berdasarkan keputusan dalam Rajah 2, nyatakan hubungan antara perubahan suhu dengan jenis alkali yang bertindak balas dengan asid hidroklorik.

[3 marks]

.....
.....

[3 marks]

2(b)

	3
--	---

(c) State the operational definition for exothermic reaction.
Nyatakan definisi secara operasi untuk tindak balas eksotermik.

[3 marks]

.....
.....

[3 marks]

2(c)

	3
--	---

(d) Based on the temperatures in Experiment II, predict the change in temperature if hydrochloric acid is replaced by ethanoic acid.
Berdasarkan suhu dalam Eksperimen II, ramalkan perubahan suhu jika asid hidroklorik digantikan dengan asid etanoik.

[3 marks]

.....
.....

[3 marks]

2(d)

	3
--	---

Total 1

	15
--	-----------

- 3 Diagram 3 shows four test tubes containing hydrochloric acid, HCl with different concentrations.

Rajah 3 menunjukkan empat tabung uji yang mengandungi asid hidroklorik, HCl dengan kepekatan yang berbeza.

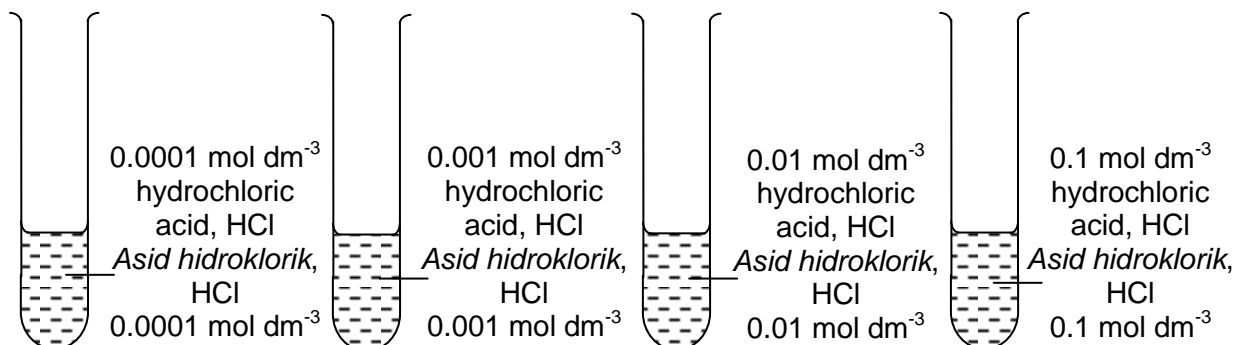


Diagram 3
Rajah 3

Using the acid in Diagram 3, plan a laboratory experiment to investigate the relationship between pH value with molarity of acid.

Menggunakan asid di dalam Rajah 3, rancang satu eksperimen makmal untuk menyiasat hubungan antara nilai pH dengan kemolaran asid.

Your planning must include the following items:

Perancangan anda hendaklah mengandungi perkara-perkara berikut:

- Problem statement
Pernyataan masalah
- All the variables
Semua pembolehubah
- Hypothesis
Hipotesis
- List of materials and apparatus
Senarai bahan dan radas
- Procedure
Prosedur
- Tabulation of data
Penjadualan data

[17 marks]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

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JABATAN PELAJARAN NEGERI TERENGGANU

<https://cikguadura.wordpress.com/>



Peperiksaan Percubaan SPM 2016

JAWAPAN BK 7 KIMIA Kertas 1

1	A
2	B
3	D
4	D
5	D
6	B
7	C
8	C
9	A
10	C
11	C
12	C
13	A
14	D
15	C
16	A
17	B
18	D
19	C
20	A

21	C
22	C
23	A
24	B
25	A
26	B
27	B
28	B
29	A
30	D
31	A
32	D
33	C
34	B
35	C
36	C
37	A
38	A
39	C
40	B

41	B
42	A
43	B
44	B
45	B
46	B
47	C
48	B
49	A
50	B

BK7 – Peperiksaan Percubaan 2016
SIJIL PELAJARAN MALAYSIA
4541/2 KIMIA
Kertas 2

Section A

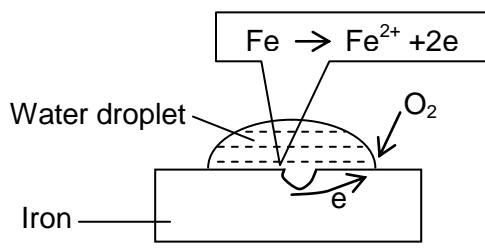
1	(a)	(i)	Contact Process		1	
		(ii)	H ₂ SO ₄		1	
	(b)	(i)	SO ₂		1	
		(ii)	SO ₂ react with rain water Produced acid rain	1 1	...2	
	(c)	(i)	NH ₃		1	
		(ii)	Urea, (NH ₂) ₂ CO = $\frac{2 \times 14}{2(14+2)+12+16} \times 100$ //	1		
			Compound Y /ammonium sulphate, (NH ₄) ₂ SO ₄ = $\frac{2 \times 14}{2(14+4) + 32 + 4(16)} \times 100$ //	1		
			Better Fertilizer : Urea	1	...3	
	TOTAL					9

2	(a)		Base to ascending order of proton number		1
	(b)		C and E		1
	(c)		Group 2 and Period 3	1	
			Have 2 valence electron and 3 shells occupied with electron	1	...2
	(d)		C more reactive than E.	1	
			Nuclei attraction toward electrons in C is stronger than E.	1	
			It is easier for atom C to attract/gain electron.	1	...3
(e)		D, E, A, B, C		1	
(f)		D		1	
TOTAL					9

3	(a)		Carbon		1
	(b)		Formula that show the simplest ratio of atom of each element in a compound.		1
	(c)	(i)	$C_4H_8O_2$ C_2H_4O	1 1	...2
		(ii)	Similarity : Type of element // C, H, O Difference : Number of atom of each element	1 1	...2
	(d)	(i)	$2C_4H_8O_2 + Mg \rightarrow (C_3H_7COO)_2Mg + H_2$	1+1	...2
		(ii)	Mol Mg = 0.5 Mass Mg = 0.5×24 // 12 g	1 1	...2
				TOTAL	10

4	(a)		Change of volume of gas released per time taken		1
	(b)		$Mg + 2HCl \rightarrow MgCl_2 + H_2$	1+1	...2
	(c)		Size of reactant / Total surface area		1
	(d)	(i)	<u>Experiment I</u> : $\frac{50}{5} = 10 \text{ cm}^3 \text{ min}^{-1}$ // $0.167 \text{ cm}^3 \text{ s}^{-1}$ <u>Experiment II</u> : $\frac{50}{3} = 16.667 \text{ cm}^3 \text{ min}^{-1}$ // $0.278 \text{ cm}^3 \text{ s}^{-1}$ 1. Correct value for both experiment 2. Correct unit for both value	1 1	...2
		(ii)	1. Size of magnesium in Experiment II is smaller than Experiment I // Total surface area of magnesium in Experiment II is greater than Experiment I. 2. Frequency of collision between magnesium atoms and hydrogen ions, H^+ in Experiment II is higher than Experiment I. 3. Frequency of effective collision between magnesium atoms and hydrogen ions, H^+ in Experiment II is higher than Experiment I.	1 1 1	...3
	(e)		The mass of magnesium in both experiments are the same.		1
				TOTAL	10

5	(a)		Chemical substance that ionises in water to produce hydroxide ion / OH ⁻ ion.		1
	(b)	(i)	Strong alkali : R	1	
		(ii)	Weak acid : Q	1	...2
	(c)		Dissolve the malic acid in water. Add zinc/zinc carbonate* into the malic acid solution. Bubbles of gas released.	1 1 1	...3
	(d)	(i)	Number of mole of NaOH = $\frac{2.0 \times 500}{1000}$ = 1 mol Mass of NaOH = 1 × 40 = 40 g	1 1	...2
		(ii)	$2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$ $\frac{M_a \times 25.0}{2.0 \times 50.0} = \frac{1}{2}$ $M_a = 2.0 \text{ mol dm}^{-3}$	1 1 1	...3
				TOTAL	11

6	(a)	(i)	Copper		1
		(ii)	The concentration / number of copper ion decrease		1
		(iii)	The oxidation number of magnesium change from 0 to +2 // The oxidation number of copper change from +2 to 0. [Change in oxidation number]	1 1	...2
		(iv)	$\text{Mg} + \text{CuSO}_4 \rightarrow \text{MgSO}_4 + \text{Cu}$		1
		(v)	No reaction. Copper is less electropositive than magnesium.	1 1	...2
	(b)	(i)	Presence of oxygen and water.		1
		(ii)	 <p>1. Label for iron, water and oxygen 2. Ionization of iron in the water droplet (at anode) 3. Flow of electron in the iron to the edge of water droplet</p>	1 1 1	...3
				TOTAL	11

Section B

7	(a)	Electrode P : Concentration of electrolyte Electrode Q : Position of the ions in the electrochemical series	1 1	2																								
	(b)	<table border="1"> <thead> <tr> <th></th> <th>Electrode P</th> <th>Electrode Q</th> </tr> </thead> <tbody> <tr> <td>Ions attracted to</td> <td>Cl⁻ and OH⁻</td> <td>Na⁺ and H⁺</td> </tr> <tr> <td>Names the ions selectively discharged</td> <td>Cl⁻</td> <td>H⁺</td> </tr> <tr> <td>Reason why the ions are selectively discharged</td> <td>Concentration of Cl⁻ is higher than OH⁻</td> <td>H⁺ ion is placed lower than Na⁺ in the electrochemical series</td> </tr> <tr> <td>Observation</td> <td>Greenish yellow gas is released</td> <td>Colourless gas is released</td> </tr> </tbody> </table>		Electrode P	Electrode Q	Ions attracted to	Cl ⁻ and OH ⁻	Na ⁺ and H ⁺	Names the ions selectively discharged	Cl ⁻	H ⁺	Reason why the ions are selectively discharged	Concentration of Cl ⁻ is higher than OH ⁻	H ⁺ ion is placed lower than Na ⁺ in the electrochemical series	Observation	Greenish yellow gas is released	Colourless gas is released	1+1 1+1 1+1 1+1	...8									
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	(c)	<table border="1"> <thead> <tr> <th></th> <th>Cell X</th> <th>Cell Y</th> </tr> </thead> <tbody> <tr> <td>Type of cell</td> <td>Electrolytic cell</td> <td>Voltaic cell</td> </tr> <tr> <td>The energy change</td> <td>Electrical energy to chemical energy</td> <td>Chemical energy to electrical energy</td> </tr> <tr> <td>The terminal of the cell</td> <td>Positive terminal / anode: Copper Negative terminal / cathode: copper</td> <td>Positive terminal / cathode: copper Negative terminal / anode: aluminium</td> </tr> <tr> <td>Ions present in the electrolyte</td> <td colspan="2">Cu²⁺, H⁺ SO₄²⁻, OH⁻</td> </tr> <tr> <td>Observation</td> <td>Anode: Thinner Cathode: brown deposit//brown solid is deposited//thicker</td> <td>Negative terminal/Aluminium plate: thinner Positive terminal/Copper plate: brown deposit//brown solid is deposited//thicker</td> </tr> <tr> <td>Half equation for both electrodes</td> <td>Anode: Cu → Cu²⁺ + 2e Cathode: Cu²⁺ + 2e → Cu</td> <td>Al plate/- terminal: Al → Al³⁺ + 3e Cu plate//+ terminal: Cu²⁺ + 2e → Cu</td> </tr> <tr> <td>Name of the process occurred at both electrodes/ terminal</td> <td colspan="2">Anode/Al plate: Oxidation Cathode/Copper plate//negative terminal: Reduction</td> </tr> </tbody> </table>		Cell X	Cell Y	Type of cell	Electrolytic cell	Voltaic cell	The energy change	Electrical energy to chemical energy	Chemical energy to electrical energy	The terminal of the cell	Positive terminal / anode: Copper Negative terminal / cathode: copper	Positive terminal / cathode: copper Negative terminal / anode: aluminium	Ions present in the electrolyte	Cu ²⁺ , H ⁺ SO ₄ ²⁻ , OH ⁻		Observation	Anode: Thinner Cathode: brown deposit//brown solid is deposited//thicker	Negative terminal/Aluminium plate: thinner Positive terminal/Copper plate: brown deposit//brown solid is deposited//thicker	Half equation for both electrodes	Anode: Cu → Cu ²⁺ + 2e Cathode: Cu ²⁺ + 2e → Cu	Al plate/- terminal: Al → Al ³⁺ + 3e Cu plate//+ terminal: Cu ²⁺ + 2e → Cu	Name of the process occurred at both electrodes/ terminal	Anode/Al plate: Oxidation Cathode/Copper plate//negative terminal: Reduction		1 1 1 1 1 1 1 1	..10
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TOTAL				20																								

8	(a)	(i)	Temperature increase // Zinc dissolve // Brown solid formed // Blue solution turn colourless [any two]	1+1	...2
		(ii)	Exothermic reaction / Heat released // When 1 mol of copper is displaced, 240 kJ heat released // Energy content of reactant is higher than product. [Any two]	1+1	...2
		(iii)	Mg + CuSO ₄ → MgSO ₄ + Cu [Correct chemical formula] [Balanced equation] Mole of CuSO ₄ // Cu ²⁺ = 0.2 × 200/1000 = 0.04 mol Heat change = 200 × 4.2 × 15.5 = 13020 J 13020 × 1/0.04 // 325500 // 325.5 Heat of displacement = - 325.5 kJ mol ⁻¹	1 1 1 1 1 1	...7
	(b)	(i)	P = HCl // HNO ₃ Q = CH ₃ COOH R = NH ₃ solution HCl // HNO ₃ is a strong acid // ionised completely in water CH ₃ COOH is a weak acid ionised partially in water some of heat release during the reaction is absorb to ionise completely	1 1 1 1 1 1	...7
		(ii)	Heat of neutralisation is heat released when 1 mol of water formed. In the reaction, 2 mol of water is formed; Heat of neutralisation = 114/2 // 57 kJ mol ⁻¹	1 1	...2
			TOTAL		20

Section C

9	(a)	<div style="text-align: center;"> $\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{H} \\ \\ \text{H} \quad \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}=\text{C}-\text{C}-\text{H} \\ \quad \quad \quad \\ \quad \quad \quad \text{H} \end{array}$ <p>2-methylpropene</p> $\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C} & -\text{C} & =\text{C} & -\text{C}-\text{H} \\ & & & \\ \text{H} & & & \text{H} \end{array}$ <p>But-2-ene</p> </div>	1	
	(b)	(i) Reaction I : Oxidation Reaction II : Dehydration Reaction III : Esterification Ethanol Alcohol $\text{C}_2\text{H}_5\text{OH} // \text{C}_2\text{H}_6\text{O}$	1 1 1 1 1 1 1	...4 ...6
	(c)	1. Alcohol : Ethanol 2. Carboxylic acid : ethanoic acid <u>Procedure</u> : 3. Pour [2 – 10] cm^3 of glacial ethanoic acid into boiling tube. 4. Add [2 – 10] cm^3 of absolute ethanol into the acid. 5. Add [1 – 2] cm^3 / a few drops of concentrated sulphuric acid to the mixture. 6. Heat the mixture. 7. <u>Equation</u> : $\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \rightarrow \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$ 8. [Functional diagram] 9. [Labelled] 10. Pour /add bromine water /acidified potassium manganate(VII) solution into test tube containing the gas. 11. The brown / purple of bromine water / acidified potassium manganate(VII) solution is decolourised.	1 1 1 1 1 1 1 1 1 1 1	...6 Max 10
TOTAL			20	

10	(a)	(i)	<u>Lead(II) nitrate</u> : Acid reacts with base/ metal oxide/ metal hydroxide/ metal carbonate/ metal <u>Lead(II) sulphate</u> : Double decomposition // Precipitation reaction	1	
				1	...2
		(ii)	<u>Lead(II) nitrate solution and sodium sulphate*</u> *[any suitable solution which contains sulphate ion, SO ₄ ²⁻]	1	
				1	...2
	(b)		1. Pour [20 -100] cm ³ nitric acid [0.1 – 2.0] mol dm ⁻³ to a beaker. 2. Add PbO/PbCO ₃ . 3. Stir the mixture. 4. Until some solid remains unreacted / excess. 5. Filter off the excess solid. 6. Evaporate until a 1/3 of volume of solution / saturated. 7. Leave to cool until crystal formed. 8. Filter and dried between filter paper. 9. PbO + 2HNO ₃ → Pb(NO ₃) ₂ + H ₂ O // PbCO ₃ + 2HNO ₃ → Pb(NO ₃) ₂ + CO ₂ + H ₂ O	1 1 1 1 1 1 1 1 1+1	..10
	(c)		<u>Sample Answer</u> : 1. Pour the solutions into two different test tubes. 2. Add barium nitrate* solution into the test tubes. 3. White precipitate formed. 4. Sulphate ion, SO ₄ ²⁻ present; the solution is sodium sulphate. 5. No precipitate formed. 6. No sulphate ion, SO ₄ ²⁻ ; the solution is sodium chloride. *[Accept other methods that can be used to detect chloride ion]	1 1 1 1 1 1	...6
			TOTAL		20

END OF MARKING SCHEME

BAHAN KECEMERLANGAN (BK7) 2016
4541/3 KIMIA
KERTAS 3

Question	https://cikguadura.wordpress.com/Rubric	Score
1(a)	Able to state all the voltmeter readings accurately with correct unit and one decimal point. <u>Sample answer:</u> Mg and W : 2.0 V Mg and X : 0.6 V Mg and Y : 1.4 V Mg and Z : 2.5 V	3
	Able to state all the voltmeter readings accurately without unit. <u>Sample answer:</u> Mg and W : 2 Mg and X : 0.60 Mg and Y : 1.4 Mg and Z : 2.5	2
	Able to state at least two readings correctly without unit	1
	No response or wrong response	0

Question	Rubric	Score										
1(b)	Able to construct a table to record the voltmeter reading for each pair of metals that contain: <ol style="list-style-type: none"> 1. Correct titles 2. Readings <u>Sample answer:</u> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Pairs of metals</th> <th>Voltage / V</th> </tr> </thead> <tbody> <tr> <td>Mg and W</td> <td>2.0</td> </tr> <tr> <td>Mg and X</td> <td>0.6</td> </tr> <tr> <td>Mg and Y</td> <td>1.4</td> </tr> <tr> <td>Mg and Z</td> <td>2.5</td> </tr> </tbody> </table>	Pairs of metals	Voltage / V	Mg and W	2.0	Mg and X	0.6	Mg and Y	1.4	Mg and Z	2.5	3
	Pairs of metals	Voltage / V										
	Mg and W	2.0										
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Mg and Y	1.4											
Mg and Z	2.5											
Able to construct a less accurate table that contains: <ol style="list-style-type: none"> 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 give the hypothesis accurately <u>Sample answer:</u> The further the distance between two metals in the electrochemical series, the higher the potential difference / voltage	3
	Able to give the hypothesis less accurately <u>Sample answer:</u> The further the distance between two metals, the higher the potential difference/voltage // vice versa	2
	Able to state an idea of hypothesis <u>Sample answer:</u> Different metals affect the potential difference	1
	No response or wrong response	0

Question	Rubric	Score
1(d)	Able to state all the three variables correctly <u>Sample answer:</u> Manipulated variable: Pair of metal Responding variable: Voltmeter reading/voltage Constant variable: magnesium/negative electrode, sodium Chloride solution//electrolyte r: volume of sodium chloride/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 arrange in ascending order of all the metals <u>Sample answer:</u> Z, W, Y, X, Mg	3
	Able to arrange any four metals in correct ascending order	2
	Able to arrange any three metals in correct ascending order	1
	No response or wrong response	0

Question	Rubric	Score
1(f)	Able to predict the value of voltage accurately with unit. Answer: 1.9 V	3
	Able to predict the value of voltage accurately without unit. Answer: 1.9	2
	Able to give an idea the value of voltage. $1.4 < V < 2.5$	1
	No response or wrong response	0

Question	Mark Scheme	Score
2(a)(i)	Able to state observations correctly. <u>Sample answer:</u> The temperature increases	3
	Able to state observations less correctly. <u>Sample answer:</u> The container/ polystyrene cup becomes hot	2
	Able to state the idea of the observations <u>Sample answer:</u> The temperature changed // The temperature decreases	1
	No response given / wrong response	0

Question	Rubric	Score
2(a)(ii)	Able to state the inference for the experiment correctly. <u>Sample answer:</u> Exothermic reaction // Heat is released	3
	Able to state the inference for the experiment less correctly. <u>Sample answer:</u> Energy changed.	2
	Able to state the idea of the inference for the experiment. <u>Sample answer:</u> Endothermic reaction // The reaction occurred	1
	No response or wrong response	0

Question	Rubric	Score
2(b)	Able to state the relationship between temperature and type of alkali <u>Sample answer:</u> The temperature change is higher when sodium hydroxide solution react with hydrochloric acid // [vice versa]	3
	Able to state the relationship between temperature and type of alkali less correctly <u>Sample answer:</u> The temperature change is higher when strong alkali react with hydrochloric acid// Temperature is directly proportional with the strength of alkali	2
	Able to give an idea of the relationship between temperature and rate of reaction <u>Sample answer:</u> Type of alkali affects the temperature change	1
	No response or wrong response	0

Question	Rubric	Score
2 (c)	Able to write the operational definition for an exothermic reaction correctly. Able to describe the following criteria: (i) What should be observed (ii) What should be done <u>Sample answer :</u> (Temperature rises)/ (Thermometer readings increases) when sodium hydroxide solution is added to hydrochloric acid.// (Temperature rises)/ (Thermometer readings increases) when ammonia solution is added to hydrochloric acid.	3
	Able to state the operational definition less correctly <u>Sample answer</u> Temperature increases // Temperature changed when acid react with alkali	2
	Able to give an idea of the operational definition <u>Sample answer</u> Temperature change // Heat released // Water produced	1
	No response given / wrong response	0

Question	Rubric	Score
2(d)	Able to predict the temperature change accurately <u>Sample answer :</u> [0.1-0.9] °C	3
	Able to predict the temperature change correctly <u>Sample answer:</u> [0.1-0.9] without unit // Lower than 1 °C	2
	Able to state an idea of temperature change <u>Sample answer:</u> Decreases // [any suitable value]without unit	1
	No response given / wrong response	0

Question	Rubric	Score
3(a)	Able to give the problem statement correctly <u>Sample answer :</u> What is the relationship between the pH value with molarity/concentration of acid? // Does the molarity/concentration of acid affect the pH value? // Does the pH increases/changes when the molarity/concentration of acid decreases/changes?	3
	Able to give the problem statement less accurately <u>Sample answer :</u> To investigate/determine the relationship between molarity/concentration of acid with pH value.	2
	Able to give an idea of problem statement <u>Sample answer :</u> Molarity/concentration of acid affect/change pH value	1
	No response given / wrong response	0

Question	Rubric	Score
3(b)	Able to state All variables correctly <u>Sample answer :</u> Manipulated variable : Molarity// Concentration // 0.0001 mol dm ⁻³ , 0.001 mol dm ⁻³ , 0.01 mol dm ⁻³ , 0.1 mol dm ⁻³ Responding variable : pH value Constant variable : Hydrochloric acid/HCl // Type of acid r : volume of acid	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 state the relationship between the manipulated variable and the responding variable with direction correctly <u>Sample answer :</u> The higher/lower the molarity/concentration of hydrochloric acid, the lower/higher the pH value	3
	Able to state the relationship between the manipulated variable and the responding variable without stating the direction <u>Sample answer :</u> The higher/lower the molarity/concentration of acid will change/affect the pH value // The lower/higher the pH value, the higher/lower the molarity/concentration of acid	2
	Able to state an idea of the hypothesis <u>Sample answer :</u> Molarity/concentration affects the pH value // The molarity/concentration change, the pH value change// The pH value is inversely proportional to the molarity/concentration	1
	No response or wrong response	0

Question	Rubric	Score
3(d)	Able to list of the apparatus and materials completely <u>Sample answer :</u> Material: 0.0001 mol dm ⁻³ , 0.001 mol dm ⁻³ , 0.01 mol dm ⁻³ , 0.1 mol dm ⁻³ hydrochloric acid/HCl Apparatus: pH meter/pH paper/universal indicator, test tube/beaker/[any suitable container]	3
	Able to list of the apparatus and material incompletely <u>Sample answer :</u> Material: Hydrochloric acid/HCl Apparatus: pH meter/pH paper/universal indicator, test tube/beaker/[any suitable container]	2
	Able to give an idea of apparatus and material <u>Sample answer :</u> Material: Acid Apparatus: pH meter/pH paper/universal indicator / [any acid-base indicator] // test tube/beaker/[any suitable container]	1
	No response or wrong response	0

Question	Rubric	Score
3(e)	Able to state all procedures correctly <u>Sample answer :</u> 1. Pour 0.0001 mol dm ⁻³ hydrochloric acid into test tube/beaker 2. Immerse/Dip pH meter into the acid // Put in a few drops of universal indicator into the acid 3. Record the pH value 4. Repeat step 1 to 3 by using 0.001 mol dm ⁻³ , 0.01 mol dm ⁻³ and 0.1 mol dm ⁻³ hydrochloric acid	3
	Able to state the steps partially correct Steps 2,3, 4	2
	Able to state any idea of procedure Steps 1,2	1
	No response or wrong response	0

Question	Rubric	Score										
3 (f)	Able to exhibit the tabulation of data that includes the following information. 1. Headings for the manipulated and responding variable 2. With unit <u>Sample answer :</u> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 70%;">Molarity/Concentration of acid/ mol dm⁻³</th> <th style="width: 30%;">pH value</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">0.1</td><td></td></tr> <tr><td style="text-align: center;">0.01</td><td></td></tr> <tr><td style="text-align: center;">0.001</td><td></td></tr> <tr><td style="text-align: center;">0.0001</td><td></td></tr> </tbody> </table>	Molarity/Concentration of acid/ mol dm ⁻³	pH value	0.1		0.01		0.001		0.0001		2
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<https://cikguadura.wordpress.com/>

END OF MARKING SCHEME