

SULIT

4541/1  
CHEMISTRY  
Kertas 1  
Sept.  
 $1\frac{1}{4}$  jam



**MAJLIS PENGETUA SEKOLAH MENENGAH MALAYSIA  
CAWANGAN NEGERI SEMBILAN**

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

**PROGRAM PENINGKATAN AKADEMIK TINGKATAN 5  
SEKOLAH-SEKOLAH MENENGAH NEGERI SEMBILAN 2016**

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**CHEMISTRY**

Kertas 1

Satu jam lima belas minit

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**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

1. *Kertas soalan ini adalah dalam dwibahasa.*
2. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
3. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

---

Kertas soalan ini mengandungi **32** halaman bercetak

1 Which of the following affect the pH value of an acid?  
*Antara berikut, yang manakah mempengaruhi nilai pH suatu asid?*

- A Solubility of acid in water  
*Keterlarutan asid dalam air*
- B Temperature of the acid solution  
*Suhu larutan asid*
- C Concentration of the hydrogen ions  
*Kepekatan ion hidrogen*
- D Number of hydrogen atoms in the molecule of the acid  
*Bilangan atom hidrogen dalam molekul asid*

2 Which chemical formula is correct?  
*Formula kimia manakah yang betul?*

- A  $\text{AgCl}_2$
- B  $\text{CaOH}$
- C  $\text{BaSO}_4$
- D  $\text{KCO}_3$

3 Diagram 1 shows one of the uses of Group 18 element to reduce the evaporation of the metal filament.  
*Rajah 1 menunjukkan salah satu kegunaan unsur Kumpulan 18 bagi mengurangkan penyejatan filamen logam.*

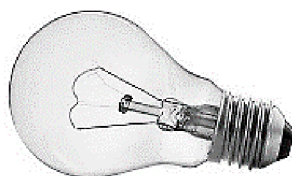


Diagram 1  
*Rajah 1*

Which of the following is the element used?  
*Antara berikut, yang manakah merupakan unsur yang digunakan?*

- A Neon  
*Neon*
- B Helium  
*Helium*
- C Argon  
*Argon*
- D Krypton  
*Krypton*



- 5 Diagram 2 shows the set-up of apparatus to determine the rate of reaction between zinc and dilute hydrochloric acid.

*Rajah 2 menunjukkan susunan radas untuk menentukan kadar tindak balas antara zink dan asid hidroklorik cair.*

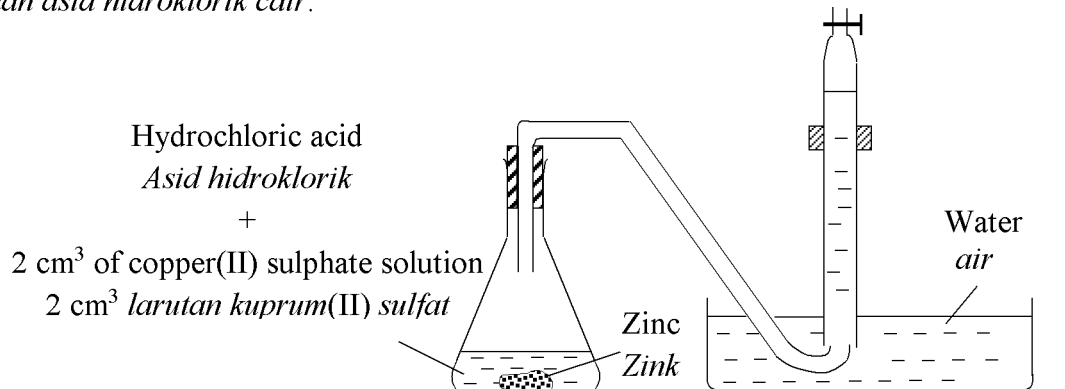


Diagram 2

*Rajah 2*

What is the function of copper(II) sulphate solution in the reaction?

*Apakah fungsi larutan kuprum(II) sulfat dalam tindak balas ini?*

- A As an indicator  
*Sebagai pemunjuk*
- B As a catalyst  
*Sebagai mangkin*
- C As a dehydrating agent  
*Sebagai agen pendehidratan*
- D Increase the volume of gas collected  
*Meningkatkan isipadu gas yang terkumpul*

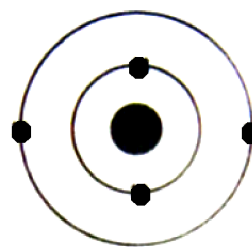
- 6 Which gas cause acid rain?  
*Gas manakah yang menyebabkan hujan asid?*
- I Methane  
*Metana*
  - II Ammonia  
*Ammonia*
  - III Sulphur dioxide  
*Sulfur dioksida*
  - IV Nitrogen dioxide  
*Nitrogen dioksida*
- A I and II  
*I dan II*
- B I and IV  
*I dan IV*
- C II and III  
*II dan III*
- D III and IV  
*III dan IV*
- 7 When solution R is added to solution S, yellow precipitate is formed.  
Which substance is the yellow precipitate?  
*Apabila larutan R ditambahkan ke dalam larutan S, mendakan kuning terbentuk.*  
*Bahan manakah adalah mendakan kuning itu?*
- A Magnesium chloride  
*Magnesium klorida*
  - B Copper(II) chloride  
*Kuprum(II) klorida*
  - C Iron(II) iodide  
*Ferum(II) iodida*
  - D Lead(II) iodide  
*Plumbum(II) iodida*

- 8 Which ion contains in hard water and forms scum when react with soap?  
*Ion manakah yang terkandung dalam air liat dan membentuk kekat apabila bertindak balas dengan sabun?*
- A Sodium ion,  $\text{Na}^+$   
*Ion natrium,  $\text{Na}^+$*
- B Calcium ion,  $\text{Ca}^{2+}$   
*Ion kalsium,  $\text{Ca}^{2+}$*
- C Barium ion,  $\text{Ba}^{2+}$   
*Ion barium,  $\text{Ba}^{2+}$*
- D Aluminium ion,  $\text{Al}^{3+}$   
*Ion aluminium,  $\text{Al}^{3+}$*
- 9 Which substance conducts electricity in molten state?  
*Bahan manakah yang mengkonduksikan arus elektrik dalam keadaan leburan?*
- A Glucose  
*Glukosa*
- B Acetamide  
*Asetamida*
- C Naphthalene  
*Naftalena*
- D Lead(II) bromide  
*Plumbum(II) bromida*
- 10 Which shows an octet electron arrangement?  
*Manakah yang menunjukkan susunan elektron oktet?*

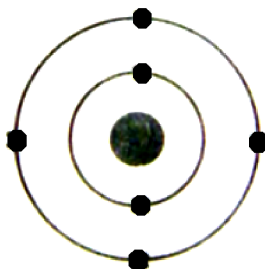
A



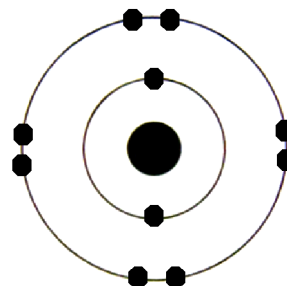
C



B



D



- 11 Diagram 3 shows the molecular structure of urea.

*Rajah 3 menunjukkan struktur molekul urea.*

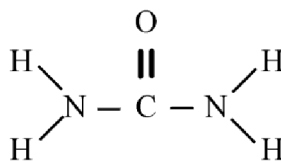


Diagram 3

*Rajah 3*

How many single covalent bonds in the compound?

*Berapakah bilangan ikatan kovalen tunggal dalam sebatian ini?*

- A 2  
 B 4  
 C 6  
 D 8
- 12 Which statements are true about exothermic and endothermic reactions?

*Pernyataan manakah yang betul bagi tindak balas eksotermik dan endotermik?*

	<b>Exothermic reaction</b> <i>Tindak balas eksotermik</i>	<b>Endothermic reaction</b> <i>Tindak balas endotermik</i>
<b>I</b>	Total energy content of products is higher than reactants <i>Jumlah kandungan tenaga hasil tindak balas lebih tinggi berbanding bahan tindak balas</i>	Total energy content of products is lower than reactants <i>Jumlah kandungan tenaga hasil tindak balas lebih rendah berbanding bahan tindak balas</i>
<b>II</b>	Surrounding temperature increases <i>Suhu persekitaran bertambah</i>	Surrounding temperature decreases <i>Suhu persekitaran berkurang</i>
<b>III</b>	Heat absorbed by the reactants <i>Haba diserap oleh bahan tindak balas</i>	Heat released by the reactants <i>Haba dibebaskan oleh bahan tindak balas</i>
<b>IV</b>	Example of the reaction is rusting of iron <i>Contoh tindak balas adalah pengurangan besi</i>	Example of the reaction is photosynthesis <i>Contoh tindak balas adalah proses fotosintesis</i>

- 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

- 13 Diagram 4 shows a few drops of food coloring is added into water.  
*Rajah 4 menunjukkan beberapa titis pewarna makanan telah ditambah ke dalam air.*



Diagram 4  
*Rajah 4*

What is the name of the process?  
*Apakah nama proses itu?*

- A Diffusion  
*Resapan*
- B Evaporation  
*Penyejatan*
- C Sublimation  
*Pemejalwapan*
- D Condensation  
*Kondensasi*



- 14 Which of food additives can be used to make food stay fresh longer and taste better?  
*Antara bahan tambah makanan berikut yang manakah boleh digunakan untuk mengekalkan kesegaran makanan dan meningkatkan rasanya?*

- I** Lecithin  
*Lesitin*
- II** Tartrazine  
*Tartrazina*
- III** Sodium benzoate  
*Natrium benzoat*
- IV** Monosodium glutamate  
*Mononatrium glutamat*
- 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*

- 15 Table 1 shows proton number of atoms W, X, Y and Z.  
 Which atom will form an ion with a charge of  $-2$ ?  
*Jadual 1 menunjukkan nombor proton bagi atom W, X, Y dan Z.  
 Atom manakah membentuk ion yang bercas  $-2$ ?*

Atom <i>Atom</i>	Proton number <i>Nombor proton</i>	Nucleon number <i>Nombor nukleon</i>
<b>W</b>	6	12
<b>X</b>	8	16
<b>Y</b>	12	24
<b>Z</b>	35	80

Table 1  
*Jadual 1*

- A** W
- B** X
- C** Y
- D** Z

- 16 Which of reagent can change the iron(II) ions to iron metal?  
*Reagen manakah yang boleh menukarkan ion ferum(II) kepada logam ferum?*
- A Acidified potassium manganate(VII)  
*Larutan kalium manganat(VII) berasid*
  - B Bromine water  
*Air bromin*
  - C Magnesium  
*Magnesium*
  - D Copper  
*Kuprum*
- 17 In an agricultural field, isotope is used to study the metabolism rate of plant. It is done by adding small amount of the isotope in the fertilisers used. The radiation produced by the isotope is detected by using Gieger Muller.  
What is the isotop used?  
*Isotop digunakan dalam bidang agrikultur bagi menyiasat kadar metabolisma pokok. Ianya dilakukan dengan menambah sejumlah kecil isotop tersebut ke dalam baja yang digunakan. Radiasi yang dihasilkan oleh isotop dikesan dengan menggunakan Gieger Muller.*  
*Apakah isotop yang digunakan?*
- A Phosphorus-32  
*Fosforus-32*
  - B Uranium-235  
*Uranium-235*
  - C Cobalt-60  
*Kobalt-60*
  - D Carbon-14  
*Karbon-14*
- 18 Which statement is true about the atom of Group 1 elements?  
*Penyataan manakah yang betul mengenai atom unsur-unsur Kumpulan 1?*
- A Contains more protons than neutrons  
*Mempunyai lebih banyak proton berbanding neutron*
  - B Contains more protons than electrons  
*Mempunyai lebih banyak proton berbanding elektron*
  - C Has one electron in its outermost electron shell  
*Mempunyai satu elektron dalam petala paling luar*
  - D Has the same number of shells filled with electrons  
*Mempunyai bilangan petala berisi elektron yang sama*

- 19 Diagram 5 shows the structural formula of a monomer.  
*Rajah 5 menunjukkan formula struktur suatu monomer.*

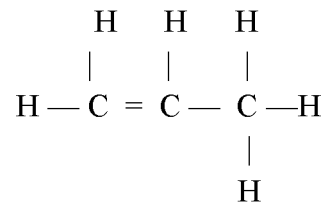
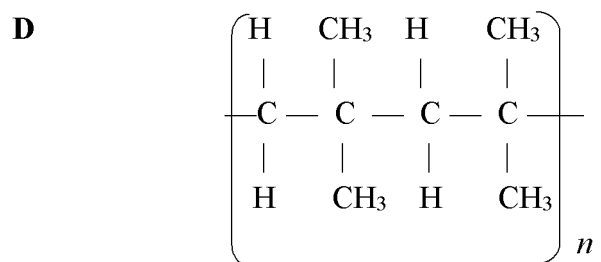
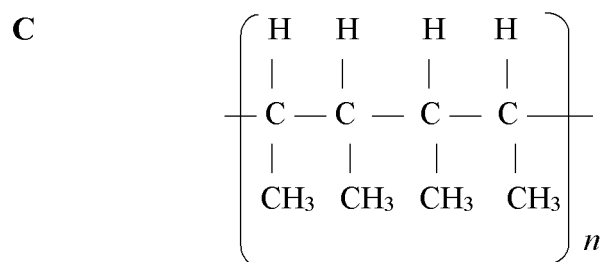
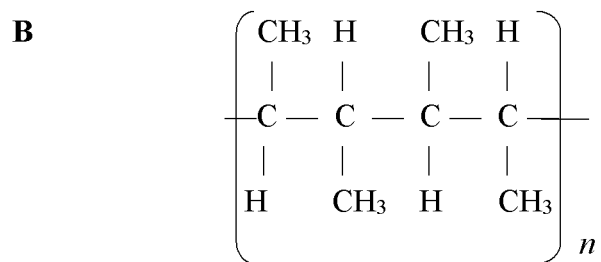
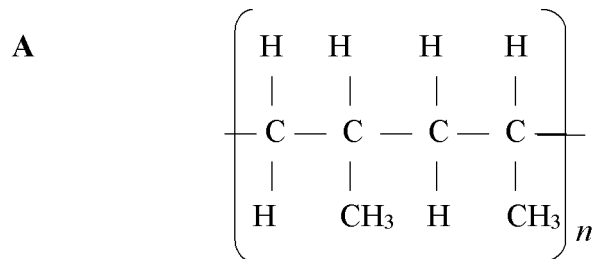


Diagram 5  
*Rajah 5*

What is the structural formula of its polymer?  
*Apakah formula struktur bagi polimernya?*



- 20** A student accidentally heated magnesium nitrate solution until it dried up.  
What is the consequence of his action?  
*Seorang murid tidak sengaja memanaskan larutan magnesium nitrat sehingga kering.  
Apakah akibat daripada tindakan itu?*
- A** Salt decomposed  
*Garam telah terurai*
  - B** Salt become ashes  
*Garam menjadi abu*
  - C** Salt will be dehydrated  
*Garam menjadi kering*
  - D** Salt will be contaminated  
*Garam akan tercemar*
- 21** Solid magnesium sulphate does not conduct electricity but magnesium sulphate solution can conduct electricity.  
Which of the following best explain the statement above?  
*Pepejal magnesium sulfat tidak boleh mengalirkan elektrik tetapi larutan magnesium sulfat boleh mengalirkan elektrik.  
Antara yang berikut, manakah terbaik menerangkan pernyataan atas?*
- A** Magnesium sulphate dissolves in water to form an alkali solution  
*Magnesium sulfat larut dalam air menghasilkan larutan beralkali*
  - B** Magnesium sulphate dissolves in water to form free moving ions  
*Magnesium sulfat larut dalam air menghasilkan ion-ion bergerak bebas*
  - C** Magnesium sulphate dissolves in water and move free in the solution  
*Magnesium sulfat larut dalam air dan bebas bergerak dalam larutan*
  - D** Magnesium sulphate dissolves in water to form freely moving electrons  
*Magnesium sulfat larut dalam air menghasilkan elektron-elektron bergerak bebas*
- 22** Which oxide turns red litmus paper to blue when dissolve in water?  
*Oksida manakah yang menukarkan kertas litmus merah kepada biru apabila larut dalam air?*
- A** Sodium oxide  
*Natrium oksida*
  - B** Carbon dioxide  
*Karbon dioksida*
  - C** Sulphur dioxide  
*Sulfur dioksida*
  - D** Copper(II) oxide  
*Kuprum(II) oksida*

- 23 Atom of element X has electron arrangement of 2.8.18.18.7.  
In which Group and Period is X located in the Periodic Table?

*Atom unsur X mempunyai susunan elektron 2.8.18.18.7.*

*Antara Kumpulan dan Kala berikut, manakah kedudukan X dalam Jadual Berkala?*

	<b>Group</b> <i>Kumpulan</i>	<b>Period</b> <i>Kala</i>
<b>A</b>	5	17
<b>B</b>	7	5
<b>C</b>	15	7
<b>D</b>	17	5

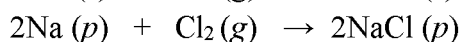
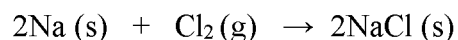
- 24 Substance X reacts with sulphuric acid produces salt and water.

What is substance X?

*Suatu bahan X bertindak balas dengan asid sulfurik menghasilkan garam dan air.*

*Apakah bahan X?*

- A** Zinc carbonate  
*Zink karbonat*
- B** Copper(II) oxide  
*Kuprum(II) oksida*
- C** Silicon(IV) oxide  
*Silikon(IV) oksida*
- D** Magnesium ribbon  
*Pita magnesium*
- 25 The equation represents the reaction between sodium and chlorine.  
*Persamaan berikut mewakili tindak balas antara natrium dengan klorin.*



Which of the following is true about the reaction?

*Manakah antara berikut adalah benar tentang tindakbalas ini?*

- A** Number of chlorine gas particles is equal to the number of sodium chloride particles  
*Bilangan zarah gas klorin adalah sama dengan bilangan zarah natrium klorida*
- B** Number of moles of sodium is greater than number of moles of sodium chloride  
*Bilangan mol natrium lebih besar daripada bilangan mol natrium klorida*
- C** Number of sodium particles is half of the number of sodium chloride particles  
*Bilangan zarah natrium adalah separuh daripada bilangan zarah natrium klorida*
- D** Number of moles of sodium is equal to the number of mol chlorine gas  
*Bilangan mol natrium sama dengan bilangan mol gas klorin*

- 26 Diagram 6 shows nuts and bolts which are protected by a layer of metal.  
*Rajah 6 menunjukkan nat dan bolt yang dilindungi dengan lapisan logam.*

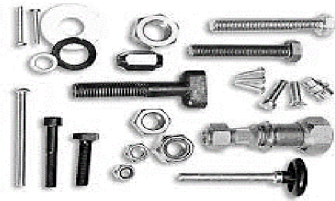


Diagram 6

*Rajah 6*

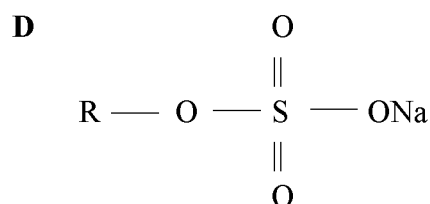
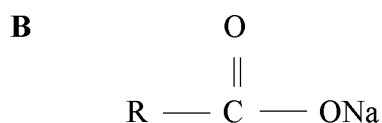
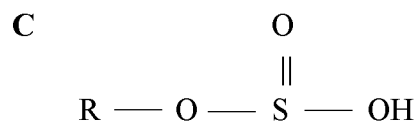
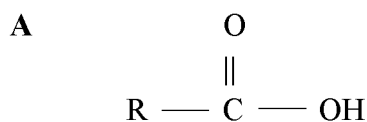
In industry metal finishing, they make use of various metals to provide the protection which is necessary to prevent corrosion as well as to improve its appearance. Nickel and tin are commonly used for corrosion protection on nuts and bolts and many other components as well.

Which process is used to protect the corrosion?

*Dalam kemasan logam industri, mereka menggunakan pelbagai logam untuk memberikan perlindungan bagi mencegah kakisan dan juga untuk memperbaiki penampilan. Nikel dan stanum biasanya digunakan untuk perlindungan kakisan pada nat dan bolt dan juga komponen-komponen lain.*

*Proses manakah yang digunakan untuk mencegah kakisan?*

- A** Extraction  
*Pengekstrakan*
- B** Purification  
*Pemulenan*
- C** Electroplating  
*Penyaduran*
- D** Polymerisation  
*Pempolimeran*
- 27 Which of the following is the structural formula for a soap?  
*Manakah antara berikut adalah formula struktur bagi sabun?*



- 28 Table 2 shows the heat of displacement,  $\Delta H$  of copper by zinc and magnesium.  
*Jadual 2 menunjukkan haba penyesaran,  $\Delta H$  kuprum oleh zink dan magnesium.*

Set	Reactants <i>Bahan tindak balas</i>	$\Delta H, \text{kJ mol}^{-1}$
I	Zinc + copper(II) sulphate solution <i>Zink + larutan kuprum(II) sulfat</i>	-210
II	Magnesium + copper(II) sulphate solution <i>Magnesium + larutan kuprum(II) sulfat</i>	-218

Table 2

*Jadual 2*

Which statement best explain the difference of heats of displacement?

*Penyataan manakah yang paling baik menerangkan perbezaan haba penyesaran?*

- A The temperature rise higher in set II  
*Kenaikan suhu set II lebih tinggi*
- B Zinc is more electropositive than magnesium  
*Zink lebih elektropositif berbanding magnesium*
- C The energy content of reactants in set I is high  
*Kandungan tenaga di dalam bahan tindak balas dalam set I adalah tinggi*
- D Distance between magnesium and copper in the electrochemical series is further  
*Jarak antara magnesium dengan kuprum di dalam siri elektrokimia adalah lebih jauh*

- 29 Diagram 7 shows the set-up of apparatus that was used by a group of students to investigate the electron transfer at a distance.

*Rajah 7 menunjukkan susunan alat radas yang telah digunakan oleh sekumpulan pelajar untuk menyiasat pemindahan elektron pada suatu jarak.*

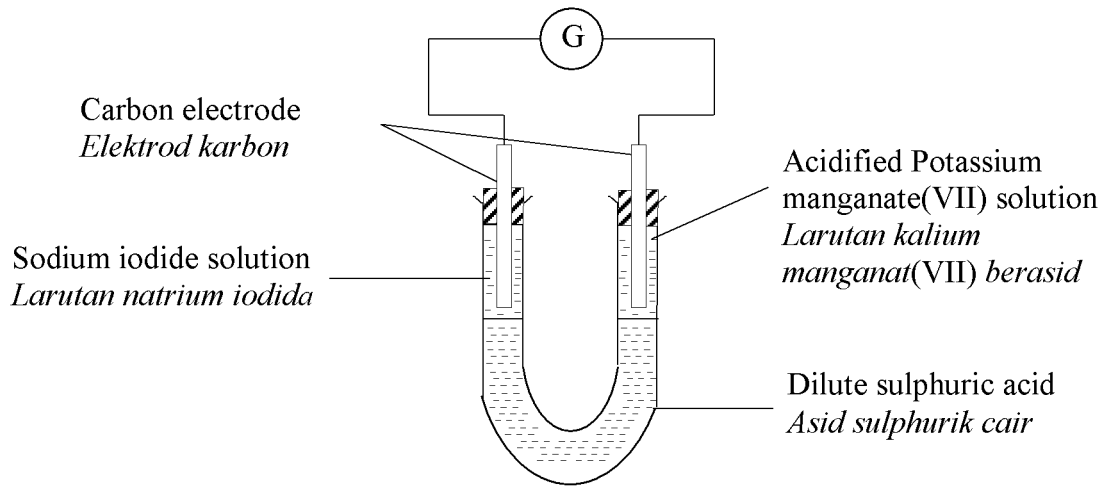


Diagram 7  
*Rajah 7*

Which of the following particles would release electrons?

*Antara berikut, zarah yang manakah akan membebaskan elektron?*

- A Iodide ion  
*Ion iodida*
- B Sodium ion  
*Ion natrium*
- C Sulphate ion  
*Ion sulfat*
- D Manganate(VII) ion  
*Ion manganat(VII)*



- 30 Diagram 8 shows structural formulae of two compounds P and Q.  
*Rajah 8 menunjukkan formula struktur bagi dua sebatian P dan Q.*

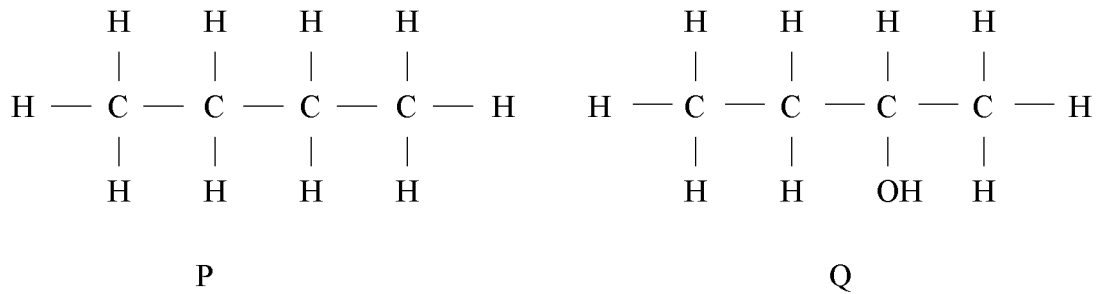


Diagram 8  
*Rajah 8*

Which reagent can be used to differentiate compounds P and Q?  
*Reagen manakah boleh digunakan untuk membezakan sebatian P dan Q?*

- A Magnesium  
*Magnesium*
- B Ethanoic acid  
*Asid etanoik*
- C Potassium hexacyanoferrate(III)  
*Kalium heksasianoferrat(III)*
- D Acidified potassium manganate(VII)  
*Kalium manganat(VII) berasid*

- 31 Diagram 9 shows the set-up of apparatus for the reaction between sodium thiosulphate solution and hydrochloric acid to form yellow precipitate.  
*Rajah 9 menunjukkan susunan radas bagi tindak balas antara larutan natrium tiosulfat dengan asid hidroklorik untuk membentuk mendakan kuning.*

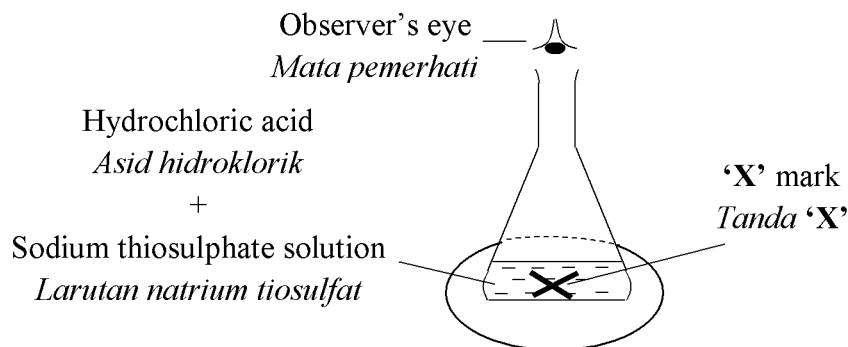


Diagram 9  
*Rajah 9*

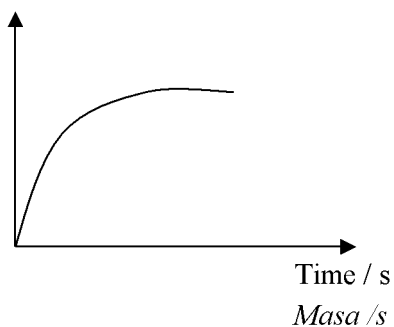
The time taken for the 'X' mark to disappear from sight is recorded.

Which of the following graphs shows the relationship between the temperature of sodium thiosulphate solution and the time taken?

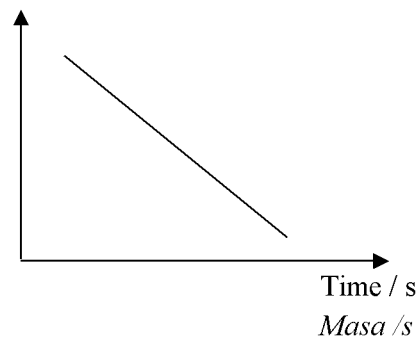
*Masa yang diambil untuk tanda 'X' hilang daripada penglihatan direkodkan.*

*Antara graf berikut, yang manakah menunjukkan hubungan kait antara suhu larutan natrium tiosulfat dengan masa yang diambil?*

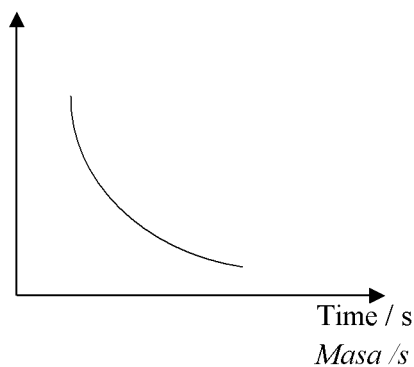
A Temperature / °C  
 Suhu / °C



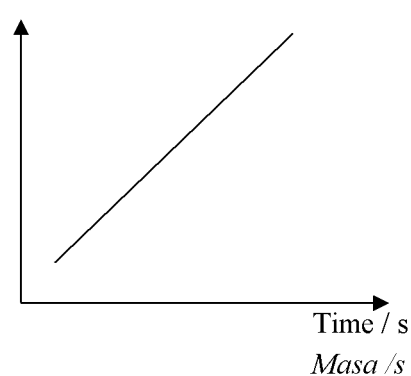
C Temperature / °C  
 Suhu / °C



B Temperature / °C  
 Suhu / °C



D Temperature / °C  
 Suhu / °C



- 32 Diagram 10 shows an artificial leg.  
*Rajah 10 menunjukkan satu kaki palsu.*

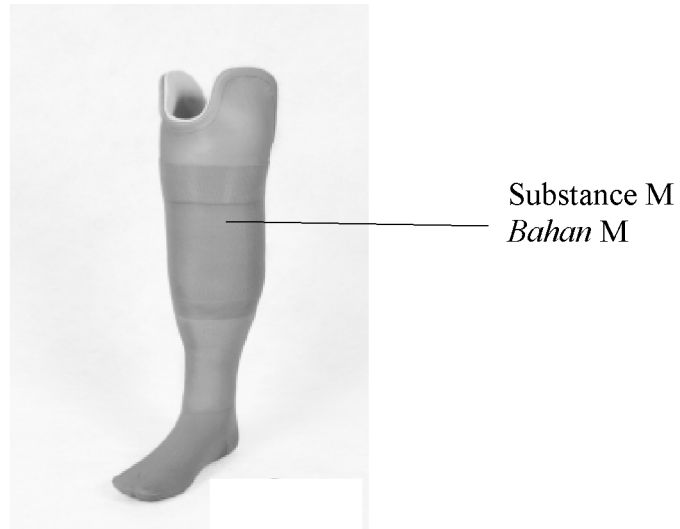


Diagram 10  
*Rajah 10*

Substance M has the following properties:  
*Bahan M mempunyai sifat-sifat yang berikut:*

- Strong  
*Kuat*
- Flexible  
*Fleksibel*
- High tensile strength  
*Kekuatan tegangan tinggi*

Which of the following could be substance M?  
*Antara yang berikut, yang manakah mungkin bahan M?*

- A Perspex  
*Perspeks*
- B Polyethene  
*Polietena*
- C Fiber glass  
*Kaca fiber*
- D Polyvinyl  
*Polivinil*

- 33 Diagram 11 shows the colour of lime water remains colourless when substance P is heated.

*Rajah 11 menunjukkan warna air kapur kekal tak berubah apabila bahan P dipanaskan.*

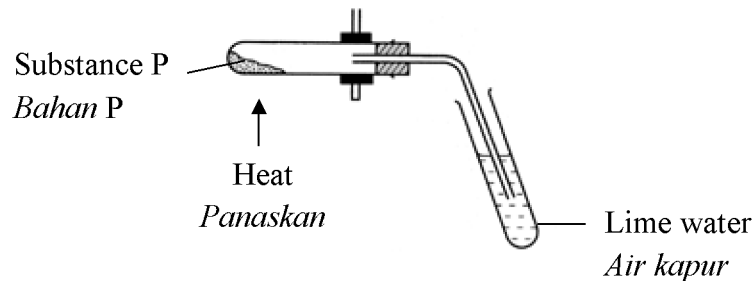


Diagram 11  
*Rajah 11*

Which substance could be P?  
*Bahan manakah mungkin P?*

- A Sodium carbonate  
*Natrium karbonat*
  - B Lead(II) carbonate  
*Plumbum(II) karbonat*
  - C Magnesium carbonate  
*Magnesium karbonat*
  - D Ammonium carbonate  
*Ammonium karbonat*
- 34 20.0 cm<sup>3</sup> of 0.5 mol dm<sup>-3</sup> acid X neutralises 25.0 cm<sup>3</sup> of 0.8 mol dm<sup>-3</sup> sodium hydroxide.  
What is acid X?  
20.0 cm<sup>3</sup> asid X 0.5 mol dm<sup>-3</sup> meneutralkan 25.0 cm<sup>3</sup> natrium hidroksida 0.8 mol dm<sup>-3</sup>.  
*Apakah asid X?*
- A Nitric acid  
*Asid nitrik*
  - B Sulphuric acid  
*Asid sulfurik*
  - C Phosphoric acid  
*Asid fosforik*
  - D Hydrochloric acid  
*Asid hidroklorik*

- 35 Diagram 12 shows the set-up of apparatus for the electrolysis of molten lead(II) bromide. *Rajah 12 menunjukkan susunan radas bagi elektrolisis leburan plumbum(II) bromida.*

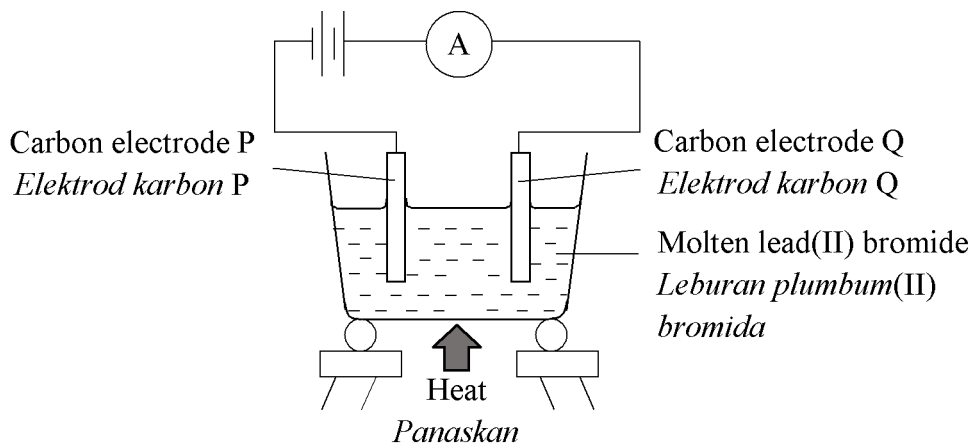


Diagram 12

*Rajah 12*

Which observation is correct?

*Pemerhatian yang manakah benar?*

- A Brown gas is released at carbon electrode Q  
*Gas perang terbebas di elektrod karbon Q*
- B Grey solid is deposited at carbon electrode Q  
*Pepejal karbon terenap di elektrod karbon Q*
- C Brown solid is deposited at carbon electrode P  
*Gas perang terbebas di elektrod karbon P*
- D Colourless gas is released at carbon electrode P  
*Gas tidak berwarna terbebas di elektrod karbon P*
- 36 Hamid added 0.1 g of manganese(IV) oxide powder to 50 cm<sup>3</sup> of 0.2 mol dm<sup>-3</sup> hydrogen peroxide at 5.0°C. He found that the rate of decomposition hydrogen peroxide is low.

Which of the following statements explains why the rate of decomposition is low?

*Hamid menambahkan 0.1 g serbuk mangan(IV) oksida kepada 50 cm<sup>3</sup> hidrogen peroksida 0.2 mol dm<sup>-3</sup> pada suhu 5.0°C. Dia mendapati kadar penguraian hidrogen peroksida adalah rendah.*

*Antara penyataan yang berikut, yang manakah menjelaskan sebab kadar penguraian adalah rendah?*

- A Temperature of the reaction is low  
*Suhu tindak balas adalah rendah*
- B Volume of hydrogen peroxide used is too little  
*Isipadu hidrogen peroksida yang digunakan sangat sedikit*
- C Concentration of hydrogen peroxide used is very low  
*Kepekatan hidrogen peroksida yang digunakan sangat rendah*
- D Total surface area of manganese(IV) oxide used is too small  
*Jumlah luas permukaan mangan(IV) oksida yang digunakan terlalu kecil*

- 37 The electron arrangement of atom Q is 2.6. P reacts with Q to form an ionic compound with formula  $P_2Q$ .

Which of the following could be the proton number of element P?

*Susunan elektron bagi atom Q ialah 2.6. P bertindak balas dengan Q menghasilkan satu sebatian ion dengan formula  $P_2Q$ .*

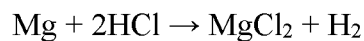
*Antara berikut, yang manakah mungkin nombor proton bagi unsur P?*

- I 9
- II 11
- III 17
- IV 19

- A I and III  
I dan III
- B I and IV  
I dan IV
- C II and III  
II dan III
- D II and IV  
II dan IV

- 38 The equation represents the reaction between 0.48 g of magnesium with excess of hydrochloric acid.

*Persamaan berikut mewakili tindak balas antara 0.48 g magnesium dengan asid hidroklorik berlebihan.*



What is the maximum volume of gas released at room conditions?

[Relative atomic mass:  $\text{Mg} = 24$ ; Molar volume of gas =  $24 \text{ dm}^3 \text{ mol}^{-1}$  at room conditions]

*Berapakah isipadu maksimum gas yang terbebas pada keadaan bilik?*

*[Jisim atom relatif:  $\text{Mg} = 24$ ; Isi padu molar gas =  $24 \text{ dm}^3 \text{ mol}^{-1}$  pada keadaan bilik]*

- A  $4.80 \text{ dm}^3$
- B  $48.0 \text{ dm}^3$
- C  $48.0 \text{ cm}^3$
- D  $480.0 \text{ cm}^3$



- 40 Hamidah experiencing depression and has difficulty in sleeping.

Which of the medicine is suitable for treating her?

*Hamidah menghadapi kemurungan dan kesukaran untuk tidur.*

*Ubat manakah yang sesuai bagi merawatnya?*

- A Codeine  
*Kodeina*
- B Barbiturate  
*Barbiturat*
- C Paracetamol  
*Parasetamol*
- D Streptomycin  
*Streptomisin*

- 41 Diagram 14 shows a diagram of the energy profile for the neutralization reaction between hydrochloric acid with sodium hydroxide solution.

*Rajah 14 menunjukkan gambarajah profil tenaga bagi tindak balas peneutralan antara asid hidroklorik dengan larutan natrium hidroksida.*

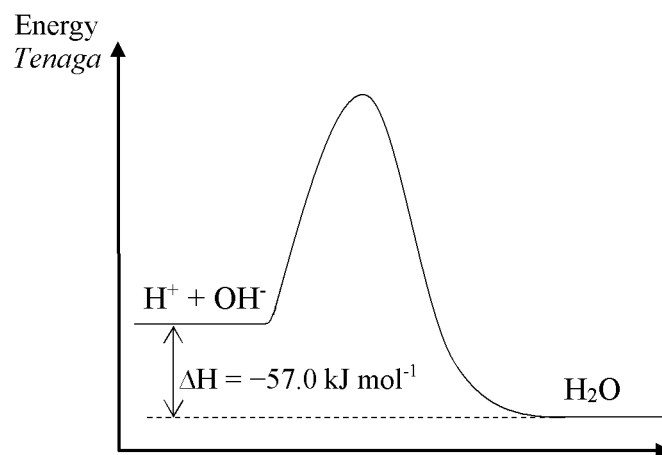


Diagram 14

*Rajah 14*

What is the change in temperature when 100 cm<sup>3</sup> of 0.5 mol dm<sup>-3</sup> hydrochloric acid is added to 100 cm<sup>3</sup> of 1.0 mol dm<sup>-3</sup> solution of sodium hydroxide solution?

[Specific heat capacity of a solution = 4.2 J g<sup>-1</sup>°C<sup>-1</sup>; density of water = 1.0 g cm<sup>-3</sup>]

*Berapakah perubahan suhu apabila 100 cm<sup>3</sup> asid hidroklorik 0.5 mol dm<sup>-3</sup> ditambah ke dalam 100 cm<sup>3</sup> larutan natrium hidroksida 1.0 mol dm<sup>-3</sup>?*

[Muatan haba tentu larutan = 4.2 J g<sup>-1</sup>°C<sup>-1</sup>; ketumpatan air = 1.0 g cm<sup>-3</sup>]

- A 1.36 °C
- B 3.39 °C
- C 6.69 °C
- D 13.57 °C



- 42 Diagram 15 shows the apparatus set-up to study the electrolysis of silver nitrate solution using carbon electrodes.

*Rajah 15 menunjukkan susunan alat radas yang digunakan untuk mengkaji elektrolisis bagi larutan argentum nitrat dengan menggunakan elektrod karbon.*

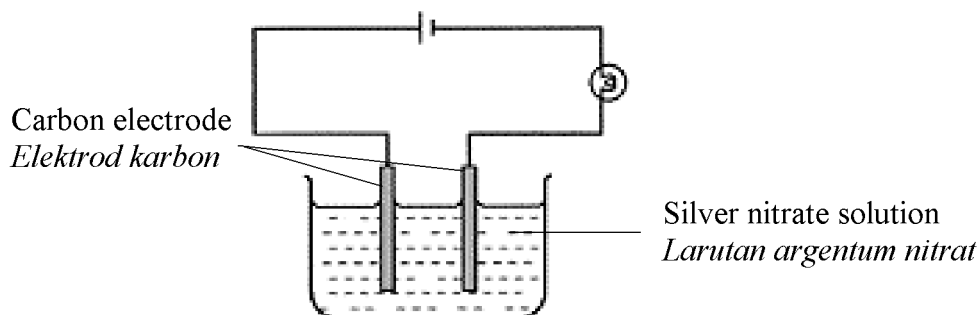


Diagram 15

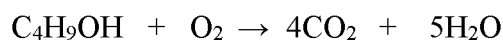
*Rajah 15*

Which half-equation show that the oxidation reaction occurs in the electrolysis?

*Persamaan setengah yang manakah menunjukkan tindak balas pengoksidaan yang berlaku di dalam elektrolisis ini?*

- A  $2\text{H}^+ + 2\text{e} \rightarrow \text{H}_2$   
 B  $\text{Ag} \rightarrow \text{Ag}^+ + \text{e}$   
 C  $\text{Ag}^+ + \text{e} \rightarrow \text{Ag}$   
 D  $4\text{OH}^- \rightarrow 2\text{H}_2\text{O} + \text{O}_2 + 4\text{e}$
- 43 The following equation represents the complete combustion of 111g of butanol in excess oxygen.

*Persamaan berikut mewakili tindak balas pembakaran lengkap 111g butanol di dalam oksigen berlebihan.*



What is the mass of water produced?

[Relative molecular mass of water = 18 ; Relative molecular mass of butanol = 74]

*Berapakah jisim air yang terbentuk?*

[*Jisim molekul relatif air = 18 ; Jisim molekul relatif butanol = 74*]

- A 135.0 g  
 B 90.0 g  
 C 27.0 g  
 D 5.4 g

- 44 Diagram 16 shows the curve P obtained when 1.0 g of calcium carbonate chips reacted with excess hydrochloric acid at 50°C.

*Rajah 16 menunjukkan lengkung P yang diperolehi apabila 1.0 g serpihan kalsium karbonat bertindak balas dengan asid hidroklorik berlebihan pada suhu 50°C.*

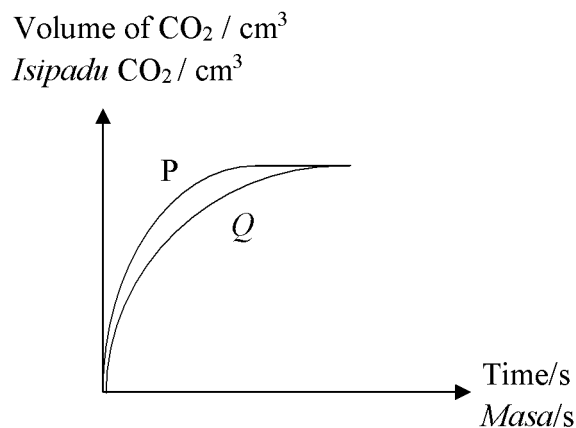
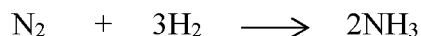


Diagram 16  
*Rajah 16*

Which of the following would have resulted in curve Q?

*Antara yang berikut, yang manakah akan menghasilkan lengkung Q?*

- A Increase the temperature of hydrochloric acid to 60°C  
*Menaikkan suhu asid hidroklorik kepada 60°C*
- B Add distilled water to the hydrochloric acid  
*Menambahkan air suling kepada asid hidroklorik*
- C Use 2.0 g of calcium carbonate powder  
*Menggunakan 2.0 g serbuk kalsium karbonat*
- D Use 0.5 g of calcium carbonate chips  
*Menggunakan 0.5 g serpihan kalsium karbonat*
- 45 The equation below shows the reaction in Haber process.  
*Persamaan di bawah menunjukkan tindak balas dalam proses Haber.*



What is the catalyst used in the process?

*Apakah mangkin yang digunakan dalam proses ini?*

- A Iron  
*Besi*
- B Nickel  
*Nikel*
- C Platinum  
*Platinum*
- D Vanadium(V) oxide  
*Vanadium(V) oksida*

- 46 Diagram 17 shows the reaction between metal X and nitric acid.  
*Rajah 17 menunjukkan tindak balas antara logam X dan asid nitrik.*

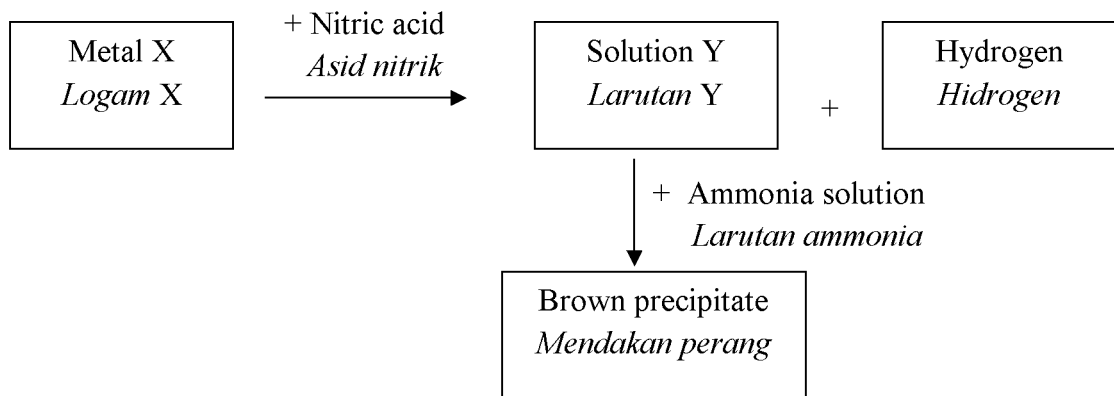
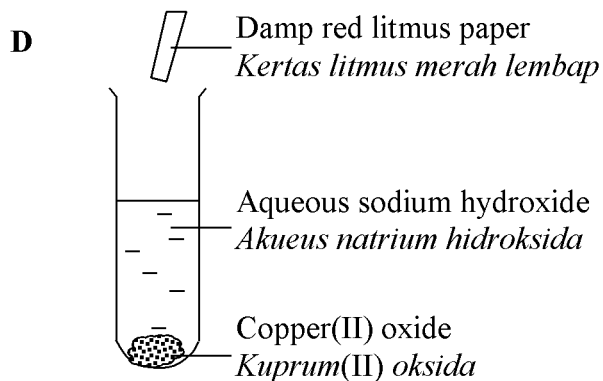
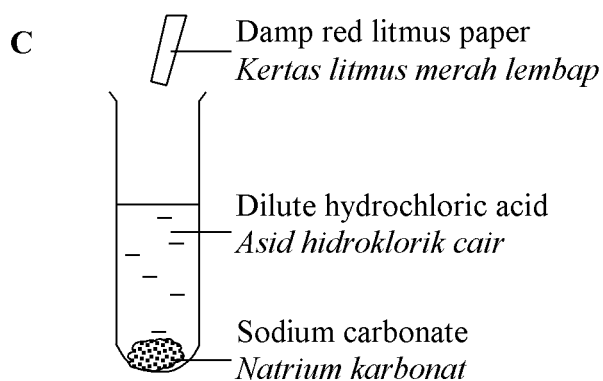
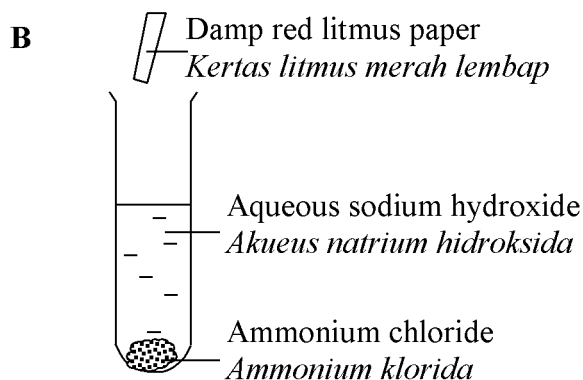
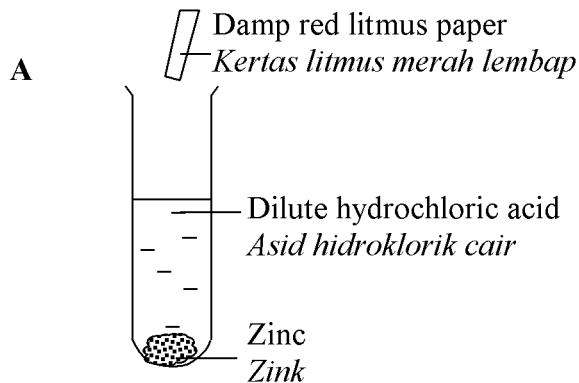


Diagram 17  
*Rajah 17*

Identify solution Y.  
*Kenal pasti larutan Y.*

- A Zinc nitrate  
*Zink nitrat*
- B Iron(II) nitrate  
*Ferum(II) nitrat*
- C Iron(III) nitrate  
*Ferum(III) nitrat*
- D Copper(II) nitrate  
*Kuprum(II) nitrat*

- 47 The diagrams show the mixture of chemicals.  
Which of the following change the colour of litmus paper?  
*Rajah-rajab menunjukkan campuran bahan kimia.*  
*Antara berikut, yang manakah memukarkan warna kertas litmus?*



- 48 Diagram 18 shows the apparatus set-up of an electrolytic cell.  
*Rajah 18 menunjukkan susunan radas bagi satu sel elektrolisis.*

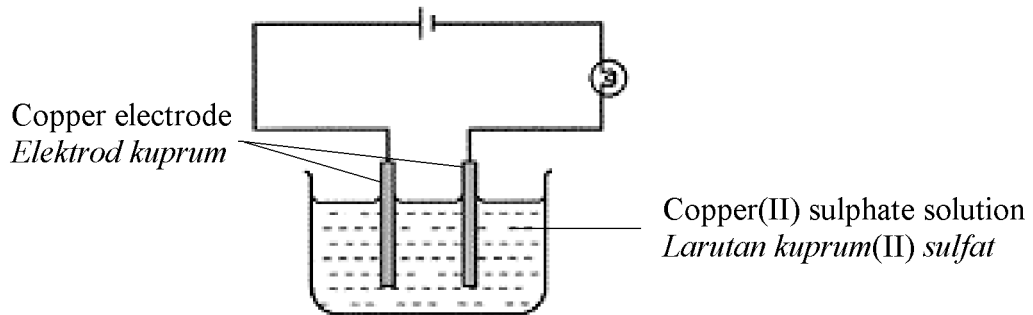


Diagram 18  
*Rajah 18*

Which of the half-equations represent the reactions at both electrodes?  
*Persamaan setengah manakah yang mewakili tindak balas di kedua-dua elektrod?*

	<b>Anode</b> <i>Anod</i>	<b>Cathode</b> <i>Katod</i>
<b>A</b>	$\text{Cu}^{2+} + 2\text{e} \rightarrow \text{Cu}$	$\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}$
<b>B</b>	$\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}$	$4\text{OH}^- \rightarrow \text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}$
<b>C</b>	$\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}$	$\text{Cu}^{2+} + 2\text{e} \rightarrow \text{Cu}$
<b>D</b>	$4\text{OH}^- \rightarrow \text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}$	$\text{Cu}^{2+} + 2\text{e} \rightarrow \text{Cu}$

- 49 Diagram 19 shows oil rig exploration in the ocean. A magnesium block were fastened to the rig poles using steel cables.

*Rajah 19 menunjukkan sebuah plantar minyak yang terdapat di lautan. Sebuah bongkah magnesium telah diikat kepada tiang plantar dengan menggunakan kabel keluli.*

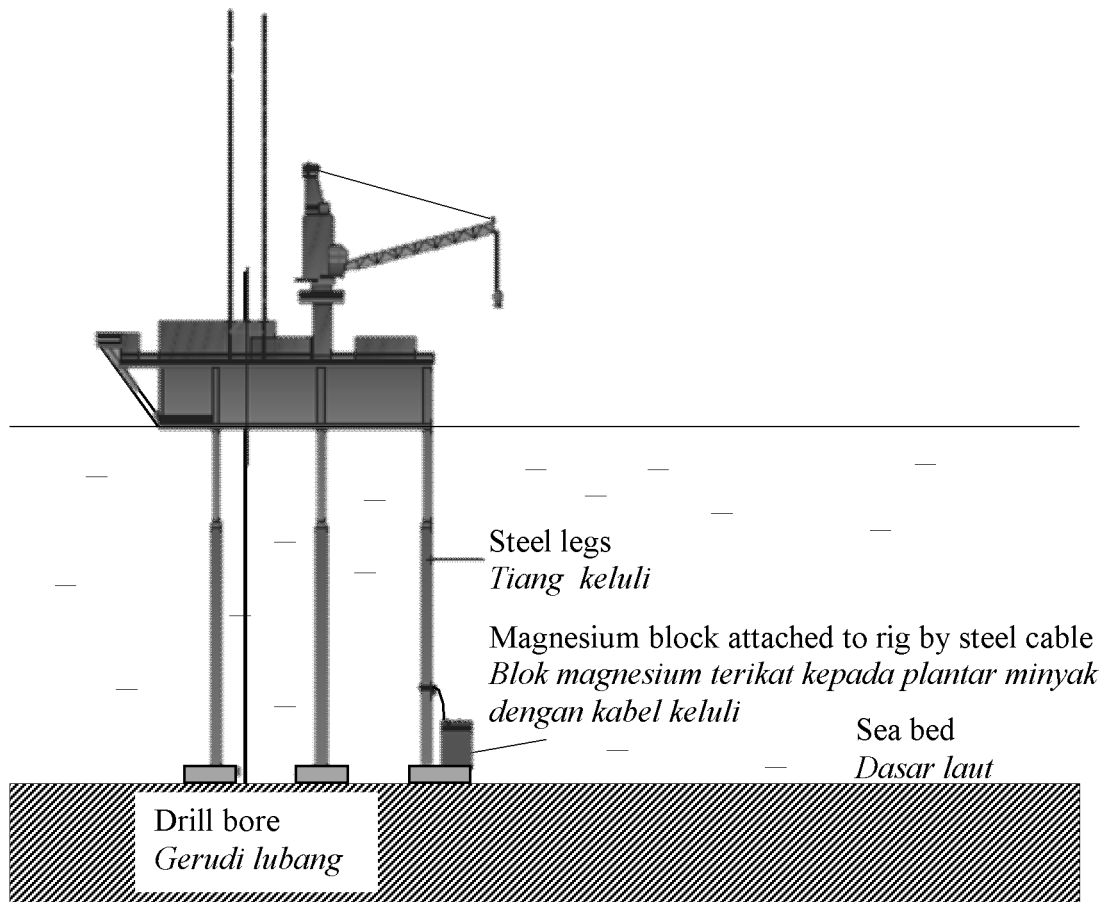


Diagram 19

*Rajah 19*

Which material can be used to replace the magnesium block?

*Bahan manakah yang boleh digunakan untuk menggantikan bongkah magnesium?*

- A Zinc  
*Zink*
- B Steel  
*Keluli*
- C Copper  
*Kuprum*
- D Composite material  
*Bahan komposit*

- 50 In an experiment, 50 cm<sup>3</sup> of 1.0 mol dm<sup>-3</sup> lead(II) nitrate solution is added to the 50 cm<sup>3</sup> of 2.0 mol dm<sup>-3</sup> copper(II) chloride solution in a plastic container. The temperature of the mixture rises by 1.5 °C.

What is the heat of precipitation?

[Density of water = 1.0 g cm<sup>-3</sup>; Specific heat capacity of solution = 4.2 J g<sup>-1</sup>°C<sup>-1</sup>]

*Dalam satu eksperimen, 50 cm<sup>3</sup> larutan plumbum(II) nitrat 1.0 mol dm<sup>-3</sup> di tambah kepada 50 cm<sup>3</sup> larutan kuprum(II) klorida 2.0 mol dm<sup>-3</sup> di dalam sebuah bekas plastik. Suhu campuran telah meningkat sebanyak 1.5 °C.*

*Berapakah haba pemendakan eksperimen ini?*

*[Ketumpatan air = 1.0 g cm<sup>-3</sup>; Muatan haba tentu larutan = 4.2 J g<sup>-1</sup>°C<sup>-1</sup>]*

- A +6.3kJ mol<sup>-1</sup>
- B -6.3 kJ mol<sup>-1</sup>
- C +12.6 kJ mol<sup>-1</sup>
- D -12.6 kJ mol<sup>-1</sup>

**END OF QUESTION PAPER**

***KERTAS SOALAN TAMAT***

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

**INFORMATION FOR CANDIDATES**  
**MAKLUMAT UNTUK CALON**

1. This question paper consists of **50** questions.  
*Kertas soalan ini mengandungi 50 soalan.*
2. Answer **all** questions.  
*Jawab **semua** soalan.*
3. Each question is followed by four alternative answers, **A, B, C** or **D**. For each question, choose **one** answer only. Blacken your answer on the objective answer sheet provided.  
*Tiap-tiap soalan diikuti oleh empat pilihan jawapan, iaitu **A, B, C** dan **D**. Bagi setiap soalan, pilih **satu** jawapan sahaja. Hitamkan jawapan anda pada kertas jawapan objektif yang disediakan.*
4. If you wish to change your answer, erase the blackened mark that you have made. Then blacken the new answer.  
*Jika anda hendak menukar jawapan, padamkan tanda yang telah dibuat. Kemudian hitamkan jawapan yang baru.*
5. The diagrams in the questions are not drawn to scale unless stated.  
*Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.*
6. You may use a scientific calculator.  
*Anda dibenarkan menggunakan kalkulator saintifik.*



**Section A**  
**Bahagian A**

[60 marks]  
[60 markah]

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

- 1 Diagram 1.1 shows one of the uses of synthetic polymer and its structural formula.  
*Rajah 1.1 menunjukkan salah satu kegunaan polimer sintetik dan formula strukturnya.*

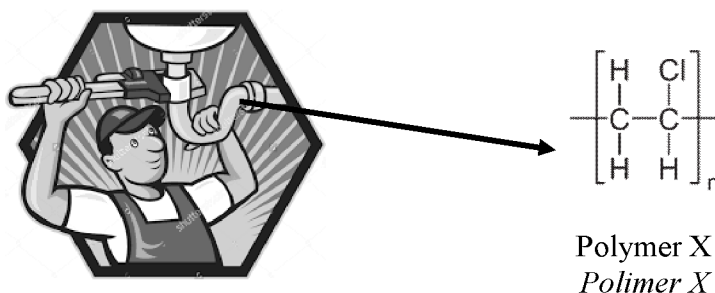


Diagram 1.1  
*Rajah 1.1*

- (a) (i) State the meaning of polymer.  
*Nyatakan maksud polimer.*

.....  
[1 mark]  
[1 markah]

- (ii) State the name polymer X.  
*Nyatakan nama polimer X.*

.....  
[1 mark]  
[1 markah]

- (iii) Draw the structural formula of the monomer of polymer X.  
*Lukiskan formula struktur monomer bagi polimer X.*

[1 mark]  
[1 markah]

- (iv) State one advantage of using X as water pipes compared to metal pipes.  
*Nyatakan satu kelebihan menggunakan X sebagai paip air berbanding paip logam.*

.....  
[1 mark]  
[1 markah]

- (b) Borosilicate glass is one type of glass that is widely use.  
*Kaca borosilikat merupakan salah satu jenis kaca yang banyak digunakan.*

- (i) State the main component of the glass.  
*Nyatakan komponen utama kaca itu.*

.....  
[1 mark]  
[1 markah]

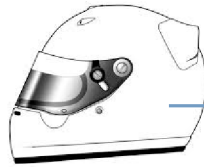
- (ii) State one main characteristics of the borosilicate glass.  
*Nyatakan satu sifat utama kaca borosilikat.*

.....  
[1 mark]  
[1 markah]

- (iii) State one use of the borosilicate glass in daily life.  
*Nyatakan satu kegunaan kaca borosilikat di dalam kehidupan seharian.*

.....  
[1 mark]  
[1 markah]

- (c) Diagram 1.2 shows a helmet that is wear by motorist for their safety.  
*Rajah 1.2 menunjukkan sebuah topi keledar yang digunakan oleh penunggang motosikal untuk keselamatan mereka.*



Material Y  
*Bahan Y*

Diagram 1.2  
*Rajah 1.2*

Material Y is made up from the mixture of glass and plastic.  
*Bahan Y diperbuat daripada campuran kaca dan plastik.*

- (i) State the name of material Y.  
*Nyatakan nama bahan Y.*

.....  
 [1 mark]  
 [1 markah]

- (ii) State one advantage of material Y compared to borosilicate glass.  
*Nyatakan kelebihan bahan Y berbanding kaca borosilikat.*

.....  
 [1 mark]  
 [1 markah]

- 2 Diagram 2.1 shows a portion of the Periodic Table of Elements. The letters listed below are not the actual symbols of the elements.

*Rajah 2.1 menunjukkan sebahagian daripada Jadual Berkala Unsur. Huruf yang disenaraikan di bawah bukan simbol yang sebenar bagi unsur-unsur.*

	1	2										13	14	15	16	17	18	
1																		Z
2													X					
3	V					W											Y	
4																		

Diagram 2.1

*Rajah 2.1*

- (a) By using the letters in Diagram 2.1, which element exists as a monoatomic?  
Give a reason.  
*Dengan menggunakan huruf-huruf dalam Rajah 2.1, unsur manakah wujud sebagai monoatom?  
Berikan satu alasan.*

.....  
.....

[2 marks]  
[2 markah]

- (b) Element W belong to a group that has special characteristics which differentiate it from the other group.  
Name the group and state one special characteristic of the group.  
*Unsur W tergolong dalam kumpulan yang mempunyai ciri-ciri istimewa yang membezakannya daripada kumpulan lain.  
Namakan kumpulan itu dan nyatakan satu ciri istimewa kumpulan itu.*

.....  
.....

[2 marks]  
[2 markah]

- (c) Write the chemical equation when Y is dissolved in water.  
*Tulis persamaan kimia apabila Y dilarutkan dalam air.*

.....  
.....

[2 marks]  
[2 markah]

- (d) Diagram 2.2 shows the structure of an atom of one of the element in Diagram 2.1.  
*Rajah 2.2 menunjukkan struktur atom bagi salah satu unsur dalam Rajah 2.1.*

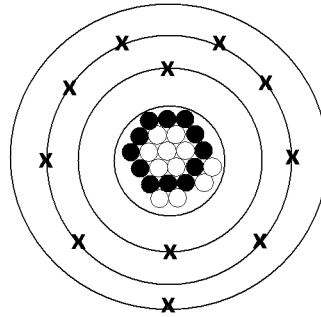


Diagram 2.2  
*Rajah 2.2*

- (i) Table 2 shows the guide for structure in Diagram 2.2.  
*Jadual 2 menunjukkan petunjuk bagi struktur atom dalam Rajah 2.2.*

Subatomic particle <i>Zarah subatom</i>	Name of subatomic particle <i>Nama zarah subatom</i>
x	Electron <i>Elektron</i>
●	
○	

Table 2  
*Jadual 2*

Complete Table 2.  
*Lengkapkan Jadual 2.*

[2 marks]  
 [2 markah]

- (ii) Which element in Diagram 2.1 has the structure of atom as in Diagram 2.2?  
*Dengan menggunakan huruf dalam Rajah 2.1, unsur manakah mempunyai struktur atom seperti dalam Rajah 2.2?*

.....  
 [1 mark]  
 [1 markah]

- (iii) Element stated in (d)(ii) is has an isotope. State the function of the isotope.  
*Unsur yang dinyatakan di (d)(ii) mempunyai satu isotop. Nyatakan fungsi isotop itu.*

.....  
[1 mark]

[1 *markah*]

- 3 (a) Diagram 3 shows an educational TV program.  
*Rajah 3 menunjukkan satu rancangan TV pendidikan.*

Chemists use unit of mol to measure the quantity of a substance.  
*Ahli kimia menggunakan unit mol untuk menyukat kuantiti bahan.*

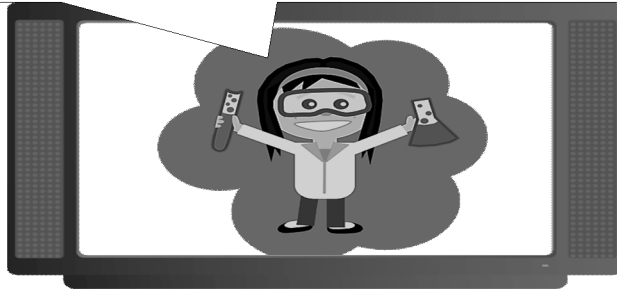


Diagram 3  
*Rajah 3*

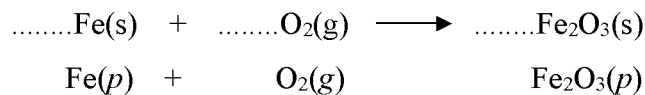
- (i) What is the meaning of a mole?  
*Apakah yang dimaksudkan dengan satu mol?*

[1 mark]  
 [1 markah]

- (ii) Calculate the numbers of particles in 0.01 mol of iron.  
 [Avogadro constant =  $6.02 \times 10^{23} \text{ mol}^{-1}$ ]  
*Hitungkan bilangan zarah-zarah dalam 0.01 mol besi.*  
 [Pemalar Avogadro =  $6.02 \times 10^{23} \text{ mol}^{-1}$ ]

[1 mark]  
 [1 markah]

- (b) The equation below is not a balance chemical equation.  
*Persamaan dibawah adalah bukan persamaan kimia yang seimbang.*



- (i) Balance the chemical equation above.  
*Seimbangkan persamaan kimia di atas.*

[1 mark]  
 [1 markah]

- (ii) Interpret the chemical equation qualitatively and quantitatively.  
*Tafsirkan persamaan itu secara kualitatif dan kuantitatif.*

.....  
.....

[2 marks]  
[2 markah]

- (c) Alkene E is an unsaturated hydrocarbon. E contains 85.7% of carbon, 14.3% of hydrogen, by mass, and the relative molecular mass of E is 42.

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

*Alkena E adalah suatu hidrokarbon tak tepu. E mengandungi 85.7% karbon, 14.3% hidrogen mengikut jisim dan jisim molekul relatif bagi E ialah 42.*

[Jisim atom relatif : H=1 ; C=12]

- (i) Determine the empirical formula of E.  
*Tentukan formula empirik bagi E.*

[3 marks]  
[3 markah]

- (ii) Determine the molecular formula of E.  
*Tentukan formula molekul bagi E.*

[2 marks]  
[2 markah]



- 4 (a) Table 4 shows the pH value of different concentration of ethanoic acid solutions.  
*Jadual 4 menunjukkan nilai pH bagi larutan asid etanoik dalam kepekatan yang berbeza.*

Set <i>Set</i>	Concentration (mol dm <sup>-3</sup> ) <i>Kepekatan, (mol dm<sup>-3</sup>)</i>	pH value <i>Nilai pH</i>
I	0.1	3
II	0.01	4

Table 4  
*Jadual 4*

- (i) Draw the structural formula of ethanoic acid.  
*Lukiskan formula struktur bagi asid etanoik.*

[1 mark]  
 [1 markah]

- (ii) The pH values of ethanoic acid in set I and set II are different. Give a reason.  
*Nilai pH asid etanoik di dalam set I dan set II adalah berbeza. Berikan satu alasan.*

.....  
 [1 mark]  
 [1 markah]

- (b) Diagram 4 shows the series of reactions involving ammonia.  
*Rajah 4 menunjukkan satu siri tindak balas yang melibatkan ammonia.*

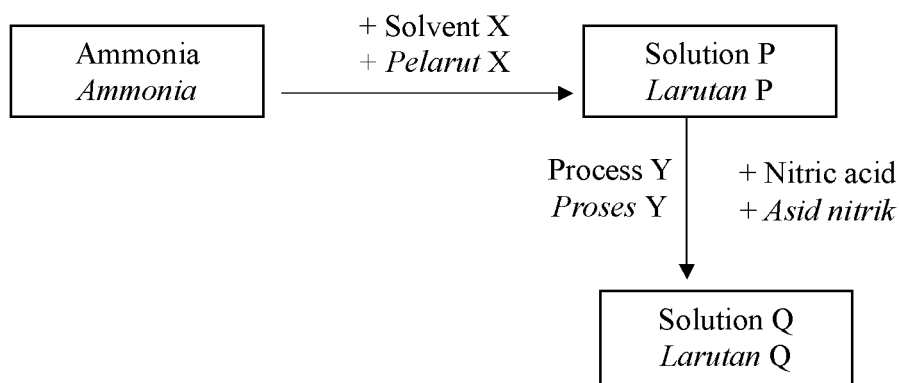


Diagram 4  
*Rajah 4*

- (i) Write the chemical formula of ammonia.  
*Tuliskan formula kimia bagi ammonia.*

.....  
[1 mark]  
[1 markah]

- (ii) State the type of particles in ammonia.  
*Nyatakan jenis zarah dalam ammonia.*

.....  
[1 mark]  
[1 markah]

- (iii) Solution P change red litmus paper to blue.  
State the particle that cause the changes.  
*Larutan P menukarkan kertas litmus merah ke biru.*  
*Nyatakan zarah yang menyebabkan perubahan itu.*

.....  
[1 mark]  
[1 markah]

- (iv) Write a balanced chemical equation for reaction between solution P and nitric acid.  
*Tuliskan persamaan kimia seimbang bagi tindak balas antara larutan P dengan asid nitrik.*

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

- (v) Name process Y.  
*Namakan proses Y.*

.....  
[1 mark]  
[1 markah]

- (vi) Describe briefly how to confirm the present of anion in solution Q.  
*Huraikan secara ringkas bagaimana anda dapat mengesahkan anion yang terdapat di dalam larutan Q.*

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

- 5 Diagram 5 shows two electrolytic cells with different concentration of sodium chloride solution as the electrolyte.

Rajah 5 menunjukkan dua sel elektrolisis dengan larutan natrium klorida sebagai elektrolit.

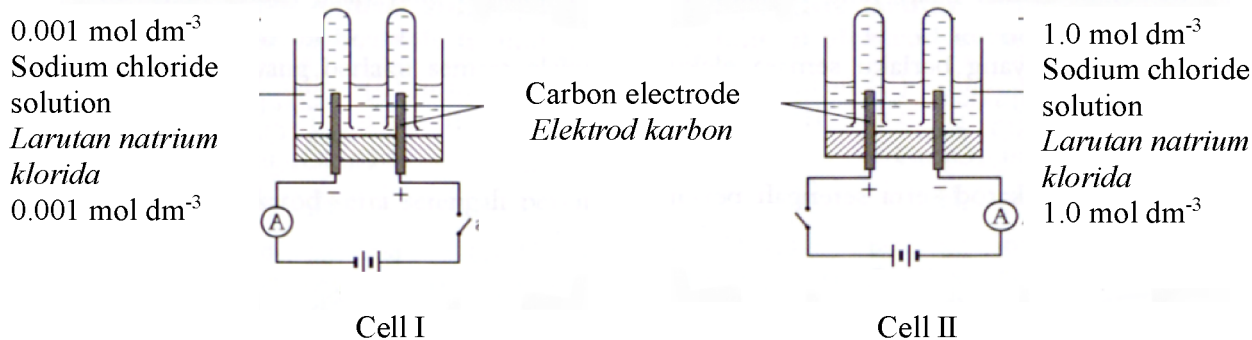


Diagram 5  
Rajah 5

- (a) Write the formula of all anions and cations present in sodium chloride solution.  
*Tuliskan formula bagi semua anion dan kation yang terdapat dalam larutan natrium klorida.*

Anions : ..... Cations : .....  
*Anion Kation*

[2 marks]  
[2 markah]

- (b) Based on Cell I and Cell II in Diagram 5,  
*Berdasarkan Sel I dan Sel II dalam Rajah 5,*

- (i) Name the product formed at the anode.  
*Namakan hasil yang terbentuk di anod.*

Cell I : .....  
*Sel I*

Cell II : .....  
*Sel II*

[ 2 marks]  
[2 markah]

- (ii) Write the half equations for the reactions at the anode.  
*Tuliskan persamaan setengah bagi tindak balas di anod.*

Cell I : .....  
*Sel I*

Cell II : .....  
*Sel II*

[ 2 marks ]  
[2 markah]

- (c) A colourless gas is produced at the cathode of Cell II and the gas is collected in a test tube. Describe one chemical test to identify the gas produced.

*Gas tanpa warna yang terhasil di katod dalam Sel II telah dikumpulkan dalam sebuah tabung uji.*

*Huraikan satu ujian kimia bagi mengenalpasti gas itu.*

.....  
 .....

[ 2 marks]

[2 markah]

- (d) A voltaic cell can generate electricity. By choosing any two metal strips given in the box, draw a labelled diagram of apparatus set-up of a voltaic cell that can produce the highest voltage.

*Sel voltan boleh menghasilkan arus elektrik.*

*Dengan memilih mana-mana dua kepingan logam yang diberi dalam kotak, lukiskan satu rajah berlabel bagi susunan radas sel voltan bagi menghasilkan voltan paling tinggi.*

Magnesium strip <i>Kepingan Magnesium</i>	Copper strip <i>Kepingan Kuprum</i>	Silver strip <i>Kepingan Argentum</i>
--	--	--

[ 2 marks ]

[2 markah]

- 6 Table 6 shows the structural formulae of three carbon compounds.  
*Jadual 6 menunjukkan formula struktur bagi tiga sebatian karbon.*

Substance <i>Bahan</i>	Structural Formula <i>Formula Struktur</i>	Name <i>Name</i>
X	$  \begin{array}{c}  \text{H} \quad \text{H} \quad \text{H} \\    \quad   \quad   \\  \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\    \quad   \quad   \\  \text{H} \quad \text{H} \quad \text{H}  \end{array}  $	.....
Y	$  \begin{array}{c}  \text{H} \quad \text{H} \quad \text{H} \\    \quad   \quad   \\  \text{H}-\text{C}-\text{C}-\text{C}-\text{OH} \\    \quad   \quad   \\  \text{H} \quad \text{H} \quad \text{H}  \end{array}  $	.....
Z	$  \begin{array}{c}  \text{H} \\    \\  \text{H}-\text{C}-\text{C}=\text{C} \begin{array}{l} / \text{H} \\ \backslash \text{H} \end{array} \\    \quad   \\  \text{H} \quad \text{H}  \end{array}  $	.....

Table 6  
*Jadual 6*

- (a) What is the meaning of carbon compounds?  
*Apakah maksud sebatian karbon?*

.....

[1 mark]  
 [1 markah]

- (b) State the name of substance X, Y and Z based on IUPAC nomenclature.  
 Write your answer in Table 6.  
*Nyatakan nama bagi bahan X, Y dan Z berpandukan sistem penamaan IUPAC.  
 Tuliskan jawapan anda dalam Jadual 6.*

[3 marks]  
 [3 markah]

- (c) Draw the structural formula for isomer of substance Y.  
*Lukiskan formula struktur bagi isomer bagi bahan Y.*

[1 mark]  
 [1 markah]

- (d) Substance Y can be converted to substance Z through dehydration reaction.  
 Draw a labelled diagram how the reaction can be carried out in the school laboratory.  
*Bahan Y boleh ditukarkan kepada bahan Z melalui tindak balas pendehidratan.*  
*Lukiskan gambar rajah berlabel susunan radas yang digunakan untuk menjalankan tindak*  
*balas itu di makmal sekolah.*

[2 marks]  
 [2 markah]

- (e) Diagram 6 shows the apparatus set-up for the reaction between bromine water with X and Z.  
*Rajah 6 menunjukkan susunan radas bagi tindak balas antara air bromin dengan X dan Z.*

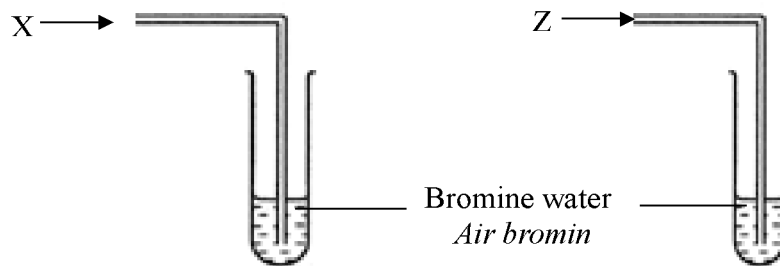


Diagram 6  
 Rajah 6

- (i) State the observations for both test tube.  
*Nyatakan pemerhatian bagi kedua-dua tindak balas.*

.....  
 [1 mark]  
 [1 markah]

- (ii) Explain the observation.  
*Terangkan pemerhatian itu.*

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

**Section B**  
**Bahagian B**

[20 marks]

[20 markah]

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

Answer any **one** question.

*Jawab mana-mana **satu** soalan.*

- 7 Table 7.1 shows the characteristics of compounds P and Q.  
*Jadual 7.1 menunjukkan ciri-ciri sebatian P dan Q.*

<b>Compound Sebatian</b>	<b>Characteristic Ciri-ciri</b>
P	<ul style="list-style-type: none"> <li>• Dissolve in tetrachloromethane <i>Larut di dalam tetraklorometana</i></li> <li>• Low melting and boiling points <i>Takat lebur dan takat didih rendah</i></li> <li>• Do not conduct electricity <i>Tidak mengkonduksi elektrik</i></li> </ul>
Q	<ul style="list-style-type: none"> <li>• Dissolve in water <i>Larut di dalam air</i></li> <li>• High melting and boiling points <i>Takat lebur dan takat didih tinggi</i></li> <li>• Conduct electricity in molten state and aqueous solution <i>Mengkonduksi elektrik dalam keadaan lebur dan larutan akues</i></li> </ul>

Table 7.1  
*Jadual 7.1*

- (a) Based on the information in Table 7.1,  
*Berdasarkan maklumat dalam Jadual 7.1,*
- (i) Identify the type of compounds P and Q.  
*Kenal pasti jenis sebatian P dan Q.*
  - (ii) Give an example for each compounds P and Q  
*Berikan satu contoh bagi setiap sebatian P dan Q.*
  - (iii) The melting point and boiling point of compounds P and Q are different.  
Explain why.  
*Takat lebur dan takat didih bagi sebatian P dan Q adalah berbeza.  
Terangkan mengapa.*

[10 marks]  
[10 markah]

- (b) Table 7.2 shows the proton number for elements X, Y and Z.  
The letters are not the actual symbols of the elements.

*Jadual 7.2 menunjukkan nombor proton bagi unsur-unsur X, Y dan Z.*

*Huruf-huruf ini bukan simbol sebenar bagi unsur-unsur tersebut.*

<b>Element Unsur</b>	<b>Proton number Nombor proton</b>
X	6
Y	9
Z	12

Table 7.2  
*Jadual 7.2*

Using the information in Table 7.2, explain how two different type of compounds can be formed from these elements.

*Dengan menggunakan maklumat di dalam Jadual 7.2, terangkan bagaimana dua jenis sebatian yang berbeza boleh terbentuk daripada unsur-unsur itu.*

[10 marks]

[10 markah]



8. Rate of reaction is important in industries and in our everyday life.  
*Kadar tindak balas adalah penting dalam industri dan kehidupan harian.*

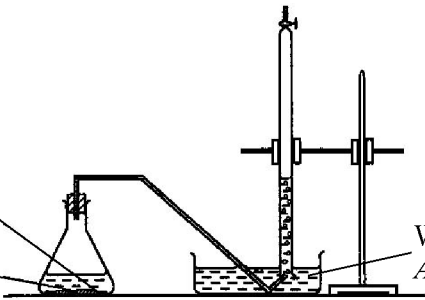
- (a) State the **four** factors that affect the rate of reaction.  
*Nyatakan empat faktor yang mempengaruhi kadar tindak balas.*

[4 marks]  
 [4 markah]

- (b) Contact process is one example of the industry to manufacture sulphuric acid.  
 What are the conditions required for the production of sulphuric acid in contact process?  
*Proses sentuh merupakan suatu contoh dalam industri untuk menghasilkan asid sulfurik.  
 Apakah keadaan-keadaan yang diperlukan untuk menghasilkan asid sulfurik dalam proses sentuh?*

[3 marks]  
 [3 markah]

- (c) A student carried out two experiments to investigate the effect of one factor on the rate of reaction in the school laboratory.  
 Diagram 8 shows the set-up of apparatus of the experiments.  
*Seorang pelajar menjalankan dua eksperimen untuk mengkaji kesan satu faktor ke atas kadar tindak balas di dalam makmal sekolah.  
 Rajah 8 menunjukkan susunan radas bagi eksperimen-eksperimen itu.*

Experiment <i>Eksperimen</i>	Apparatus set-up <i>Susunan radas</i>
I	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Excess sulphuric acid  <math>0.2 \text{ mol dm}^{-3}</math>  <i>Asid sulfurik <math>0.2 \text{ mol dm}^{-3}</math> berlebihan</i></p> <p>0.2 g zinc carbonate chips  <math>0.2 \text{ g}</math> serpihan zink karbonat</p> </div> <div style="width: 50%; text-align: center;">  <p>Water  <i>Air</i></p> </div> </div>

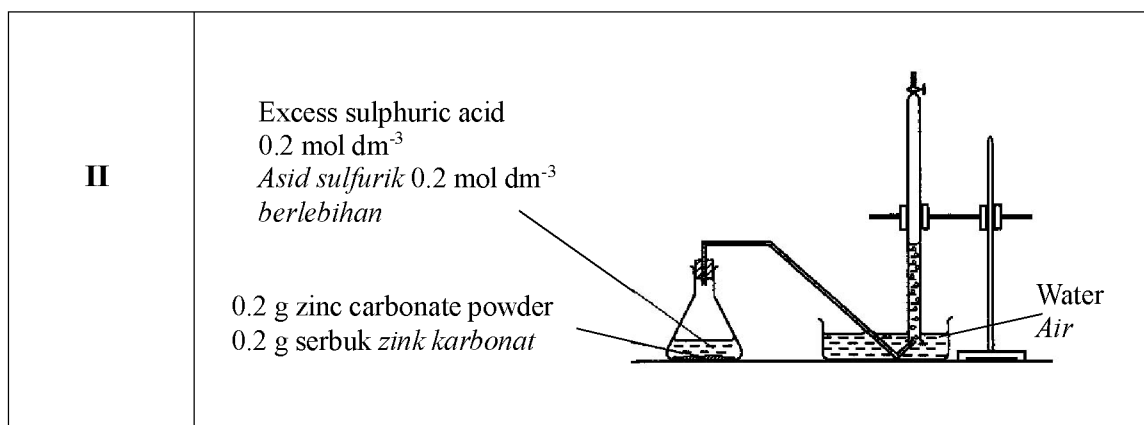


Diagram 8  
Rajah 8

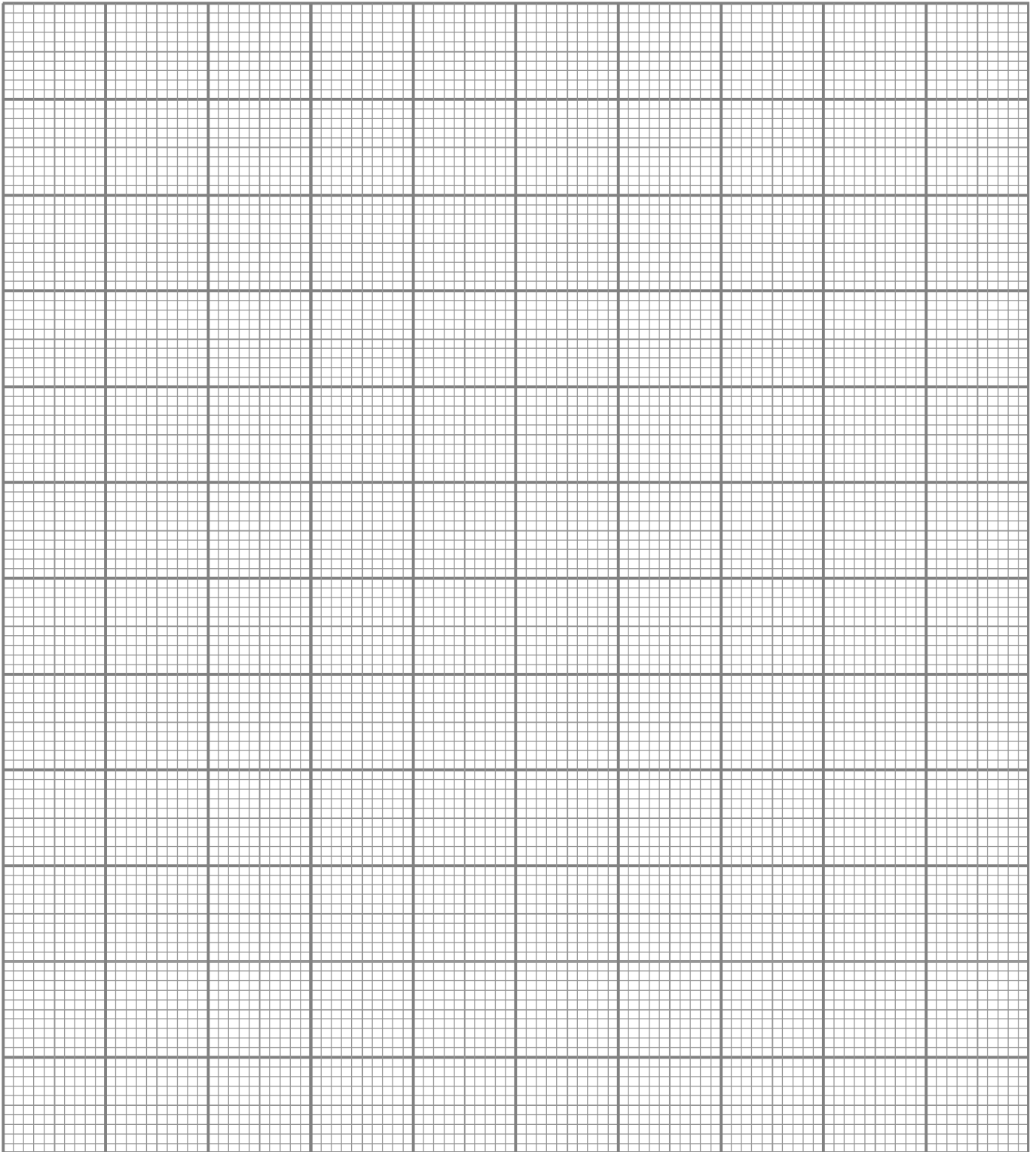
Table 8 shows the results of the experiments.  
*Jadual 8 menunjukkan keputusan eksperimen itu.*

Time /s <i>Masa /s</i>	0	30	60	90	120	150	180	210	240
Volume of gas of Experiment I $/\text{cm}^3$ <i>Isipadu gas bagi Eksperimen I <math>/\text{cm}^3</math></i>	0.00	5.30	12.10	17.40	22.30	26.50	30.20	32.00	32.00
Volume of gas of Experiment II $/\text{cm}^3$ <i>Isipadu gas bagi Eksperimen II <math>/\text{cm}^3</math></i>	0.00	11.00	18.50	23.40	28.70	32.00	32.00	32.00	32.00

Table 8  
*Jadual 8*

- (i) Plot the graph of the volume of carbon dioxide gas against time for Experiment I and Experiment II on the same axes on the graph paper provided at page 20.  
*Lukiskan graf isipadu gas karbon dioksida melawan masa bagi Eksperimen I dan Eksperimen II pada paksi yang sama pada kertas graf yang disediakan di muka surat 20.*

[4 marks]  
[4 markah]



- (ii) Calculate the average rate of reaction for Experiment I and Experiment II.  
*Hitungkan kadar tindak balas purata bagi Eksperimen I dan Eksperimen II.*
- [4 marks]  
[4 markah]
- (iii) Compare the rate of reaction between Experiment I and Experiment II.  
Explain your answer by using the collision theory.  
*Bandingkan kadar tindak balas antara Eksperimen I dengan Eksperimen II.*  
*Terangkan jawapan anda menggunakan teori pelanggaran.*
- [5 marks]  
[5 markah]

**Section C**  
**Bahagian C**

[20 marks]  
[20 markah]

Answer any **one** question.  
*Jawab mana-mana satu soalan.*  
<https://cikguadura.wordpress.com/>

- 9 (a) (i) Table 9 shows the heat of neutralisation of potassium hydroxide solution with two acids.  
*Jadual 9 menunjukkan haba peneutralan bagi larutan kalium hidroksida dengan dua asid.*

Set Set	Reactant <i>Bahan tindak balas</i>	Heat of neutralisation <i>Haba peneutralan</i> $\Delta H / \text{kJ mol}^{-1}$
I	Potassium hydroxide and acid X <i>Kalium hidroksida dan asid X</i>	-54
II	Potassium hydroxide and acid Y <i>Kalium hidroksida dan asid Y</i>	-57

Table 9  
*Jadual 9*

Compare  $\Delta H$  of set I and set II.  
Explain your answer.  
*Bandingkan  $\Delta H$  bagi set I dan set II.*  
*Terangkan jawapan anda.*

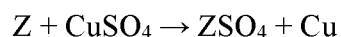
[4 marks]  
[4 markah]

- (ii) By using either set I or set II, sketch the energy level diagram for the reaction.  
Give two information from the diagram.  
*Dengan menggunakan sama ada set I atau set II, lakar gambar rajah aras tenaga untuk tindakbalas tersebut.*  
*Berikan dua maklumat daripada rajah itu.*

[5 marks]  
[5 markah]

- (b) The equation for the displacement reaction between metal Z and copper(II) sulphate solution is as follows:

*Persamaan bagi tindakbalas penyesaran antara logam Z dengan larutan kuprum(II) sulfat adalah seperti berikut:*



Suggest metal Z.

Describe an experiment to determine the heat of displacement between metal Z and copper(II) sulphate solution.

*Cadangkan logam Z.*

*Huraikan satu eksperimen untuk menentukan haba penyesaran antara logam Z dan larutan kuprum(II) sulfat.*

Your answer should include the following aspects:

*Jawapan anda hendaklah mengandungi aspek-aspek berikut:*

- Procedure of the experiment  
*Prosedur eksperimen*
- Tabulation of data  
*Penjadualan data*
- Calculation steps to show how the heat of displacement is determined.  
*Langkah pengiraan untuk menunjukkan bagaimana haba penyesaran ditentukan.*

[11 marks]

10. Table 10 shows results of chemical test of acidified potassium manganate(VII) and bromine water towards solution X and solution Y.

*Jadual 10 menunjukkan keputusan ujian kimia kalium manganat(VII) berasid dan air bromin terhadap larutan X dan larutan Y.*

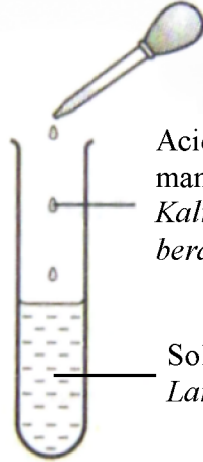
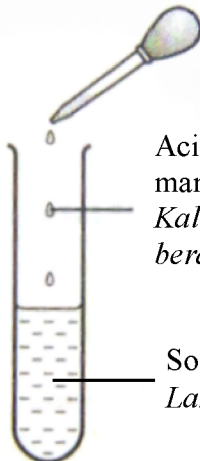
Set	Chemical Test <i>Ujian kimia</i>	Observation <i>Pemerhatian</i>
I	 <p>Acidified potassium manganate(VII) <i>Kalium manganat(VII) berasid</i></p> <p>Solution X <i>Larutan X</i></p>	<p>The colour of solution X changes from green to brown <i>Warna larutan X bertukar daripada hijau kepada perang</i></p>
II	 <p>Acidified potassium manganate(VII) <i>Kalium manganat(VII) berasid</i></p> <p>Solution Y <i>Larutan Y</i></p>	<p>The colour of solution Y changes from colourless to brown <i>Warna larutan Y bertukar daripada tidak berwarna kepada perang</i></p>

Table 10  
*Jadual 10*

- (a) Based on the chemical test and the observation in Table 10, identify solution X and solution Y. Explain your answer based on the following aspects:

*Berdasarkan ujian kimia dan pemerhatian dalam Jadual 10, kenalpasti larutan X dan larutan Y. Jelaskan jawapan anda berdasarkan aspek-aspek berikut:*

- The change in the oxidation number for X and Y.  
*Perubahan nombor pengoksidaan bagi X dan Y.*
- The type of reaction that has occurred to X and Y.  
*Jenis tindak balas yang berlaku pada X dan Y.*
- Half-equation for the reducing agents.  
*Persamaan setengah bagi agen penurunan.*
- Half-equation for the oxidizing agents.  
*Persamaan setengah bagi agen pengoksidaan.*
- Confirmatory test of product formed in Set I and Set II.  
*Ujian pengesahan hasil yang terbentuk dalam Set I dan Set II.*

[12 marks]

[12 markah]

- (b)

Electric current can be produced by the transfer of electron at a distance in a chemical reaction.

*Arus elektrik boleh dihasilkan melalui pemindahan elektron pada suatu jarak dalam suatu tindak balas kimia.*

By using any suitable materials and apparatus, describe an experiment to prove the statement above.

Your description must include the following:

*Dengan menggunakan bahan dan radas yang bersesuaian, huraikan eksperimen bagi membuktikan pernyataan di atas.*

*Huraian anda hendaklah disertakan perkara yang berikut:*

- Labelled diagram.  
*Gambarajah berlabel.*
- Procedure of the experiment  
*Prosedur eksperimen*
- Observation  
*Pemerhatian*
- Direction of electron flow  
*Arah aliran elektron*

[8 marks]

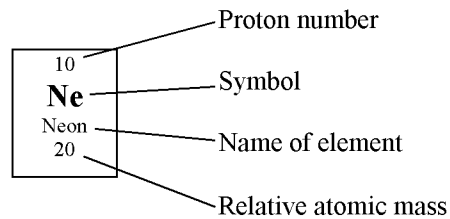
[8 markah]

<https://cikguadura.wordpress.com/>  
**END OF QUESTION PAPER**  
**KERTAS SOALAN TAMAT**



## THE PERIODIC TABLE OF THE ELEMENTS

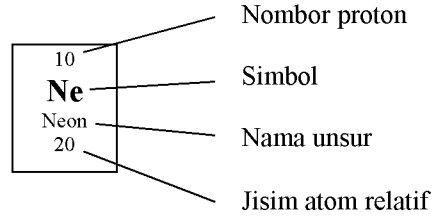
1 <b>H</b> Hydrogen 1																	2 <b>He</b> Helium 4
3 <b>Li</b> Lithium 7	4 <b>Be</b> Beryllium 9											5 <b>B</b> Boron 11	6 <b>C</b> Carbon 12	7 <b>N</b> Nitrogen 14	8 <b>O</b> Oxygen 16	9 <b>F</b> Fluorine 19	10 <b>Ne</b> Neon 20
11 <b>Na</b> Sodium 23	12 <b>Mg</b> Magnesium 24											13 <b>Al</b> Aluminium 27	14 <b>Si</b> Silicon 28	15 <b>P</b> Phosphorus 31	16 <b>S</b> Sulphur 32	17 <b>Cl</b> Chlorine 35	18 <b>Ar</b> Argon 40
19 <b>K</b> Potassium 39	20 <b>Ca</b> Calcium 40	21 <b>Sc</b> Scandium 45	22 <b>Ti</b> Titanium 48	23 <b>V</b> Vanadium 51	24 <b>Cr</b> Chromium 52	25 <b>Mn</b> Manganese 55	26 <b>Fe</b> Iron 56	27 <b>Co</b> Cobalt 59	28 <b>Ni</b> Nickel 59	29 <b>Cu</b> Copper 64	30 <b>Zn</b> Zinc 65	31 <b>Ga</b> Gallium 70	32 <b>Ge</b> Germanium 73	33 <b>As</b> Arsenic 75	34 <b>Se</b> Selenium 79	35 <b>Br</b> Bromine 80	36 <b>Kr</b> Krypton 84
37 <b>Rb</b> Rubidium 86	38 <b>Sr</b> Strontium 88	39 <b>Y</b> Yttrium 89	40 <b>Zr</b> Zirconium 91	41 <b>Nb</b> Niobium 93	42 <b>Mo</b> Molybdenum 96	43 <b>Tc</b> Technetium 98	44 <b>Ru</b> Ruthenium 101	45 <b>Rh</b> Rhodium 103	46 <b>Pd</b> Palladium 106	47 <b>Ag</b> Silver 108	48 <b>Cd</b> Cadmium 112	49 <b>In</b> Indium 115	50 <b>Sn</b> Tin 119	51 <b>Sb</b> Antimony 122	52 <b>Te</b> Tellurium 128	53 <b>I</b> Iodine 127	54 <b>Xe</b> Xenon 131
55 <b>Cs</b> Caesium 133	56 <b>Ba</b> Barium 137	57 <b>La</b> Lanthanum 139	72 <b>Hf</b> Hafnium 179	73 <b>Ta</b> Tantalum 181	74 <b>W</b> Tungsten 184	75 <b>Re</b> Rhenium 186	76 <b>Os</b> Osmium 190	77 <b>Ir</b> Iridium 192	78 <b>Pt</b> Platinum 195	79 <b>Au</b> Gold 197	80 <b>Hg</b> Mercury 201	81 <b>Tl</b> Thallium 204	82 <b>Pb</b> Lead 207	83 <b>Bi</b> Bismuth 209	84 <b>Po</b> Polonium 210	85 <b>At</b> Astatine 210	86 <b>Rn</b> Radon 222
87 <b>Fr</b> Francium 223	88 <b>Ra</b> Radium 226	89 <b>Ac</b> Actinium 227	104 <b>Unq</b> Unnilquadium 257	105 <b>Unp</b> Unnilpentium 260	106 <b>Unh</b> Unnilhexium 263	107 <b>Uns</b> Unnilseptium 262	108 <b>Uno</b> Unniloctium 265	109 <b>Une</b> Unnilennium 266									



58 <b>Ce</b> Cerium 140	59 <b>Pr</b> Praseodymium 141	60 <b>Nd</b> Neodymium 144	61 <b>Pm</b> Promethium 147	62 <b>Sm</b> Samarium 150	63 <b>Eu</b> Europium 152	64 <b>Gd</b> Gadolinium 157	65 <b>Tb</b> Terbium 167	66 <b>Dy</b> Dyprosium 163	67 <b>Ho</b> Holmium 165	68 <b>Er</b> Erbium 167	69 <b>Tm</b> Thulium 169	70 <b>Yb</b> Ytterbium 173	71 <b>Lu</b> Lutetium 175
90 <b>Th</b> Thorium 232	91 <b>Pa</b> Protactinium 231	92 <b>U</b> Uranium 238	93 <b>Np</b> Neptunium 237	94 <b>Pu</b> Plutonium 244	95 <b>Am</b> Americium 243	96 <b>Cm</b> Curium 247	97 <b>Bk</b> Berkelium 247	98 <b>Cf</b> Californium 249	99 <b>Es</b> Einsteinium 254	100 <b>Fm</b> Fermium 253	101 <b>Md</b> Mendelevium 256	102 <b>No</b> Nobelium 254	103 <b>Lr</b> Lawrencium 257

### JADUAL BERKALA UNSUR

1 <b>H</b> Hidrogen 1																	2 <b>He</b> Helium 4						
3 <b>Li</b> Litium 7	4 <b>Be</b> Berilium 9																	5 <b>B</b> Boron 11	6 <b>C</b> Karbon 12	7 <b>N</b> Nitrogen 14	8 <b>O</b> Oksigen 16	9 <b>F</b> Fluorin 19	10 <b>Ne</b> Neon 20
11 <b>Na</b> Natrium 23	12 <b>Mg</b> Magnesium 24																	13 <b>Al</b> Aluminium 27	14 <b>Si</b> Silikon 28	15 <b>P</b> Fosforus 31	16 <b>S</b> Sulfur 32	17 <b>Cl</b> Klorin 35	18 <b>Ar</b> Argon 40
19 <b>K</b> Kalium 39	20 <b>Ca</b> Kalsium 40	21 <b>Sc</b> Skandium 45	22 <b>Ti</b> Titanium 48	23 <b>V</b> Vanadium 51	24 <b>Cr</b> Kromium 52	25 <b>Mn</b> Mangan 55	26 <b>Fe</b> Ferum 56	27 <b>Co</b> Kobalt 59	28 <b>Ni</b> Nikel 59	29 <b>Cu</b> Kuprum 64	30 <b>Zn</b> Zink 65	31 <b>Ga</b> Galium 70	32 <b>Ge</b> Germanium 73	33 <b>As</b> Arsenik 75	34 <b>Se</b> Selenium 79	35 <b>Br</b> Bromin 80	36 <b>Kr</b> Kripton 84						
37 <b>Rb</b> Rubidium 86	38 <b>Sr</b> Strontium 88	39 <b>Y</b> Yttrium 89	40 <b>Zr</b> Zirkonium 91	41 <b>Nb</b> Niobium 93	42 <b>Mo</b> Molibdenu 96	43 <b>Tc</b> Teknetium 98	44 <b>Ru</b> Ruthenium 101	45 <b>Rh</b> Rodium 103	46 <b>Pd</b> Paladium 106	47 <b>Ag</b> Argentum 108	48 <b>Cd</b> Kadmium 112	49 <b>In</b> Indium 115	50 <b>Sn</b> Stanum 119	51 <b>Sb</b> Antimoni 122	52 <b>Te</b> Telurium 128	53 <b>I</b> Iodin 127	54 <b>Xe</b> Xenon 131						
55 <b>Cs</b> Sesium 133	56 <b>Ba</b> Barium 137	57 <b>La</b> Lanthanum 139	72 <b>Hf</b> Hafnium 179	73 <b>Ta</b> Tantalum 181	74 <b>W</b> Tungsten 184	75 <b>Re</b> Renyum 186	76 <b>Os</b> Osmium 190	77 <b>Ir</b> Iridium 192	78 <b>Pt</b> Platinum 195	79 <b>Au</b> Aurum 197	80 <b>Hg</b> Merkuri 201	81 <b>Tl</b> Taliun 204	82 <b>Pb</b> Plumbum 207	83 <b>Bi</b> Bismut 209	84 <b>Po</b> Polonium 210	85 <b>At</b> Astatin 210	86 <b>Rn</b> Radon 222						
87 <b>Fr</b> Fransium 223	88 <b>Ra</b> Radium 226	89 <b>Ac</b> Actinum 227	104 <b>Unq</b> Unnil- kuadium 257	105 <b>Unp</b> Unnil- pentium 260	106 <b>Unh</b> Unnilhexium 263	107 <b>Uns</b> Unnilseptium 262	108 <b>Uno</b> Unnilokti- um 265	109 <b>Une</b> Unnilenni- um 266															



58 <b>Ce</b> Serium 140	59 <b>Pr</b> Praseo- dimium 141	60 <b>Nd</b> Neodimium 144	61 <b>Pm</b> Prometium 147	62 <b>Sm</b> Samarium 150	63 <b>Eu</b> Europium 152	64 <b>Gd</b> Gadoliniu m 157	65 <b>Tb</b> Terbium 167	66 <b>Dy</b> Diprosiu m 163	67 <b>Ho</b> Holmium 165	68 <b>Er</b> Erbium 167	69 <b>Tm</b> Tulium 169	70 <b>Yb</b> Iterbium 173	71 <b>Lu</b> Lutetium 175
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*Reference: Chang, Raymond (1991). Chemistry. McGraw-Hill, Inc*

**INFORMATION FOR CANDIDATES**  
**MAKLUMAT UNTUK CALON**

1. This question paper consists of three sections: **Section A**, **Section B** and **Section C**  
*Kertas soalan ini mengandungi tiga bahagian: Bahagian A, Bahagian B dan Bahagian C.*
2. Answer **all** questions in **Section A**. Write your answer for **Section A** in the spaces provided in this question paper.  
*Jawab semua soalan dalam Bahagian A. Jawapan anda bagi Bahagian A hendaklah ditulis pada ruang disediakan dalam kertas soalan ini.*
3. Answer any **one** question from **Section B** and any one question from **Section C**. Write your answers for **Section B** and **Section C** on the 'helaian tambahan' provided by the invigilators.  
You may use equations, diagrams, tables, graphs and other suitable methods to explain your answers.  
*Jawab satu soalan dalam Bahagian B dan satu soalan daripada Bahagian C. Jawapan anda bagi Bahagian B dan Bahagian C hendaklah ditulis dalam helaian tambahan yang dibekalkan oleh pengawas peperiksaan. Anda boleh menggunakan persamaan, rajah, jadual, graf dan cara lain sesuai untuk menjelaskan jawapan anda.*
4. The diagrams in the questions are not drawn to scale unless stated.  
*Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.*
5. Marks allocated for each question or sub-part of a question is shown in brackets.  
*Markah yang diperuntukkan bagi setiap soalan atau ceraihan soalan ditunjukkan dalam kurungan.*
6. Show your working. It may help you to get marks.  
*Tunjukkan kerja mengira. Ini membantu anda mendapatkan markah.*
7. If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.  
*Jika anda hendak memukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.*
8. The Periodic Table of Elements is provided on page 26 and 27.  
*Jadual Berkala Unsur disediakan di halaman 26 dan 27.*
9. You may use non-programmable scientific calculator.  
*Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.*
10. You are advised to spend 90 minutes to answer questions in **Section A**, 30 minutes for **Section B** and 30 minutes for **Section C**.  
*Anda dinasihati supaya mengambil masa 90 minit untuk menjawab soalan dalam Bahagian A, 30 minit dalam Bahagian B dan 30 minit untuk Bahagian C.*
11. Detach **Section B** and **Section C** from this question paper. Tie the "helaian tambahan" together with this question paper and hand in to the invigilator at the end of the examination.

*Ceraikan Bahagian B dan Bahagian C daripada kertas soalan ini. Ikat helaian tambahan bersama-sama kertas soalan ini dan serahkan kepada pengawas peperiksaan pada akhir peperiksaan.*



Name : .....

Class : .....

**MAJLIS PENGETUA SEKOLAH MENENGAH MALAYSIA  
CAWANGAN NEGERI SEMBILAN**

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

**PROGRAM PENINGKATAN AKADEMIK TINGKATAN 5  
SEKOLAH-SEKOLAH MENENGAH NEGERI SEMBILAN 2016**

**4541/3****CHEMISTRY****Kertas 3****Sept.** $1\frac{1}{2}$  jam

Satu jam tiga puluh minit

**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

1. Tulis **nama dan kelas** anda pada ruangan yang disediakan.
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		
Kod Pemeriksa :		
Soalan	Markah Penuh	Markah Diperoleh
<b>1</b>	18	
<b>2</b>	15	
<b>3</b>	17	
Jumlah	50	

Kertas soalan ini mengandungi 12 halaman bercetak

Anwer **all** questions  
 Jawab **semua** soalan  
<https://cikguadura.wordpress.com/>

- 1 A student carried out an experiment to determine the heat of combustion of methanol, ethanol, propanol and butanol.  
 Diagram 1 shows the apparatus set-up for the experiment.

*Seorang pelajar telah menjalankan satu eksperimen untuk menentukan haba pembakaran metanol, etanol, propanol dan butanol.  
 Rajah 1 menunjukkan susunan radas bagi eksperimen itu.*

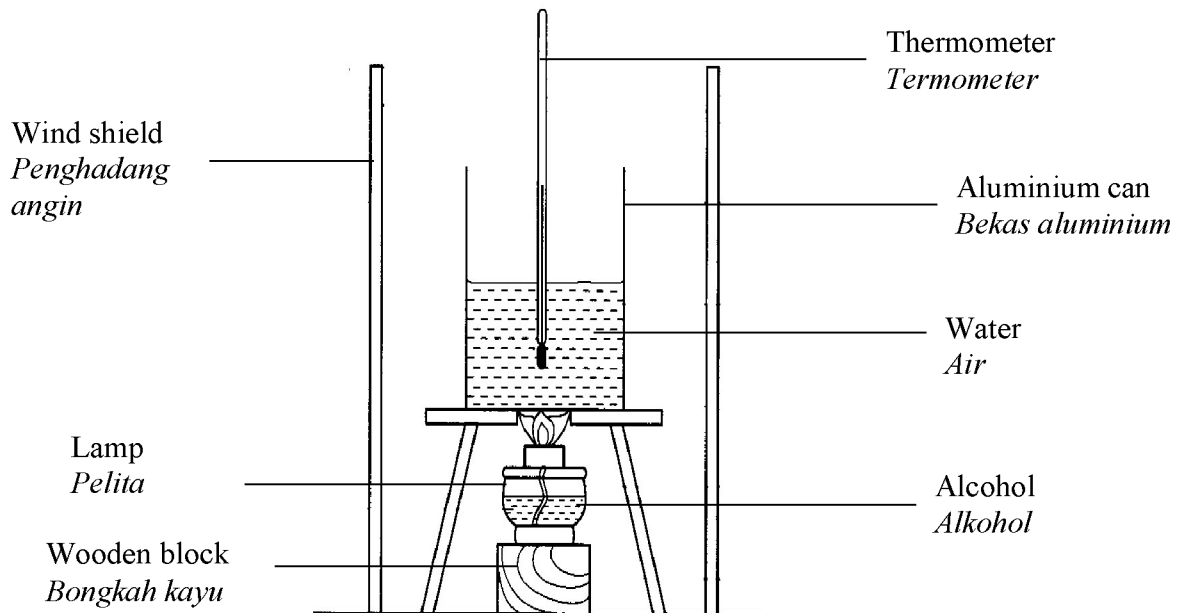


Diagram 1  
 Rajah 1

Table 1.1 shows the mass of lamp before and after burning of the alcohols.  
*Jadual 1.1 menunjukkan jisim pelita sebelum dan selepas pembakaran alkohol itu.*

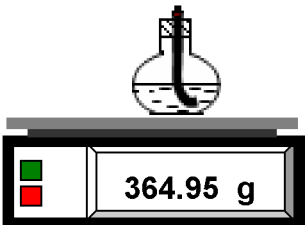
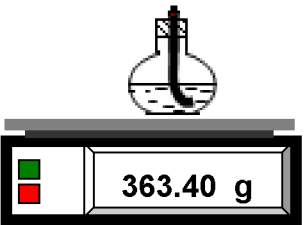
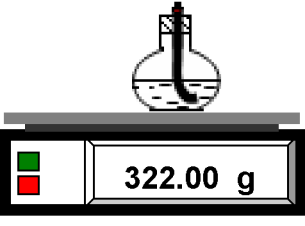
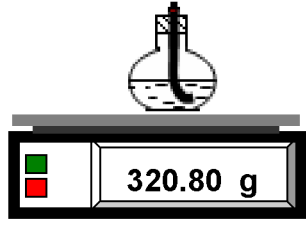
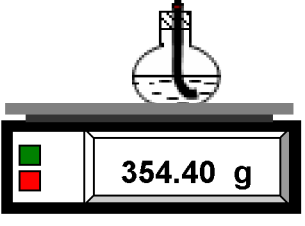
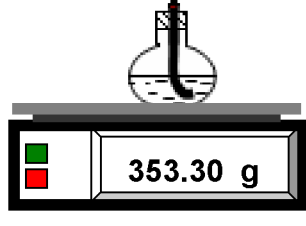
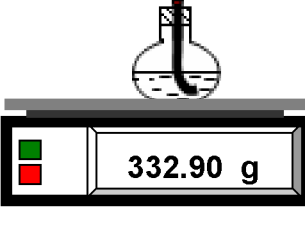
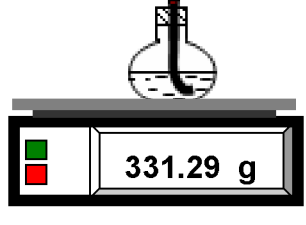
Alcohol <i>Alkohol</i>	Reading of Electronic Balance <i>Bacaan Penimbang Elektronik</i>		Mass of alcohol used <i>Jisim alkohol digunakan</i> (g)
	Before	After	
Methanol <i>Metanol</i>  CH <sub>3</sub> OH			.....
Ethanol <i>Etanol</i>  C <sub>2</sub> H <sub>5</sub> OH			.....
Propanol <i>Propanol</i>  C <sub>3</sub> H <sub>7</sub> OH			.....
Butanol <i>Butanol</i>  C <sub>4</sub> H <sub>9</sub> OH			.....

Table 1.1  
*Rajah 1.1*

- (a) State the mass of alcohols used in the spaces provided in Table 1.1.  
*Nyatakan jisim alkohol yang digunakan dalam ruangan yang disediakan dalam Jadual 1.1.*  
 [3 marks]  
 [3 markah]

(b) State the variables for this experiment.  
*Nyatakan pembolehubah bagi eksperimen ini.*

(i) Manipulated variable  
*Pembolehubah dimanipulasikan*

.....  
 (ii) Responding variable  
*Pembolehubah bergerak balas*

.....  
 (iii) Fixed variable  
*Pembolehubah dimalarkan*

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

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

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

Table 1.2 shows the heat of combustion determined by the student.

*Jadual 1.2 menunjukkan haba pembakaran yang telah ditentukan oleh pelajar itu.*

Alcohol <i>Alkohol</i>	Heat of combustion(kJ mol <sup>-1</sup> ) <i>Haba pembakaran (kJ mol<sup>-1</sup>)</i>
Methanol <i>Metanol</i>	540
Ethanol <i>Etanol</i>	970
Propanol <i>Propanol</i>	1400
Butanol <i>Butanol</i>	1830

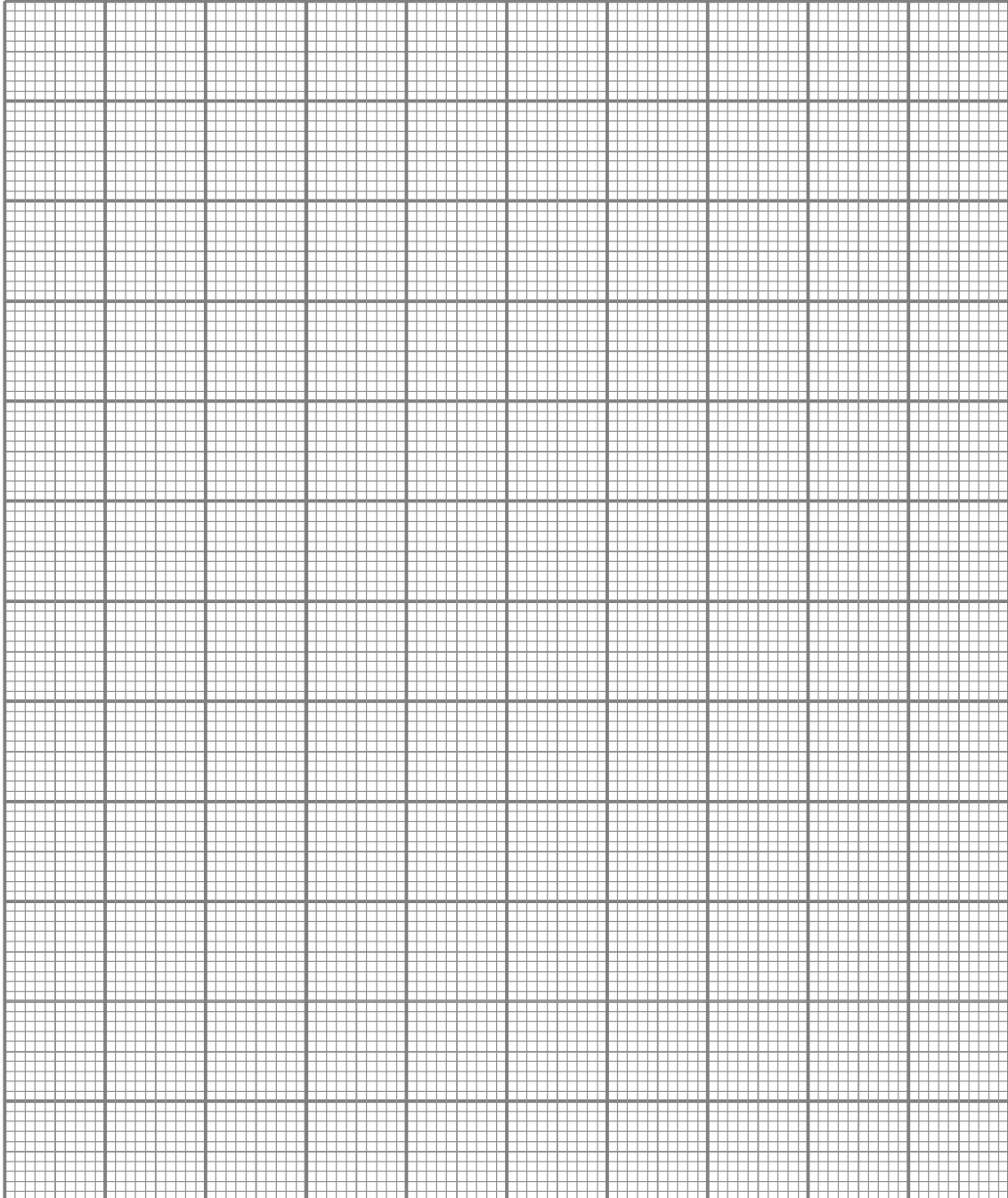
Table 1.2  
*Jadual 1.2*

- (d) Using the data in Table 1.2, draw a bar chart of heat combustion of alcohols against types of alcohol.

*Dengan menggunakan Jadual 1.2, lukis carta bar bagi haba pembakaran alkohol melawan jenis alkohol.*

[3 marks]

[3 markah]





- (e) Predict the value of heat of combustion of pentanol.  
Draw a bar of pentanol on the graph in (d).  
*Ramalkan nilai haba pembakaran bagi pentanol.*  
*Lukis satu bar bagi pentanol pada graf di (d).*

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

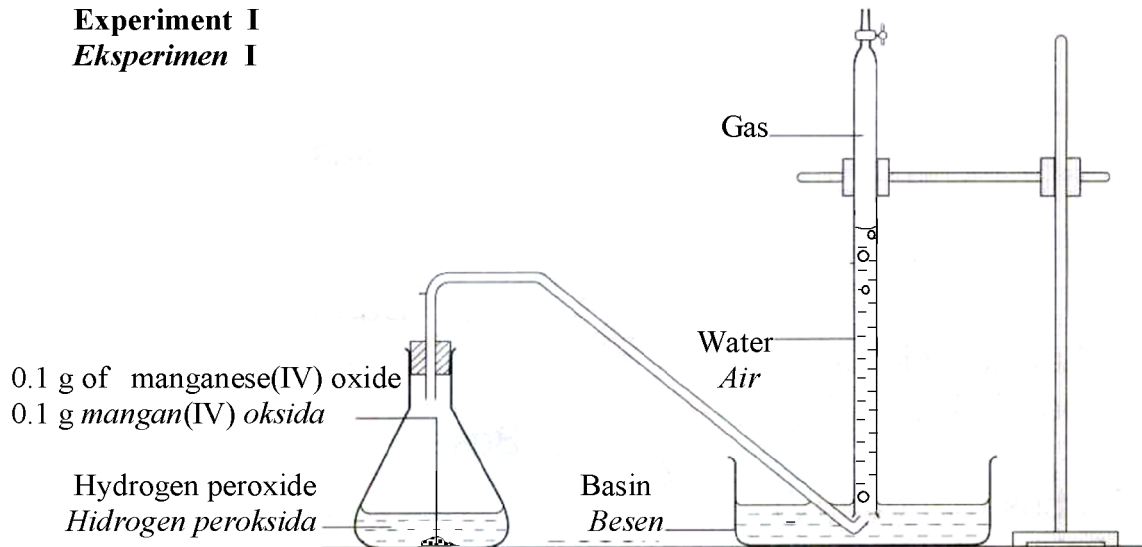
- (f) State the operational definition of heat of combustion of alcohol in this experiment.  
*Nyatakan definisi secara operasi bagi haba pembakaran alkohol dalam eksperimen ini.*

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

- 2 Diagram 2 shows the set-up of the apparatus used in Experiments I and II to investigate the effect of the quantity of manganese(IV) oxide as catalyst on the rate of decomposition of hydrogen peroxide for the first 30 seconds.

*Rajah 2 menunjukkan susunan radas yang digunakan dalam Eksperimen I dan Eksperimen II untuk mengkaji kesan kuantiti mangkin mangan(IV) oksida terhadap kadar penguraian hidrogen peroksida bagi 30 saat pertama.*

**Experiment I**  
**Eksperimen I**



**Experiment II**  
**Eksperimen II**

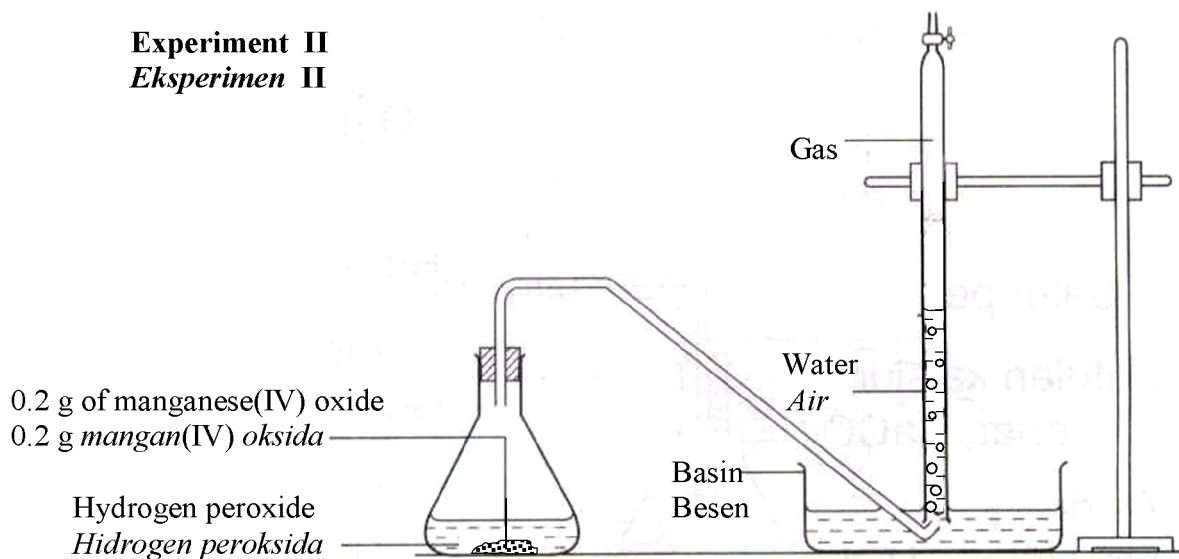


Diagram 2  
*Rajah 2*

- (a) (i) Based on Diagram 2, state the observation of this experiment.  
*Berdasarkan Rajah 2, nyatakan pemerhatian bagi eksperimen ini.*

.....  
 .....

[3 marks]  
 [3 markah]

- (ii) State an inference based on your observation.  
*Nyatakan inferens berdasarkan pemerhatian anda.*

.....

[3 marks]  
 [3 markah]

Table 2 show the volume of gas evolved for the first 30 s in Experiment I and Experiment II using different quantity of catalyst.

*Jadual 2 menunjukkan isipadu gas yang terbebas dalam 30 s pertama dalam Eksperimen I dan Eksperimen II dengan menggunakan kuantiti mangkin yang berbeza.*

Time(s) Masa(s)	Volume of gas evolved(cm <sup>3</sup> ) <i>Isipadu gas yang terbebas (cm<sup>3</sup>)</i>	
	Experiment I <i>Eksperimen I</i>	Experiment II <i>Eksperimen II</i>
	0.1 g of manganese(IV) oxide powder <i>0.1 g serbuk mangan(IV) oksida</i>	0.2 g of manganese(IV) oxide powder <i>0.2 g serbuk mangan(IV) oksida</i>
0	0.00	0.00
30	12.00	20.00

Table 2  
*Jadual 2*

- (b) Use data in Table 2, calculate the average of rate of reaction for both experiments.  
Compare the both rate of reactions.  
*Gunakan data dalam Jadual 2 hitungkan kadar tindak balas purata bagi kedua-dua eksperimen.*  
*Bandingkan kedua-dua kadar tindak balas tersebut.*

[3 marks]  
[3 markah]

- (c) Reaction in Experiment II is completed at 120 s.  
State the change of bubbles formed from 30 s to 120 s.  
Explain your answer.  
*Tindak balas dalam Eksperimen II telah lengkap pada masa 120 s.*  
*Nyatakan perubahan gelembung gas yang terbentuk dari 30 s ke 120 s.*  
*Jelaskan jawapan anda.*

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

- (d) The following are the examples of reactions:
- Rusting of iron
  - Potassium reacts with water
  - Magnesium ribbon burns in air
  - Decomposition of hydrogen peroxide

*Berikut ialah contoh tindak balas:*

- *Pengaratan besi*
- *Kalium bertindak balas dengan air*
- *Pita magnesium terbakar dalam udara*
- *Penguraian hidrogen peroksida*

Classify the above reactions into slow and fast reactions.

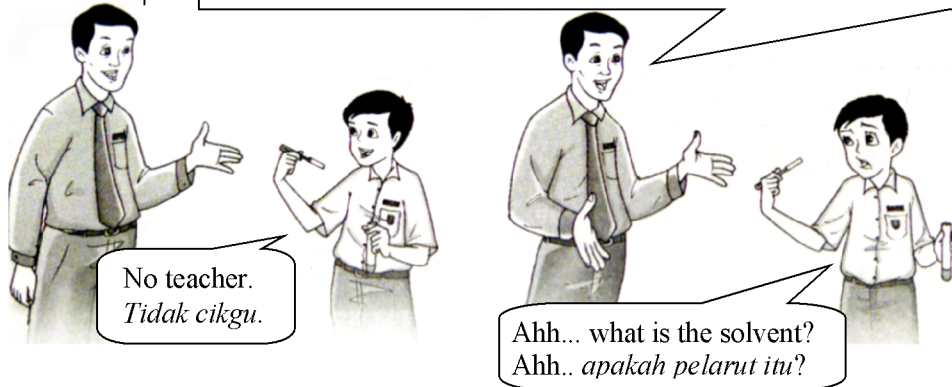
*Kelaskan tindak balas-tindak balas di atas kepada tindak balas perlahan dan cepat.*

[3 marks]  
[3 markah]

3

Aidil, can you see any change in blue litmus paper when it dip inside the glacial ethanoic acid?  
 Aidil, bolehkah kamu nampak perubahan pada kertas litmus biru bila ia di celup ke dalam asid etanoik glasial?

Can you suggest a solvent should be added to glacial ethanoic acid so that it can change the colour of the litmus paper.  
 Boleh kamu cadangkan suatu pelarut yang perlu ditambahkan ke asid etanoik glasial supaya warna kertas litmus itu berubah warna.



Referring to the conversation above, plan a laboratory experiment to investigate the role of solvent to show the properties of acids.

Merujuk kepada perbualan di atas, rancang satu eksperimen makmal untuk menyiasat peranan pelarut untuk menunjukkan sifat-sifat asid.

Your planning should include the following aspect:

Perancangan anda hendaklah mengandungi aspek-aspek berikut:

- (a) Problem statement  
*Pernyataan masalah*
- (b) All the variables  
*Semua pemboleh ubah*
- (c) Statement of the hypothesis  
*Penyataan 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**  
<https://cikguadura.wordpress.com/>

**INFORMATION FOR CANDIDATES**  
**MAKLUMAT UNTUK CALON**

1. This question paper consists of three questions: **Question 1**, **Question 2** and **Question 3**.  
*Kertas soalan ini mengandungi tiga soalan: Soalan 1, Soalan 2 dan Soalan 3.*
2. Answer **all** questions. Write your answers for **Question 1** and **Question 2** in the spaces provided in this question paper.  
*Jawab semua soalan. Tulis jawapan anda bagi Soalan 1 dan Soalan 2 pada ruang yang disediakan dalam kertas soalan ini.*
3. Write your answers for **Question 3** on the ‘helaian tambahan’ provided by the invigilators. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answers.  
*Tulis jawapan anda bagi Soalan 3 dalam helaian tambahan yang dibekalkan oleh pengawas peperiksaan. Anda boleh menggunakan persamaan, rajah, jadual, graf dan cara lain sesuai untuk menjelaskan jawapan anda.*
4. Show your working, it may help you to get marks.  
*Tunjukkan kerja mengira, ini membantu anda mendapatkan markah.*
5. The diagrams in the questions are not drawn to scale unless stated.  
*Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.*
6. The marks allocated for each question or sub-part of a question is shown in brackets.  
*Markah yang diperuntukkan bagi setiap soalan atau ceraihan soalan ditunjukkan dalam kurungan.*
7. If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.  
*Jika anda hendak memukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.*
8. You may use non-programmable scientific calculator.  
*Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.*
9. You are advised to spend 1 hour to answer **Question 1** and **Question 2** and 30 minutes for **Question 3**.  
*Anda dinasihati supaya mengambil masa 1 jam untuk menjawab Soalan 1 dan Soalan 2 dan 30 minit untuk Soalan 3.*
10. Detach **Question 3** from this question paper. Tie the ‘helaian tambahan’ together with this question paper and hand in to the invigilator at the end of the examination.  
*Ceraikan Soalan 3 daripada kertas soalan ini. Ikat helaian tambahan bersama-sama kertas soalan ini dan serahkan kepada pengawas peperiksaan pada akhir peperiksaan.*



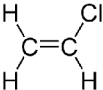
**PROGRAM PENINGKATAN AKADEMIK TINGKATAN 5  
SEKOLAH-SEKOLAH MENENGAH NEGERI SEMBILAN 2016  
CHEMISTRY**

<https://cikguadura.wordpress.com/> **KERTAS 1**

No.	Key	No.	Key
1	C	26	C
2	C	27	B
3	C	28	D
4	D	29	A
5	B	30	D
6	D	31	B
7	D	32	C
8	B	33	A
9	D	34	B
10	D	35	A
11	C	36	A
12	C	37	D
13	A	38	D
14	D	39	A
15	B	40	B
16	C	41	B
17	A	42	D
18	C	43	A
19	A	44	B
20	A	45	A
21	B	46	C
22	A	47	B
23	D	48	C
24	B	49	A
25	C	50	D

A	13
B	12
C	12
D	13



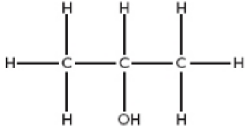
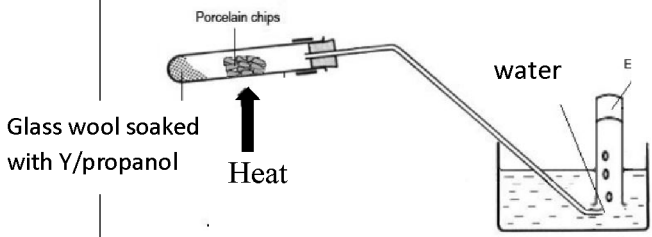
Question	Mark scheme <a href="https://cikguadura.wordpress.com/">https://cikguadura.wordpress.com/</a>	Sub Mark	Total mark
1(a)(i)	<i>Able to state the meaning of polymer correctly</i> <u>Answer</u> Large molecules made up of many identical repeating subunits of monomer	1	1
(a)(ii)	<i>Able to state the name of polymer X correctly</i> <u>Sample answer</u> Polyvinyl chloride/ PVC/ Polychloroethene	1	1
(a)(iii)	<i>Able to draw the structural formula of the monomer of polymer X correctly</i> <u>Answer</u> 	1	1
(a)(iv)	<i>Able to state one advantage of using X as water pipes compared to metal pipes correctly</i> <u>Sample answer</u> Does not rust//low cost	1	1
(b)(i)	<i>Able to state the main component of the glass correctly</i> <u>Answer</u> SiO <sub>2</sub> / Silica/ Sand	1	1
(b)(ii)	<i>Able to state one special characteristics of the borosilicate glass correctly</i> <u>Sample answer</u> Resistant to heat	1	1
(b)(iii)	<i>Able to state one use of the borosilicate glass in daily life correctly</i> <u>Sample answer</u> Cooking utensils// laboratory apparatus	1	1
(c)(i)	<i>Able to state the name of material Y correctly</i> <u>Answer</u> Fibre glass	1	1
(c)(ii)	<i>Able to state one advantage of using material Y compared to borosilicate glass correctly</i> <u>Sample answer</u> Stronger// harder	1	1
	<b>Total</b>		<b>9</b>

Question	Mark Scheme	Sub Mark	Total Mark								
2(a)	<p><i>Able to state the element that exists as a monoatomic</i></p> <p><u>Answer:</u> Z</p> <p><i>Able to explain why</i></p> <p><u>Sample answer:</u> Atom does not have to donate, accept or share electron // Atom has duplet electron arrangement</p>	1  1	2								
(b)	<p><i>Able to name the group</i></p> <p><u>Answer:</u> Transition element / metal</p> <p><i>Able to state one special characteristic</i></p> <p><u>Sample answer:</u> Has more than one oxidation number // Form coloured compound // Can form complex ion // Used as catalyst</p>	1  1	2								
(c)	<p><i>Able to write the chemical equation when Y is dissolved in water.</i></p> <ol style="list-style-type: none"> <li>Correct formulae of reactants and products.</li> <li>Balanced chemical equation</li> </ol> <p><u>Answer:</u> <math>Y_2 + H_2O \rightarrow HY + HOY</math> // <math>Cl_2 + H_2O \rightarrow HCl + HOCl</math></p>	1 1	2								
(d)(i)	<p><i>Able to complete Table 2.1 correctly</i></p> <p><u>Answer:</u></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Subatomic particle</th> <th>Name of subatomic particle</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">x</td> <td style="text-align: center;">Electron</td> </tr> <tr> <td style="text-align: center;">●</td> <td style="text-align: center;">Neutron</td> </tr> <tr> <td style="text-align: center;">○</td> <td style="text-align: center;">Proton</td> </tr> </tbody> </table>	Subatomic particle	Name of subatomic particle	x	Electron	●	Neutron	○	Proton	1  1	2
Subatomic particle	Name of subatomic particle										
x	Electron										
●	Neutron										
○	Proton										
(d)(ii)	<p><i>Able to state which element has the structure of atom</i></p> <p><u>Answer:</u> V / Na / Sodium</p>	1	1								
(d)(iii)	<p><i>Able to state the function of isotope</i></p> <p><u>Sample answer:</u> To detect the leakage of underground pipe</p>	1	1								
<b>Total</b>			<b>10</b>								

Question	Mark Scheme	Sub Mark	Total Mark
3(a)(i)	<i>Able to state the meaning of a mole</i>  <u>Sample answer:</u>  Amount of substance that contain as many particle as the number of atoms is exactly 12g of carbon-12 // $6 \times 10^{23}$ of particles in a substance	1	1
(a)(ii)	<i>Able to calculate the amount of particles in <math>FeCl_3</math></i>  <u>Answer:</u> $0.01 \times 6.02 \times 10^{23} / 6.02 \times 10^{21}$	1	1
(b)(i)	<i>Able to balance the chemical equation correctly</i>  <u>Answer:</u> $4Fe(s) + 3O_2(g) \rightarrow 2Fe_2O_3(s)$	1	1
(b)(ii)	<i>Able to interpret the equation correctly</i>  1 names of reactants and product 2 physical states 3 moles of reactants and product [ any two correctly]  <u>Sample answer:</u>  4 mol of solid iron <u>reacts</u> with 3 mol of oxygen gas produces 2 mol of solid iron(III) oxide	1 1 1	2
(c)(i)	<i>Able to calculate the empirical formula</i>  C : H  Number of moles $\frac{85.7}{12} : \frac{14.3}{1}$  Simplest ratio 1 : 2  Empirical formula = $CH_2$	1  1 1	3
(c)(ii)	<i>Able to determine the molecular formula</i>  $(14 + 2) n = 42 / n = 3$  Molecular formula = $C_3H_6$	1 1	2
	<b>Total</b>		<b>10</b>

Question	Mark Scheme	Sub Mark	Total Mark
4 (a) (i)	<p><i>Able to draw the structural formula of ethanoic acid correctly</i></p> <p><u>Answer</u></p> $\begin{array}{c} \text{H} \quad \text{O} \\   \quad    \\ \text{H}-\text{C}-\text{C}-\text{OH} \\   \\ \text{H} \end{array}$	1	1
(ii)	<p><i>Able to give a reason the different in pH values</i></p> <p><u>Sample answer</u> The concentration of hydrogen ions in set I is higher</p>	1	1
(b) (i)	<p><i>Able to write the chemical formula of ammonia correctly</i></p> <p><u>Answer</u> NH<sub>3</sub></p>	1	1
(ii)	<p><i>Able to state the type of particle consist in ammonia correctly</i></p> <p><u>Answer</u> Molecule</p>	1	1
(iii)	<p><i>Able to state the particle that cause the red litmus paper turns blue correctly</i></p> <p><u>Answer</u> Hydroxide ion // OH<sup>-</sup></p>	1	1
(iv)	<p><i>Able to write the balanced chemical equation correctly</i></p> <ol style="list-style-type: none"> <li>1. Correct formula of reactants</li> <li>2. Correct formula of products</li> </ol> <p><u>Sample answer</u> NH<sub>3</sub> + HNO<sub>3</sub> → NH<sub>4</sub>NO<sub>3</sub> // NH<sub>4</sub>OH + HNO<sub>3</sub> → NH<sub>4</sub>NO<sub>3</sub> + H<sub>2</sub>O</p>	1 1	2
(v)	<p><i>Able to state the process Y correctly</i></p> <p><u>Answer</u> Neutralization</p>	1	1
(vi)	<p><i>Able to describe briefly the confirmation test of anion correctly</i></p> <p><u>Sample answer</u></p> <ol style="list-style-type: none"> <li>1. Pour dilute sulphuric acid and iron(II) sulphate solution into the solution P</li> <li>2. Slowly drops concentrated sulphuric acid</li> <li>3. Brown ring is formed</li> </ol>	1 1 1	3
	<b>Total</b>		<b>11</b>

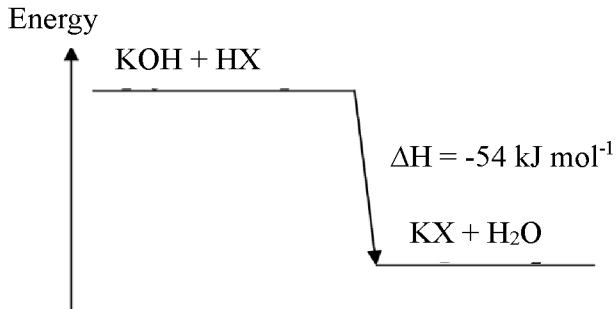
Question	Mark scheme	Sub Mark	Total mark
5(a)	<i>Able to write the formulae of all anions and cations that present in NaCl solution</i> <u>Answer</u> Anions: Cl <sup>-</sup> , OH <sup>-</sup> Cations: Na <sup>+</sup> , H <sup>+</sup>	1 1	2
5(b)(i)	<i>Able to Name the product produced at the anode for Cell I and Cell II.</i> <u>Answer</u> Cell I : Oxygen Cell II : Chlorine	1 1	2
(b)(ii)	<i>Able to Write the half equations for the reactions at the anode for Cell I and Cell II.</i> <u>Answer</u> Cell I : $4\text{OH}^- \rightarrow \text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}$ Cell II : $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}$	1 1	2
5(c)	<i>Able to Describe one chemical test to identify the gas produced</i> <u>Answer</u> 1. Put a burning splinter at the mouth of the test tube 2. A 'pop' sound produced	1 1	2
5(d)	<i>Able to build a voltaic cell that can produce the highest voltage.</i> <u>Answer</u> 1. Functional diagram 2. Correct label (Mg & Ag)	1 1	2
<b>Total</b>			<b>10</b>

Question	Mark scheme	Sub Mark	Total mark
6(a)	<i>Able to the meaning of carbon compounds</i> <u>Sample Answer</u> Compound that contains carbon as its constituent element	1	<b>1</b>
6(b)	<i>Able to name of Substance X, Y and Z based on IUPAC nomenclature</i> <u>Answer</u> X : Propane Y : Propan-1-ol Z : Propene	1 1 1	<b>3</b>
6(c)	<i>Able to draw the structural formula for isomer of Substance Y (propan-1-ol)</i> <u>Answer</u> 	1	<b>1</b>
6(d)	<i>Able to draw a labelled diagram apparatus set-up for dehydration alcohol</i> <u>Answer</u>  <ol style="list-style-type: none"><li>Functional diagram</li><li>Correct label: Propanol, Heat, Porcelain chip and water</li></ol>	1 1	<b>2</b>
6(e)(i)	<i>Able to State the observations for both test tube</i> <u>Sample Answer</u> Z change brown colour of bromine water to colourless and X unchange the colour of bromine water	1	<b>1</b>
(e)(ii)	<i>Able to explain the observation</i> <u>Sample Answer</u> <ol style="list-style-type: none"><li>Z is unsaturated hydrocarbon and X is saturated hydrocarbon</li><li>Z undergoes addition reaction with bromine / bromination and X does not react with bromine water</li></ol>	1 1	<b>2</b>
<b>Total</b>			<b>10</b>

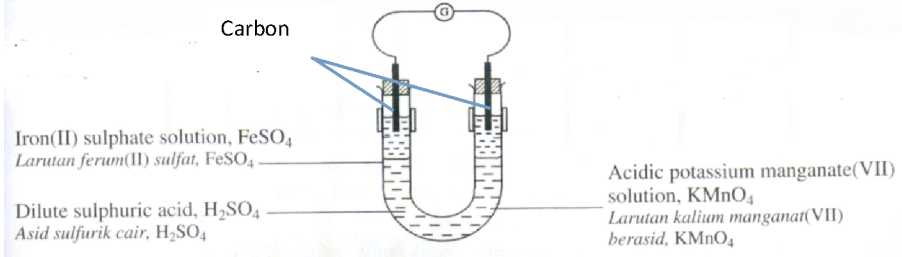
Question	Mark scheme <a href="https://cikguadura.wordpress.com/">https://cikguadura.wordpress.com/</a>	Sub Mark	Total Mark
7(a) (i)	<p><i>Able to identify compounds P and Q</i></p> <p><u>Answer</u> P: Covalent compound Q: Ionic compound</p>	1 1	2
(ii)	<p><i>Able to give an example for each compounds P and Q</i></p> <p><u>Sample answer</u> P: Any suitable covalent compound Q: Any suitable ionic compound</p>	1 1	2
(iii)	<p><i>Able to explain why the melting and boiling point of compounds P and Q are different.</i></p> <p><u>Sample answer</u></p> <ol style="list-style-type: none"> <li>1. P is molecules</li> <li>2. Attracted together by weak intermolecular forces//van de Waals forces</li> <li>3. Required less heat energy to overcome the forces</li> <li>4. Q is ions</li> <li>5. Attracted together by strong electrostatic forces</li> <li>6. Required more heat energy to overcome the forces</li> </ol>	1 1 1 1 1 1	6
(b)	<p><i>Able to explain the formation of ionic compound and covalent compound.</i></p> <p><u>Sample Answer</u></p> <p>Ionic compound</p> <ol style="list-style-type: none"> <li>1. The electron arrangement of atom Z is 2.8.2 and atom Y is 2.7</li> <li>2. To achieve octet electron arrangement</li> <li>3. Atom Z donate 2 electrons to form <math>Z^{2+}</math></li> <li>4. Atom Y accept 1 electron to form <math>Y^{-}</math></li> <li>5. The ions are attracted together by strong electrostatic forces</li> <li>6. One <math>Z^{2+}</math> and two <math>Y^{-}</math> to form <math>ZY_2</math>// Diagram</li> </ol> <p>Covalent compound</p> <ol style="list-style-type: none"> <li>1. Atom X has electron arrangement of 2.4</li> <li>2. To achieve octet electron arrangement</li> <li>3. Atom X contribute 4 electrons</li> <li>4. Atom Y contribute 1 electron</li> <li>5. One atom of X and four atoms of Y share four pairs of electron to formed <math>XY_4</math>// Diagram</li> </ol>	1 1 1 1 1 1 1 1 1	10
	<b>Total</b>		<b>20</b>

Question	Mark scheme	Sub Mark	Total Mark
8(a)	<p><i>Able to state the four factors that affect the rate of reaction</i></p> <p><u>Answer:</u></p> <ol style="list-style-type: none"> <li>1. Size of the reactant/the total surface area of the reactant</li> <li>2. Concentration of the reactant</li> <li>3. Temperature of the reactant</li> <li>4. Catalyst</li> <li>5. Pressure</li> </ol> <p>[ any four correctly]</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	4
(b)	<p><i>Able to state the condition for the contact process</i></p> <p><u>Answer:</u></p> <ol style="list-style-type: none"> <li>1. Temperature: 450 °C-550°C</li> <li>2. Pressure: 1 atm</li> <li>3. Catalyst :vanadium(V) oxide</li> </ol>	<p>1</p> <p>1</p> <p>1</p>	3
(c)(i)	<p><i>Able to plot the graph correctly</i></p> <p><u>Sample answer:</u></p> <ol style="list-style-type: none"> <li>1. The axes are labelled together with unit</li> <li>2. The uniform scale and occupied 50% graph paper</li> <li>3. All the points are transferred correctly</li> <li>4. Draw smooth curves and labeled for experiment I / II</li> </ol> <p>[Refer to page 14]</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>	4
(c)(ii)	<p><i>Able to calculate the average rate of reaction</i></p> <p><u>Sample answer:</u></p> <ol style="list-style-type: none"> <li>1. Average rate of reaction for experiment I = <math>\frac{32.00}{210}</math> = 0.15 cm<sup>3</sup> s<sup>-1</sup></li> <li>2. Average rate of reaction for experiment II = <math>\frac{32.00}{150}</math> = 0.21 cm<sup>3</sup> s<sup>-1</sup></li> </ol>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>	4
(c)(iii)	<p><i>Able to explain the differences in the rate of reaction</i></p> <p><u>Sample answer:</u></p> <ol style="list-style-type: none"> <li>1. The rate of reaction of Experiment II is higher</li> <li>2. Experiment II is using zinc carbonate powder/ smaller size</li> <li>3, The smaller size of zinc carbonate has larger total surface area</li> <li>4. The collision frequency between H<sup>+</sup> and ZnCO<sub>3</sub> in Experiment II is higher</li> <li>5. The effective collision frequency in Experiment II is higher</li> </ol>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	5
	<b>Total</b>		<b>20</b>

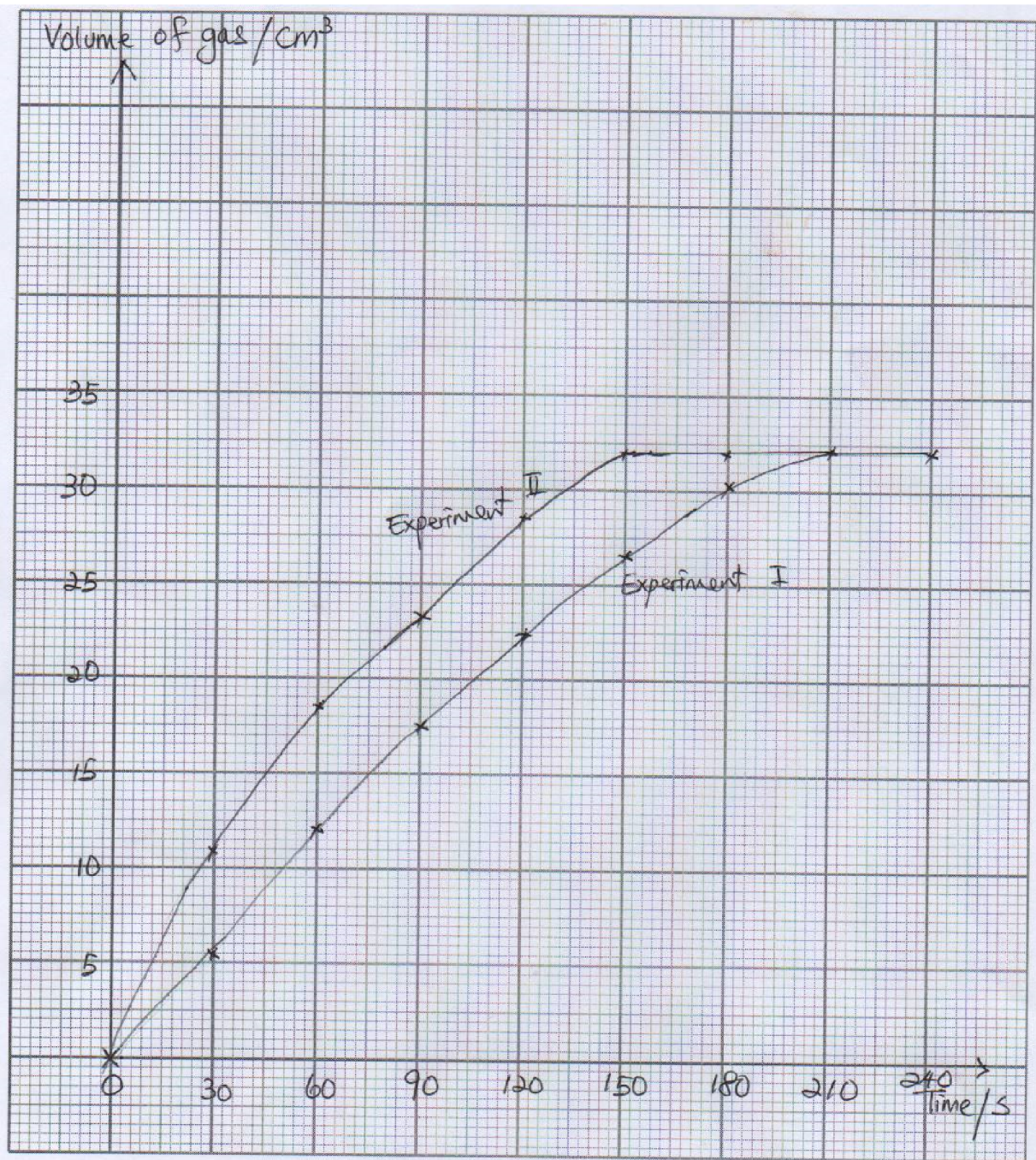


Question	Mark scheme	Sub Mark	Total Mark
9(a)(i)	<p><i>Able to compare <math>\Delta H</math> of set I and set II and explain the answer</i></p> <p><u>Sample answer:</u></p> <ol style="list-style-type: none"> <li><math>\Delta H</math> of set I is lower // <math>\Delta H</math> of set II is higher</li> <li>Acid X ionises partially in water</li> <li>Acid Y ionises completely in water</li> <li>Some of the heat release is used by acid X molecule to ionise completely</li> </ol>	<p>1 1 1 1</p>	4
9(a)(ii)	<p><i>Able to sketch energy level diagram of either set I or set II and give two information</i></p> <p><u>Sample answer:</u></p> <ol style="list-style-type: none"> <li>y-axis labelled with <u>Energy</u> and two parallel lines</li> <li>Correct energy level with reactants and products</li> <li>Correct <math>\Delta H</math> with unit</li> <li>Two correct information correspondent to the energy level diagram</li> </ol> <p>Example of the energy level diagram:</p>  <p>Example of information:</p> <ol style="list-style-type: none"> <li>The reaction releases heat energy to surrounding</li> <li>Temperature of the surrounding increases</li> <li>Total energy of products is lower than total energy of reactants (Any 2 correctly)</li> </ol>	<p>1 1 1 1+1</p>	5



Question	Mark scheme	Sub mark	Total mark
10 (a)	<p><i>Able to identify solution X and Y, and give explanation correctly</i></p> <p><u>Sample answer</u></p> <ol style="list-style-type: none"> <li>1. X = Iron(II) sulphate//FeSO<sub>4</sub>//soluble salt solution containing Fe<sup>2+</sup> ion</li> <li>2. Y = Potassium iodide // KI//soluble salt solution containing I<sup>-</sup> ion // Br<sup>-</sup> ion</li> <li>3. Oxidation number of iron increases from +2 to +3</li> <li>4. Oxidation number of bromine/iodine increases from -1 to 0</li> <li>5. X = Oxidation, Y = Oxidation</li> <li>6. Fe<sup>2+</sup> --&gt; Fe<sup>3+</sup> + e</li> <li>7. 2I<sup>-</sup> --&gt; I<sub>2</sub> + 2e // Br<sup>-</sup> --&gt; Br<sub>2</sub> + 2e</li> <li>8. MnO<sub>4</sub><sup>-</sup> + 8H<sup>+</sup> + 5e --&gt; Mn<sup>2+</sup> + 4H<sub>2</sub>O</li> </ol> <p><u>For Y</u></p> <ol style="list-style-type: none"> <li>9. Add starch solution//1,1,1-trichloroethane</li> <li>10. Dark blue formed//brown layer formed</li> </ol> <p><u>For X</u></p> <ol style="list-style-type: none"> <li>11. Add potassium hexacyanoferrate(II) solution/K<sub>4</sub>Fe(CN)<sub>6</sub>// potassium thiocyanate solution/KSCN</li> <li>12. Dark blue precipitate formed//Blood red colouration</li> </ol>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	12
	<p><i>Able to explain the experiment by including all the aspect required correctly</i></p> <p><u>Sample answer</u></p>  <ol style="list-style-type: none"> <li>1. Functional diagram</li> <li>2. Correct label: Any reducing agent, any oxidising agent and dilute sulphuric acid</li> </ol> <p><u>Procedure</u></p>	<p>1</p> <p>1</p>	

	<p>3. Dilute sulphuric acid is poured into a U-tube until half full.</p> <p>4. Fill one arm of the U-tube with iron(II) sulphate solution and another arm with acidified potassium manganate(VII) solution slowly/carefully/drop by drop.</p> <p>5. Immerse carbon electrode into both solutions and connect to galvanometer/ voltmeter/ ammeter/ bulb.</p> <p>6. Record the observation.</p> <p><u>Observation</u></p> <p>7. The green colour of iron(II) sulphate solution changes to brown// The purple colour of potassium manganate(VII) solution changes to a colourless // The needle of galvanometer/ voltmeter deflected//bulb lights up</p> <p>8. Correct flow of electron.</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>8</p>
	<p><a href="https://cikguadura.wordpress.com/">https://cikguadura.wordpress.com/</a></p>	<p><b>Total</b></p>	<p><b>20</b></p>



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**MAJLIS PENGETUA SEKOLAH MENENGAH MALAYSIA  
CAWANGAN NEGERI SEMBILAN  
PROGRAM PENINGKATAN AKADEMIK TINGKATAN 5  
SEKOLAH-SEKOLAH MENENGAH NEGERI SEMBILAN 2016**

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**CHEMISTRY (KIMIA)  
KERTAS 3  
PERATURAN PEMARKAHAN**

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

UNTUK KEGUNAAN PEMERIKSA SAHAJA

**AMARAN**

Peraturan pemarkahan ini **SULIT** dan **Hak Cipta MPSM Cawangan NSDK**. Kegunaannya khusus untuk pemeriksa yang berkenaan sahaja. Sebarang maklumat dalam peraturan pemarkahan ini tidak boleh dimaklumkan kepada sesiapa. Peraturan pemarkahan ini tidak boleh dikeluarkan dalam apa juga bentuk media.

Question	Explanation	Maximum score
1(a)	<p><i>[Able to fulfil the following criteria]</i></p> <p>1. <b>all</b> readings correct</p> <p>2. <b>two</b> decimal places</p> <p>3. <b>without</b> unit</p> <p>Answer:</p> <p>Methanol = 1.55 Ethanol = 1.20 Propanol = 1.10 Butanol = 1.61</p>	3
	<i>One of criteria is not fulfilled</i>	2
	<i>[Able to fulfil criteria 1]</i>	1
	<i>[No response given or wrong response]</i>	0

Question	Explanation	Maximum score
1 (b)	<p><i>[Able to state all variables correctly]</i></p> <p>Sample answer:</p> <p><b>Manipulated variable:</b> Types of alcohols//[Name of alcohols]</p> <p><b>Responding variable:</b> Heat of combustion//Temperature increase/change</p> <p><b>Fixed variable:</b> Aluminium can//Water (<i>Reject: Volume of water</i>)</p>	3
	<i>[Able to state any 2 variables correctly]</i>	2
	<i>[Able to state any 1 variable correctly]</i>	1
	<i>[No response given or wrong response]</i>	0

Question	Explanation	Maximum score
1 (c)	<p><i>[Able to state the relationship between the manipulated variable and the responding variable with direction correctly]</i></p> <p>Sample answer:</p> <p>The higher the number of carbon atoms per molecule of alcohol, the higher the heat of combustion.</p> <p>Note : <math>RV \rightarrow MV</math> score 2</p>	3
	<p><i>[Able to state the relationship between the manipulated variable and the responding variable]</i></p> <p>Sample answer:</p> <p>The higher the number of carbon atoms, the higher the heat of combustion.</p>	2
	<p><i>[Able to state an idea of hypothesis]</i></p> <p>Sample answer:</p> <p>Different alcohols ,different heat of combustion.</p>	1
	<i>[No response given or wrong response]</i>	0

Question	Explanation	Maximum score
1 (d)	<i>Able to draw a bar chart by fulfill the following criteria:</i> (i) <i>Axes are labelled with correct unit</i> (ii) <i>Scale used must cover at least 50% of graph paper</i> (iii) <i>Uniform spacing and width for each bar</i> <i>Sample answer: [Refer to page 8]</i>	3
	<i>Able to draw a bar chart by fulfill the following criteria:</i> (i) <i>Axes are labelled with correct unit</i> (ii) <i>Uniform spacing and width for each bar</i>	2
	<i>Able to draw a bar chart by fulfill the following criteria:</i> (i) <i>Axes are labelled with correct unit</i> (ii) <i>All bars are combined</i>	1
	<i>[No response given or wrong response]</i>	0

Question	Explanation	Maximum score
1(e)	<i>[Able to predict the heat of combustion of pentanol and draw the bar for pentanol correctly]</i> <i>Criteria : 1. Value with correct unit</i> <i>2. The bar drawn as in 1(d) score 3</i> <i>Answer:</i> $2260 \text{ kJ mol}^{-1}$ <i>[Draw a correct bar chart]</i>	3
	<i>[Able to predict the heat of combustion of pentanol and draw the bar for pentanol]</i> <i>Answer:</i> $2260 \pm 20$ <i>[without unit]</i> <i>[Draw a correct bar chart]</i>	2
	<i>[Able to predict the heat of combustion of pentanol or draw the bar for pentanol]</i> <i>Answer:</i> $2260 \pm 20$ <i>[without unit]</i> <i>or</i> <i>[Draw a correct bar chart]</i>	1
	<i>[No response given or wrong response]</i>	0



Question	Explanation	Maximum score
1 (f)	<i>[Able to state the operational definition for heat of combustion correctly]</i> Sample answer: The heat released/produced when 1 mole of alcohol is burnt in excess oxygen, thermometer reading increases.	3
	<i>[Able to state the operational definition for heat of combustion]</i> Sample answer: Heat released/produced when alcohol is burnt in excess oxygen.	2
	<i>[Able to state an idea of operational definition for heat of combustion]</i> Sample answer: Heat released when alcohol burns.	1
	<i>[No response given or wrong response]</i>	0

Question	Explanation	Maximum score
2 (a)(i)	<i>[Able to state an observation correctly]</i> Sample answer: Bubbles produced in Experiment II is more // Volume of gas in Experiment II is higher	3
	<i>[Able to state an observation ]</i> Sample answer: Bubbles is more	2
	<i>[Able to state an idea of observation]</i> Sample answer: Gas produced	1
	<i>[No response given or wrong response]</i>	0

Question	Explanation	Maximum score
2 (a)(ii)	<i>[Able to state an inference correctly]</i> Sample answer: Mass of catalyst is used in Experiment II is higher// Rate of reaction in Experiment II is higher	3
	<i>[Able to state an inference ]</i> Sample answer: Different mass of catalyst used	2
	<i>[Able to state an idea of inference]</i> Sample answer: Use catalyst	1
	<i>[No response given or wrong response]</i>	0

Question	Explanation	Maximum score
2 (b)	<p><i>[Able to calculate the average of rate of reaction and compare for the rate of reactions correctly]</i></p> <p>Criteria : 1. correct values with unit for experiment 1 2. correct values with unit for experiment 2 3. correct comparison</p> <p>Sample answer:</p> <p>1. Experiment I: <math>\frac{12}{30} = 0.4 \text{ cm}^3 \text{ s}^{-1}</math></p> <p>2. Experiment II: <math>\frac{20}{30} = 0.67 \text{ cm}^3 \text{ s}^{-1}</math></p> <p>3. Rate of reaction in Experiment II is higher</p>	3
	<i>[Able to fulfil two criteria]</i>	2
	<i>[Able to fulfil one criteria]</i>	1
	<i>[No response given or wrong response]</i>	0

Question	Explanation	Maximum score
2 (c)	<p><i>[Able to state a change in bubbles produced and give a reason correctly]</i></p> <p>Sample answer: Number of bubbles decrease Concentration of hydrogen peroxide decrease</p>	3
	<p><i>[Able to state a change in bubbles produced and give a reason]</i></p> <p>Sample answer: Bubbles becomes less Concentration decrease</p>	2
	<p><i>[Able to state a change in bubbles produced]</i></p> <p>Sample answer: Bubbles produced</p>	1
	<i>[No response given or wrong response]</i>	0

Question	Explanation	Maximum score				
2 (d)	<p><i>[Able to classify the reactions correctly]</i></p> <p>Sample answer:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Slow reaction</th> <th style="width: 50%; text-align: center;">Fast reaction</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> <li>• Rusting of iron</li> <li>• Decomposition of hydrogen peroxide</li> </ul> </td> <td> <ul style="list-style-type: none"> <li>• Potassium reacts with water</li> <li>• Magnesium ribbon burns in air</li> </ul> </td> </tr> </tbody> </table>	Slow reaction	Fast reaction	<ul style="list-style-type: none"> <li>• Rusting of iron</li> <li>• Decomposition of hydrogen peroxide</li> </ul>	<ul style="list-style-type: none"> <li>• Potassium reacts with water</li> <li>• Magnesium ribbon burns in air</li> </ul>	3
Slow reaction	Fast reaction					
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	<i>[Able to classify one pair of reactions correctly]</i>	2				
	<p><i>[Has idea to classify the reactions]</i></p> <p>Sample answer:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 50%;"> <ul style="list-style-type: none"> <li>• Rusting of iron</li> </ul> </td> <td style="width: 50%;"> <ul style="list-style-type: none"> <li>• Potassium reacts with water</li> </ul> </td> </tr> </tbody> </table>	<ul style="list-style-type: none"> <li>• Rusting of iron</li> </ul>	<ul style="list-style-type: none"> <li>• Potassium reacts with water</li> </ul>	1		
<ul style="list-style-type: none"> <li>• Rusting of iron</li> </ul>	<ul style="list-style-type: none"> <li>• Potassium reacts with water</li> </ul>					
	<i>[No response given or wrong response]</i>	0				

Question	Explanation	Maximum score
3 (a)	<i>[Able to state the problem statement by relating the following 2 information correctly]:</i> 1. Role of water 2. Properties of acid <i>Sample answer:</i> Does an acid need water to show its acidic properties?	3
	<i>[Able to state problem statement]</i> <i>Sample answer:</i> Does an acid need water to show its acidic properties	2
	<i>[Able to give an idea of statement of the problem]</i> <i>Sample answer:</i> To investigate the effect of water on acids	1
	<i>No response or wrong response.</i>	0

Question	Explanation	Maximum score
3(b)	<i>[Able to state all variables correctly]</i> <i>Sample answer:</i> <b>Manipulated variable:</b> Presence of water <b>Responding variable:</b> acidic properties//Colour change in litmus paper <b>Fixed variable:</b> Type of acid //Glacial ethanoic acid	3
	<i>[Able to state any two variables correctly]</i>	2
	<i>[Able to state any one variable correctly]</i>	1
	<i>No response or wrong response.</i>	0

Question	Explanation	Maximum score
3(c)	<i>[Able to state the relationship between the manipulated variable and the responding variable with direction correctly]</i> <i>Sample answer:</i> Water is needed for an acid to show its acidic properties	3
	<i>[Able to state a hypothesis]</i> <i>Sample answer:</i> Water affects the acidic properties.	2
	<i>[Able to state an idea of hypothesis]</i> <i>Sample answer:</i> Acid needs water	1
	<i>No response or wrong response.</i>	0

Question	Explanation	Maximum score
3(d)	<i>[Able to give a complete list of materials and apparatus]</i> Sample answer: Apparatus: test tubes/boiling tubes/petri dish, droppers Materials: Glacial ethanoic acid, water, blue litmus paper	3
	<i>One of the apparatus or materials not listed</i> Sample answer: Apparatus: [suitable container], droppers Materials: Glacial ethanoic acid, water, blue litmus paper	2
	<i>[Able to give a list of basic materials and apparatus]</i> Apparatus: [suitable container] Materials: Ethanoic acid, litmus paper	1
	<i>No response or wrong response.</i>	0

Question	Explanation	Maximum score
3(e)	<i>[Able to state the procedure correctly]</i> Sample answer: 1. Drop ethanoic acid into a test tube 2. Dip a dry blue litmus paper in the acid. 3. Record observation 4. Add (1-5) cm <sup>3</sup> of water to the acid. 5. Dip a dry blue litmus papers to the mixture 6. Record observation.	3
	Steps 1,2,3 or 4,5,6	2
	Step 1,2 or 4,5	1
	<i>No response or wrong response.</i>	0

Question	Explanation	Maximum score						
3(f)	<i>[Able to exhibit the tabulation of data that includes the following information correctly]</i> 1. Heading for the manipulated variables 3. Heading for responding variable Sample answer: <table border="1" data-bbox="343 1653 1214 1767"> <thead> <tr> <th>Eksperimen</th> <th>Observation</th> </tr> </thead> <tbody> <tr> <td>Glacial ethanoic acid</td> <td></td> </tr> <tr> <td>Glacial ethanoic acid+Water</td> <td></td> </tr> </tbody> </table>	Eksperimen	Observation	Glacial ethanoic acid		Glacial ethanoic acid+Water		2
Eksperimen	Observation							
Glacial ethanoic acid								
Glacial ethanoic acid+Water								
	<i>[Able to exhibit the tabulation of data]</i> Sample answer: <table border="1" data-bbox="343 1861 1214 1937"> <thead> <tr> <th></th> <th>Observation</th> </tr> </thead> <tbody> <tr> <td>Glacial ethanoic acid</td> <td></td> </tr> </tbody> </table>		Observation	Glacial ethanoic acid		1		
	Observation							
Glacial ethanoic acid								
	<i>No response or wrong response.</i>	0						

END OF MARKING SCHEME <https://cikguadura.wordpress.com/>

Heat of combustion/ $\text{kJ mol}^{-1}$

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