

**CONFIDENTIAL**  
**4541/1**  
**Chemistry**  
**Paper 1**  
**September**  
**2015**  
**1 ¼ hours**



**SIJIL PENDIDIKAN**  
**MAKTAB RENDAH SAINS MARA**  
**2015**

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**CHEMISTRY**

**Paper 1**

**One hour and fifteen minutes**  
<https://cikguadura.wordpress.com/>

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**DO NOT OPEN THE QUESTION BOOKLET**  
**UNTIL BEING TOLD TO DO SO**

- 1 This question booklet is bilingual.  
*Kertas soalan ini adalah dalam dwibahasa.*
- 2 Candidates are required to read the information at the last page of this question booklet.  
*Calon dikehendaki membaca maklumat di halaman belakang kertas soalan.*

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This question booklet contains 32 printed pages.  
*Buku soalan ini mengandungi 32 halaman bercetak.*

1 Which of the following exists as atom only?  
*Antara berikut, yang manakah wujud sebagai atom sahaja?*

- A Helium  
*Helium*
- B Glucose  
*Glukosa*
- C Nitrogen  
*Nitrogen*
- D Magnesium oxide  
*Magnesium oksida*

2

Barium sulphate is used in carrying out colonoscopy  
X-ray to detect bowel cancer.

*Barium sulfat digunakan dalam X-ray kolonoskopi bagi  
menganalisis kanser usus.*

What is the chemical formula of barium sulphate?  
*Apakah formula kimia bagi barium sulfat?*

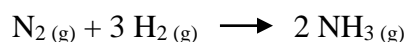
- A  $\text{BaSO}_4$
- B  $\text{BaSO}_3$
- C  $\text{BaS}_2\text{O}_3$
- D  $\text{Ba}(\text{OH})_2$

3 Which of the following ions present in the copper(II) sulphate solution?  
*Antara ion-ion berikut, yang manakah terdapat dalam larutan kuprum(II) sulfat?*

- A  $\text{Cu}^{2+}$ ,  $\text{SO}_4^{2-}$ ,  $\text{H}^+$  and  $\text{OH}^-$  ions  
*Ion  $\text{Cu}^{2+}$ ,  $\text{SO}_4^{2-}$ ,  $\text{H}^+$  dan  $\text{OH}^-$*
- B  $\text{Cu}^{2+}$  and  $\text{SO}_4^{2-}$  ions  
*Ion  $\text{Cu}^{2+}$  dan  $\text{SO}_4^{2-}$*
- C  $\text{H}^+$  and  $\text{OH}^-$  ions  
*Ion  $\text{H}^+$  dan  $\text{OH}^-$*
- D  $\text{Cu}^{2+}$  and  $\text{H}^+$  ions  
*Ion  $\text{Cu}^{2+}$  dan  $\text{H}^+$*

- 4 The following reaction occurs in Haber Process:

*Tindak balas berikut berlaku dalam Proses Haber:*



What is the optimum condition of this reaction?

*Apakah keadaan optimum bagi tindak balas tersebut?*

	Temperature (°C) <i>Suhu (°C)</i>	Pressure (atm) <i>Tekanan (atm)</i>	Catalyst <i>Mangkin</i>
<b>A</b>	800	3	Platinum <i>Platinum</i>
<b>B</b>	180	1	Nickel <i>Nikel</i>
<b>C</b>	450	1	Vanadium(V) oxide <i>Vanadium(V) oksida</i>
<b>D</b>	450	200	Iron <i>Ferum</i>

- 5 Water molecules consist of hydrogen and oxygen atoms.

Which of the following is the best statement to describe why the boiling point of water is low?

*Molekul air terdiri daripada atom hidrogen dan oksigen.*

*Antara pernyataan berikut, yang manakah terbaik untuk menerangkan mengapa takat didih air adalah rendah?*

- A** A lot of heat energy is needed to overcome the ionic bond between ions  
*Banyak tenaga haba diperlukan untuk mengatasi ikatan ion antara ion*
- B** Less heat energy is needed to overcome the covalent bond between atoms  
*Kurang tenaga haba diperlukan untuk mengatasi ikatan kovalen antara atom*
- C** Less heat energy is needed to overcome the forces of attraction between molecules  
*Kurang tenaga haba diperlukan untuk mengatasi daya tarikan antara molekul*
- D** A lot of heat energy is needed to overcome the ionic and covalent bonding between atoms  
*Banyak tenaga haba diperlukan untuk mengatasi ikatan ion dan kovalen antara atom*

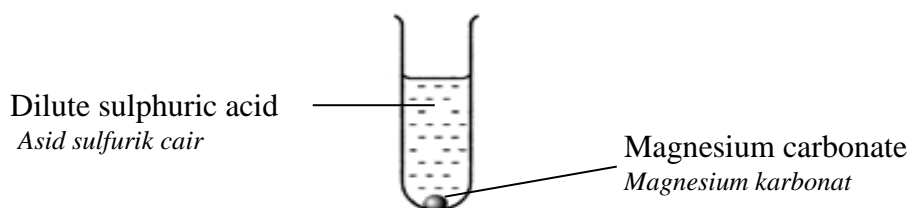
- 6 The following information shows the uses of process K.  
Maklumat berikut menunjukkan kegunaan proses K.

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Prevent corrosion<br/><i>Mencegah kakisan</i></li> </ul> | <ul style="list-style-type: none"> <li>• Improve the appearance<br/><i>Memperbaiki rupa</i></li> </ul> |
|---|--|

What is process K?

*Apakah proses K?*

- A** Purification  
*Penulenan*
- B** Extraction  
*Pengekstrakan*
- C** Wrapping  
*Pembungkusan*
- D** Electroplating  
*Penyaduran*
- 7 Diagram 1 shows the apparatus set-up to determine the chemical properties of sulphuric acid.  
*Rajah 1 menunjukkan susunan radas untuk menentukan sifat kimia asid sulfurik.*



Which of the following are the products of the reaction?

*Antara berikut, yang manakah merupakan hasil tindak balas itu?*

- A** Magnesium sulphate and water  
*Magnesium sulfat dan air*
- B** Magnesium sulphate and hydrogen gas  
*Magnesium sulfat dan gas hidrogen*
- C** Magnesium sulphate, water and hydrogen gas  
*Magnesium sulfat, air dan gas hidrogen*
- D** Magnesium sulphate, water and carbon dioxide gas  
*Magnesium sulfat, air dan gas karbon dioksida*

- 8 Table 1 shows the list of acids for substances P, Q, R and S.  
*Jadual 1 menunjukkan senarai asid bagi bahan-bahan P, Q, R dan S.*

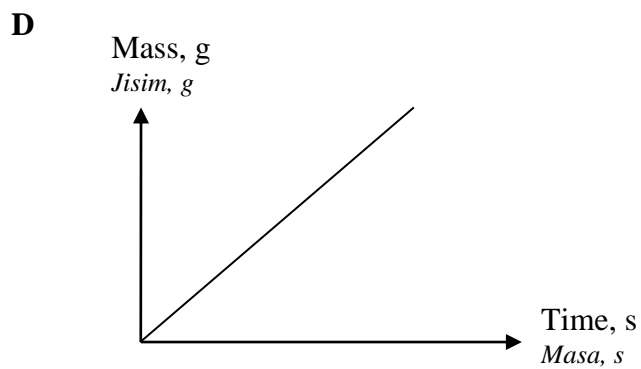
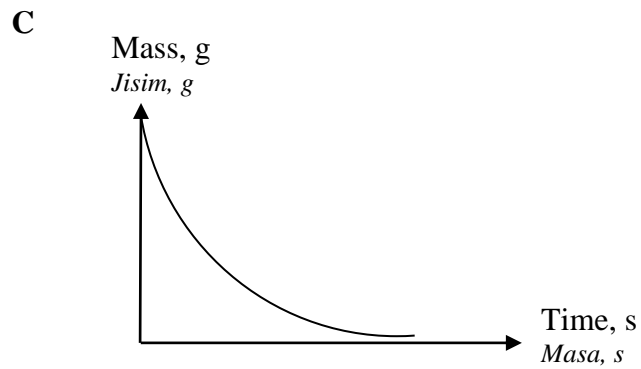
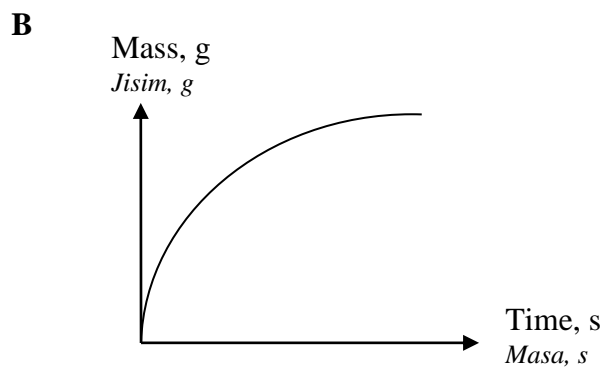
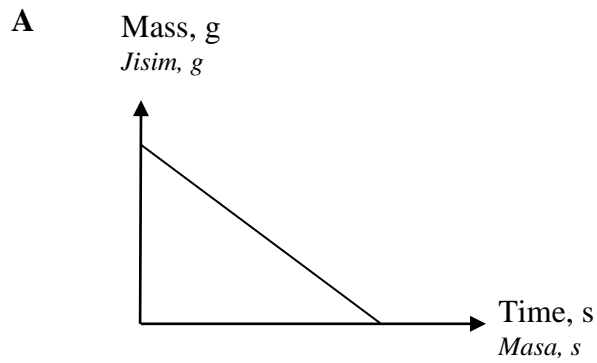
Substance <i>Bahan</i>	Name <i>Nama</i>
P	Hydrochloric acid <i>Asid hidroklorik</i>
Q	Sulphuric acid <i>Asid sulfurik</i>
R	Ethanoic acid <i>Asid etanoik</i>
S	Nitric acid <i>Asid nitrik</i>

Table 1  
*Jadual 1*

- Which of the following are monoprotic acid?  
*Antara berikut, yang manakah asid monoprotik?*
- A P and Q  
*P dan Q*
- B Q and R  
*Q dan R*
- C P, R and S  
*P, R dan S*
- D P, Q, R and S  
*P, Q, R dan S*
- 9 Which of the following is not suitable to be used in the preparation of copper(II) nitrate salt?  
*Antara berikut, yang manakah tidak sesuai digunakan dalam penyediaan garam kuprum(II) nitrat?*
- A Copper and dilute nitric acid  
*Kuprum dan asid nitrik cair*
- B Copper(II) oxide and dilute nitric acid  
*Kuprum(II) oksida dan asid nitrik cair*
- C Copper(II) carbonate and dilute nitric acid  
*Kuprum(II) karbonat dan asid nitrik cair*
- D Copper(II) hydroxide and dilute nitric acid  
*Kuprum(II) hidroksida dan asid nitrik cair*

- 10** Which statement is true about groups in the Periodic Table of Elements?  
*Antara pernyataan berikut, yang manakah benar berkaitan kumpulan dalam Jadual Berkala Unsur?*
- A** Each group contains both metals and non-metals  
*Setiap kumpulan mengandungi kedua-dua logam dan bukan logam*
- B** Atoms of elements in the same group have the same number of protons  
*Atom-atom bagi unsur-unsur dalam kumpulan yang sama memiliki bilangan proton yang sama*
- C** In Group 1, reactivity decreases with increasing proton number  
*Dalam Kumpulan 1, kereaktifan menurun dengan pertambahan nombor proton*
- D** In Group 17, the melting point of the elements increases with increasing proton number  
*Dalam Kumpulan 17, takat lebur unsur meningkat dengan pertambahan nombor proton*
- 11** Why is silver chloride added in photochromic glass?  
*Mengapa argentum klorida ditambah ke dalam kaca fotokromik?*
- A** To make it lighter  
*Menjadikannya lebih ringan*
- B** To make it stronger  
*Menjadikannya lebih kuat*
- C** To make it less fragile  
*Menjadikannya tidak mudah pecah*
- D** To make it sensitive to light  
*Menjadikannya peka terhadap cahaya*
- 12** What are the products for complete combustion of ethane?  
*Apakah hasil tindakbalas bagi pembakaran lengkap etana?*
- A** Carbon and water  
*Karbon dan air*
- B** Carbon dioxide and water  
*Karbon dioksida dan air*
- C** Carbon monoxide and water  
*Karbon monoksida dan air*
- D** Carbon dioxide, carbon and water  
*Karbon dioksida, karbon dan air*

- 13 Which graph correctly shows the change of mass of reactant against time?  
*Graf manakah yang betul menunjukkan perubahan jisim bahan tindak balas melawan masa?*



- 14 Diagram 2 shows the reaction of propene.  
Rajah 2 menunjukkan tindak balas propena.

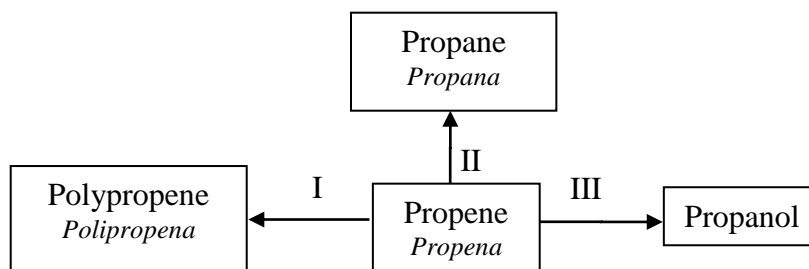


Diagram 2  
Rajah 2

- Name the reaction I, II and III.  
Namakan tindak balas I, II dan III.

	I	II	III
A	Polymerization <i>Pempolimeran</i>	Halogenation <i>Penghalogenan</i>	Hydration <i>Penghidratan</i>
B	Hydrogenation <i>Penghidrogenan</i>	Halogenation <i>Penghalogenan</i>	Oxidation <i>Pengoksidaan</i>
C	Polymerization <i>Pempolimeran</i>	Hydrogenation <i>Penghidrogenan</i>	Hydration <i>Penghidratan</i>
D	Halogenation <i>Penghalogenan</i>	Hydrogenation <i>Penghidrogenan</i>	Oxidation <i>Pengoksidaan</i>

- 15 Which of the following is a reduction process?  
Antara berikut, yang manakah proses penurunan?

- A Increase in oxidation number  
*Peningkatan nombor pengoksidaan*
- B Gain of oxygen  
*Menerima oksigen*
- C Loss of hydrogen  
*Kehilangan hidrogen*
- D Gain of electron  
*Menerima elektron*



- 16** Which substance can be used to convert  $\text{Fe}^{2+}$  ions to  $\text{Fe}^{3+}$  ions in an aqueous solution?  
*Bahan manakah boleh digunakan untuk menukar ion  $\text{Fe}^{2+}$  kepada ion  $\text{Fe}^{3+}$  di dalam larutan akueus?*
- A** Magnesium strip  
*Kepingan magnesium*
  - B** Sulphur dioxide gas  
*Gas sulfur dioksida*
  - C** Potassium iodide solution  
*Larutan kalium iodida*
  - D** Acidified potassium dichromate(VI) solution  
*Larutan kalium dikromat(VI) berasid*
- 17** Which of the chemical reaction releases heat to the surrounding?  
*Tindak balas kimia yang manakah membebaskan haba ke persekitaran?*
- A** Dissolving potassium nitrate in water  
*Melarutkan kalium nitrat di dalam air*
  - B** Dissolving ammonium sulphate in water  
*Melarutkan ammonium sulfat di dalam air*
  - C** Adding sodium hydroxide to nitric acid  
*Menambahkan natrium hidroksida kepada asid nitrik*
  - D** Adding potassium hydrogen carbonate to hydrochloric acid  
*Menambahkan kalium hidrogen karbonat kepada asid hidroklorik*
- 18** Which of the following medicine is an antibiotic?  
*Antara ubat berikut, yang manakah merupakan antibiotik?*
- A** Insulin  
*Insulin*
  - B** Codeine  
*Kodeina*
  - C** Streptomycin  
*Streptomisin*
  - D** Aspirin  
*Aspirin*

- 19 Diagram 3 shows the energy level diagram of a chemical reaction between substance X and water.  
*Rajah 3 menunjukkan gambar rajah aras tenaga bagi tindak balas antara bahan X dan air.*

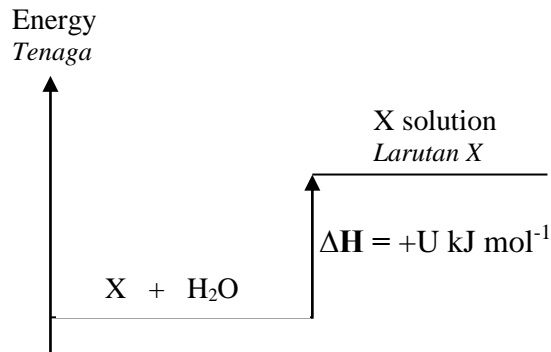


Diagram 3  
*Rajah 3*

What is substance X?  
*Apakah bahan X?*

- A Ammonium nitrate  
*Ammonium nitrat*
- B Potassium hydroxide  
*Kalium hidroksida*
- C Sodium metal  
*Logam natrium*
- D Concentrated hydrochloric acid  
*Asid hidroklorik pekat*
- 20 Which ion forms scum when added to soap solution?  
*Ion manakah membentuk kekat apabila ditambah kepada larutan sabun?*
- A  $\text{K}^+$
- B  $\text{Ca}^{2+}$
- C  $\text{Zn}^{2+}$
- D  $\text{Al}^{3+}$

- 21 Diagram 4 shows the symbol of element T.  
Rajah 4 menunjukkan simbol bagi unsur T.

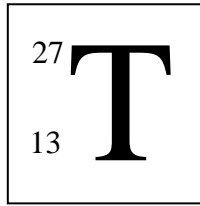


Diagram 4  
Rajah 4

Which of the following is true about element T?  
Antara berikut, yang manakah benar mengenai unsur T?

	<b>Proton number</b> <i>Nombor proton</i>	<b>Nucleon number</b> <i>Nombor nukleon</i>	<b>Electron arrangement</b> <i>Susunan elektron</i>
<b>A</b>	13	27	2.8.3
<b>B</b>	13	14	2.8.4
<b>C</b>	27	13	2.8.3
<b>D</b>	27	14	2.8.4

- 22 Element Y can react with oxygen to form a compound with formula YO.

What is the formula of the compound formed when element Y reacts with chlorine?

[Proton number: O=8, Cl=17]

*Unsur Y bertindak balas dengan oksigen untuk membentuk sebatian dengan formula YO.*

*Apakah formula sebatian yang terbentuk apabila unsur Y bertindak balas dengan klorin?*

*[Nombor proton: O=8, Cl=17]*

- A** YCl  
**B** YCl<sub>2</sub>  
**C** Y<sub>2</sub>Cl  
**D** Y<sub>2</sub>Cl<sub>3</sub>

- 23 Table 2 shows the electron arrangement of atom S, T, U and V.  
*Jadual 2 menunjukkan susunan elektron bagi atom S, T, U dan V.*

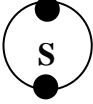
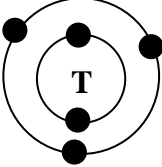
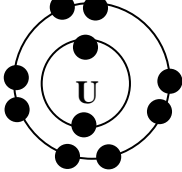
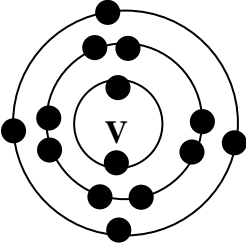
Atom <i>Atom</i>	Electron arrangement <i>Susunan elektron</i>
S	
T	
U	
V	

Table 2  
*Jadual 2*

Which atoms belong to Group 18?

*Antara atom-atom berikut, yang manakah dari Kumpulan 18?*

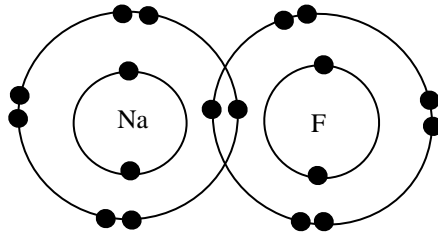
- A** U only  
*U sahaja*
- B** S and U  
*S dan U*
- C** T and V  
*T dan V*
- D** S, T and V  
*S, T dan V*

- 24 Which of the following represents the electron arrangement for the compound sodium fluoride, NaF?  
[Proton number: F=9, Na=11]

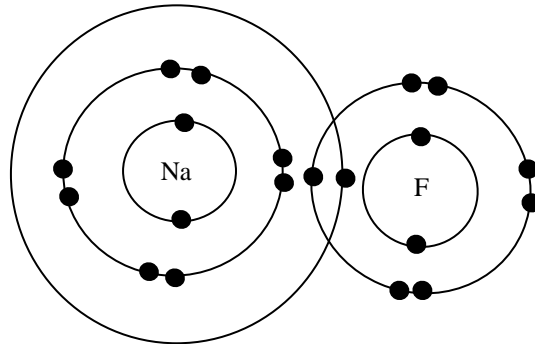
*Antara berikut, yang manakah menunjukkan susunan elektron bagi sebatian natrium florida, NaF?*

*[Nombor Proton: F=9, Na=11]*

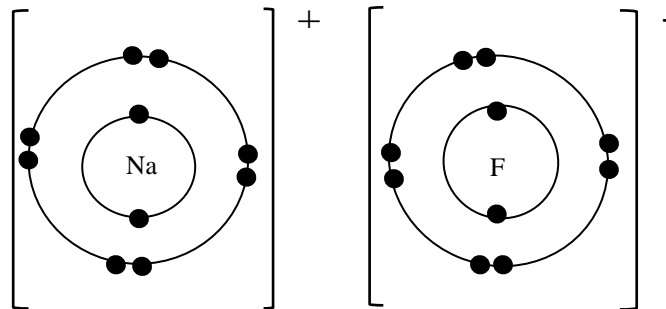
A



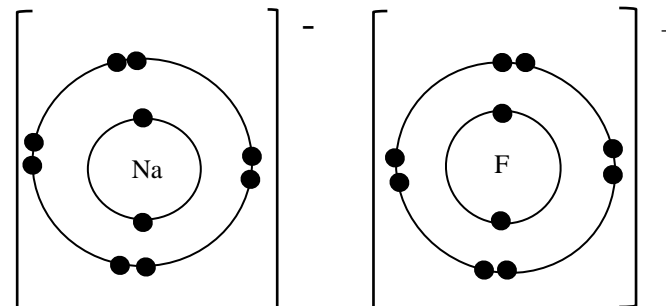
B



C



D



- 25 Diagram 5 shows the apparatus set-up for electrolysis of  $0.001 \text{ mol dm}^{-3}$  hydrochloric acid.  
*Rajah 5 menunjukkan susunan radas bagi elektrolisis larutan asid hidroklorik  $0.001 \text{ mol dm}^{-3}$ .*

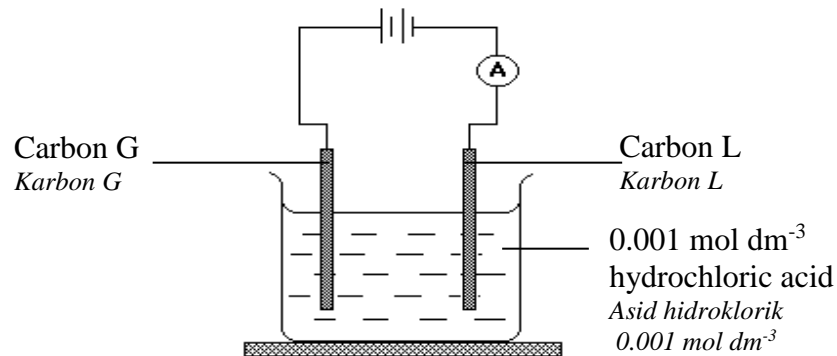
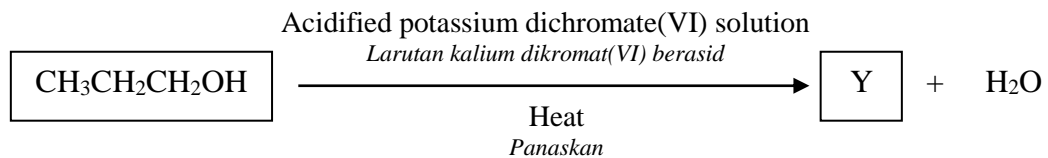


Diagram 5  
*Rajah 5*

What is formed at carbon G?  
*Apakah yang terbentuk di karbon G?*

- A Chlorine gas  
*Gas klorin*
- B Oxygen gas  
*Gas oksigen*
- C Hydrogen gas  
*Gas hidrogen*
- D Hydrogen chloride gas  
*Gas hidrogen klorida*
- 26 The following equation represents a chemical reaction of an organic compound.  
*Persamaan berikut mewakili tindak balas kimia bagi suatu sebatian organik.*



What is the suitable chemical used to verify substance Y?  
*Apakah bahan kimia yang sesuai digunakan untuk menentusahkan bahan Y?*

- A Tetrachloromethane  
*Tetraklorometana*
- B Bromine water  
*Air bromin*
- C Marble chips  
*Ketulan marmar*
- D Lime water  
*Air kapur*

- 27 Diagram 6 shows dry hydrogen chloride gas is passed through dilute ammonia solution which was added with three drops of phenolphthalein.  
*Rajah 6 menunjukkan gas hidrogen klorida kering dialirkan melalui larutan ammonia akueus cair yang telah ditambah dengan tiga titik fenolftalein.*

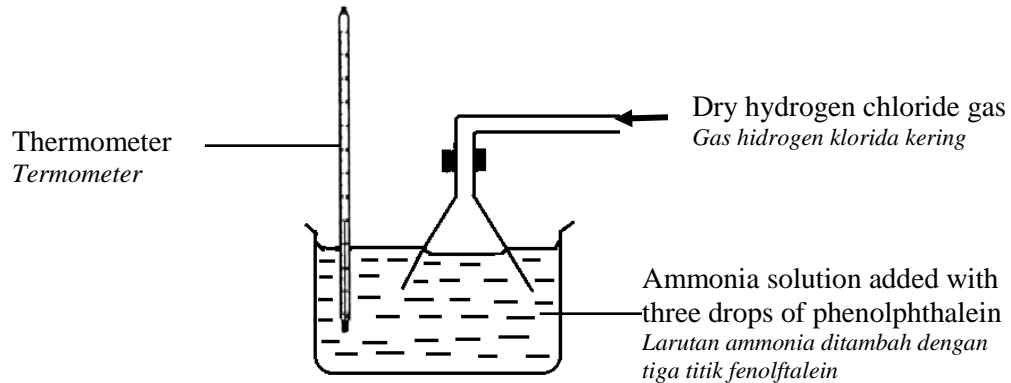


Diagram 6  
*Rajah 6*

- Which of the following is true?  
*Antara berikut, yang manakah benar?*
- A** The colourless solution turns pink  
*Larutan tak berwarna bertukar ke merah jambu*
- B** White precipitate forms  
*Mendakan putih terbentuk*
- C** Temperature of the solution increases  
*Suhu larutan meningkat*
- D** pH of solution increases  
*pH larutan bertambah*
- 28 What is the oxidation number of chromium in  $\text{Cr}_2\text{O}_7^{2-}$  ion and  $\text{Cr}_2\text{O}_3$ ?  
*Apakah nombor pengoksidaan bagi kromium dalam ion  $\text{Cr}_2\text{O}_7^{2-}$  dan  $\text{Cr}_2\text{O}_3$ ?*
- A** -3 and +6  
*-3 dan +6*
- B** +6 and +3  
*+6 dan +3*
- C** +6 and +2  
*+6 dan +2*
- D** -6 and -3  
*-6 dan -3*

- 29 Diagram 7 shows the pH value of the soil in parts W and X of a palm oil plantation.  
Rajah 7 menunjukkan nilai pH bagi tanah di bahagian W dan X di ladang kelapa sawit.

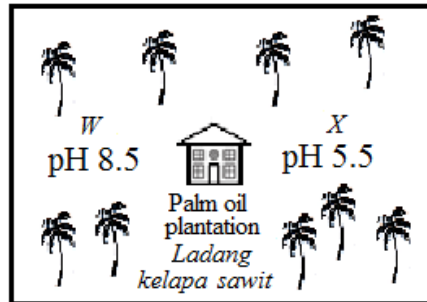


Diagram 7  
Rajah 7

Encik Ali wants to neutralise the soil in his plantation.  
Which of the following should be added to each part?

Encik Ali ingin meneutralkan tanah di ladangnya.

Antara berikut, yang manakah perlu ditambah kepada setiap bahagian?

	W	X
A	Compost <i>Kompos</i>	Soda lime <i>Kapur tohor</i>
B	Vinegar <i>Cuka</i>	Salt <i>Garam</i>
C	Soda lime <i>Kapur tohor</i>	Compost <i>Kompos</i>
D	Fertiliser <i>Baja</i>	Compost <i>Kompos</i>

- 30 Diagram 8 shows a ceramic pot.  
Rajah 8 menunjukkan periuk seramik.



Diagram 8  
Rajah 8

Which is the most suitable property of ceramic in this application?  
Ciri seramik manakah yang paling sesuai dalam aplikasi ini?

- A Ceramics are hard but brittle  
*Seramik keras tetapi rapuh*
- B Ceramics can withstand high pressure  
*Seramik tahan tekanan tinggi*
- C Ceramics are inert to chemicals and retains heat  
*Seramik lengai terhadap bahan kimia dan mengekalkan haba*
- D Ceramics are good conductor of electricity and heat  
*Seramik ialah pengalir elektrik dan haba yang baik*



- 31 Diagram 9 shows the apparatus set-up to prepare lead(II) carbonate salt .  
Rajah 9 menunjukkan susunan radas bagi menyediakan garam plumbum(II) karbonat.

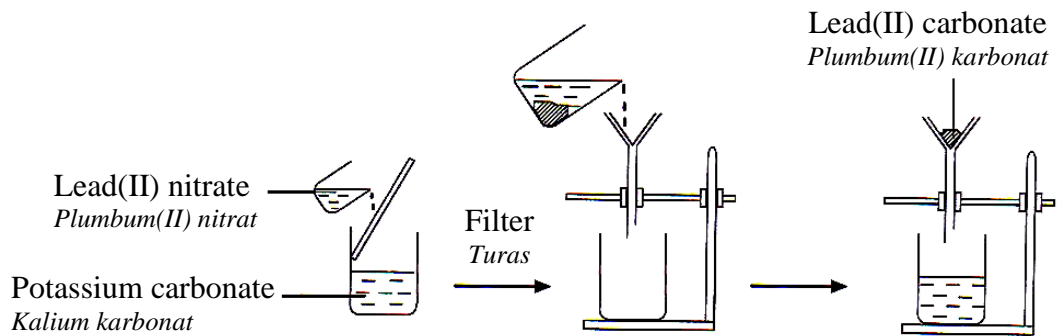


Diagram 9  
Rajah 9

Which of the following substance can replace potassium carbonate to obtain the same salt?

Antara bahan berikut, yang manakah dapat menggantikan kalium karbonat untuk mendapatkan garam yang sama?

- A Ammonium carbonate  
Ammonium karbonat
- B Zinc carbonate  
Zink karbonat
- C Aluminium carbonate  
Aluminium karbonat
- D Magnesium carbonate  
Magnesium karbonat
- 32 Substance E will prolong the freshness of food and retain its nutrient by reducing the effects of oxygen on food. Substance E is also beneficial to human health.  
Bahan E akan memanjangkan tempoh kesegaran dan mengekalkan kandungan nutrien makanan dengan mengurangkan tindakan oksigen ke atas makanan. Bahan E juga memberi manfaat kepada kesihatan manusia.

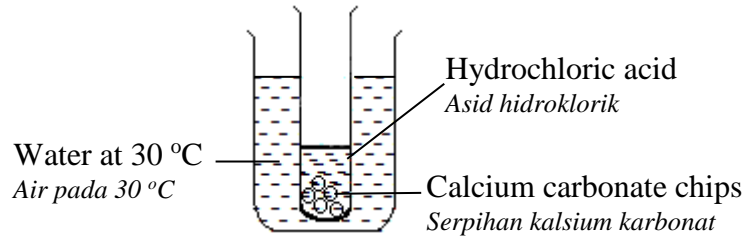
Which of the following is substance E?

Antara berikut manakah bahan E?

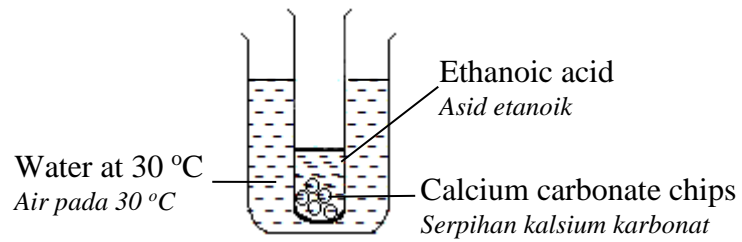
- A Butylated hydroxyanisole (BHA)  
Butylated hydroxyanisole (BHA)
- B Sodium chloride  
Natrium klorida
- C Ethanoic acid  
Asid etanoik
- D Ascorbic acid  
Asid askorbik

- 33 Which reaction is the fastest?  
Tindak balas yang manakah paling cepat?

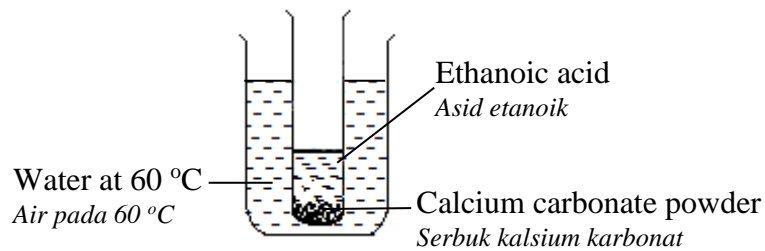
**A**



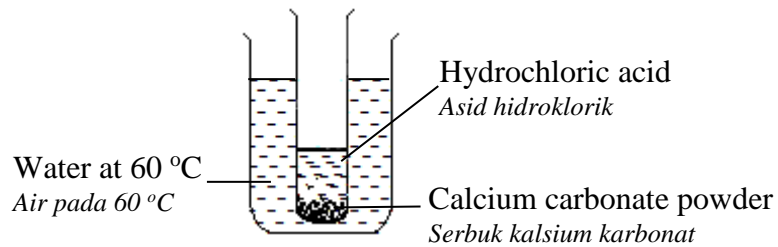
**B**



**C**



**D**



- 34 Diagram 10 shows the structural formula of carbon compound Z.  
*Rajah 10 menunjukkan formula struktur sebatian karbon Z.*

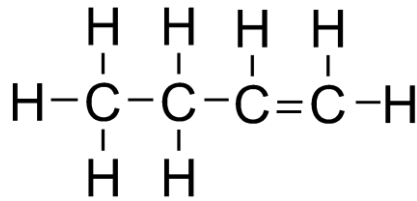


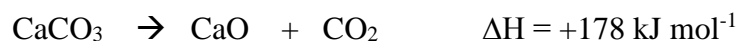
Diagram 10  
*Rajah 10*

Which of the following statements are true?  
*Antara pernyataan berikut, yang manakah benar?*

- I Empirical formula of compound Z is  $\text{C}_4\text{H}_8$   
*Formula empirik sebatian Z ialah  $\text{C}_4\text{H}_8$*
- II Name of the compound Z is but-1-ene  
*Nama sebatian Z ialah but-1-ena*
- III Oxidation of compound Z produce butan-1,2-diol  
*Pengoksidaan sebatian Z menghasilkan butan-1,2-diol*
- IV One of the isomers of compound Z is 2-methylpropene  
*Salah satu isomer bagi sebatian Z ialah 2-metilpropena*
- A I and III  
*I dan III*
- B II and IV  
*II dan IV*
- C II, III and IV  
*II, III dan IV*
- D I, II, III and IV  
*I, II, III dan IV*

- 35** The following thermochemical equation shows the decomposition of calcium carbonate.

*Persamaan termokimia berikut menunjukkan penguraian kalsium karbonat.*



What happens in this reaction?

*Apakah yang berlaku dalam tindak balas ini?*

- A** Energy is absorbed more during the formation of bonds than energy released during the breaking of bonds  
*Lebih banyak tenaga haba diserap semasa pembentukan ikatan berbanding tenaga yang dibebaskan untuk memutuskan ikatan*
- B** Energy is released more during the formation of bonds than energy absorbed during the breaking of bonds  
*Lebih banyak tenaga haba dibebaskan semasa pembentukan ikatan berbanding tenaga yang diserap untuk memutuskan ikatan*
- C** The quantity of heat released to the surrounding during reaction is 178 kJ  
*Kuantiti haba yang dibebaskan ke persekitaran semasa tindak balas ialah 178 kJ*
- D** Total energy content of calcium carbonate is lower than total energy content of calcium oxide and carbon dioxide  
*Jumlah kandungan tenaga kalsium karbonat lebih rendah daripada jumlah kandungan tenaga kalsium oksida dan karbon dioksida*
- 36** 0.05 mol of diatomic molecule gas J has a mass of 1.4 g.  
*0.05 mol gas molekul dwiatom J mempunyai jisim 1.4 g.*

What is the relative atomic mass of element J?

*Apakah jisim atom relatif bagi unsur J?*

- A** 7
- B** 14
- C** 28
- D** 40

- 37** When copper(II) carbonate is heated, it decomposes to copper(II) oxide and carbon dioxide gas.

If  $4.80 \text{ dm}^3$  of carbon dioxide gas produced, what is the mass of copper(II) carbonate used?

[Relative atomic mass: C=12, O=16, Cu=64; 1 mole of a gas occupies  $24 \text{ dm}^3$  at room conditions]

*Apabila kuprum(II) karbonat dipanaskan, ia terurai menjadi kuprum(II) oksida dan gas karbon dioksida.*

*Jika  $4.80 \text{ dm}^3$  gas karbon dioksida dihasilkan, apakah jisim kuprum(II) karbonat yang digunakan?*

*[Jisim atom relatif : C=12, O=16, Cu=64; 1 mol gas memenuhi  $24 \text{ dm}^3$  gas pada keadaan bilik]*

- A** 12.4 g
- B** 24.8 g
- C** 37.2 g
- D** 124.0 g

- 38** Atom W has 1 valence electron and 2 shells filled with electrons.  
Which of the following chemical equations represents a reaction between element W and water?

*Unsur W mempunyai 1 elektron valens dan 2 petala berisi elektron.*

*Antara persamaan kimia berikut, yang manakah menunjukkan tindak balas antara unsur W dan air?*

- A**  $2 \text{ W} + 2 \text{ H}_2\text{O} \rightarrow 2 \text{ WOH} + \text{H}_2$
- B**  $2 \text{ W} + \text{H}_2\text{O} \rightarrow \text{W}_2\text{O} + \text{H}_2$
- C**  $2 \text{ W} + 3 \text{ H}_2\text{O} \rightarrow \text{W}_2\text{O}_3 + 3\text{H}_2$
- D**  $\text{W} + \text{H}_2\text{O} \rightarrow \text{WO} + \text{H}_2$

- 39 Table 3 shows the proton number of J, K, L and M elements.  
*Jadual 3 menunjukkan nombor proton bagi unsur J, K, L dan M.*

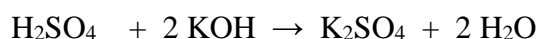
Element <i>Unsur</i>	Proton number <i>Nombor proton</i>
J	3
K	6
L	8
M	17

Table 3  
*Jadual 3*

Which of the following pair of elements form a compound with high melting point?

*Antara pasangan unsur berikut, yang manakah membentuk sebatian dengan takat lebur yang tinggi?*

- A** J and M  
*J dan M*
- B** K and L  
*K dan L*
- C** K and M  
*K dan M*
- D** J and K  
*J dan K*
- 40 The following chemical equation represent the neutralization reaction between sulphuric acid and potassium hydroxide.  
*Persamaan kimia berikut menunjukkan tindak balas peneutralan di antara asid sulfurik dan kalium hidroksida.*



20.0 cm<sup>3</sup> of 2.0 mol dm<sup>-3</sup> potassium hydroxide solution was titrated with 1.0 mol dm<sup>-3</sup> sulphuric acid.

*20.0 cm<sup>3</sup> larutan kalium hidroksida 2.0 mol dm<sup>-3</sup> telah dititratkan dengan asid sulfurik 1.0 mol dm<sup>-3</sup>.*

What is the final burette reading if the initial reading is 3.00 cm<sup>3</sup>?

*Apakah bacaan akhir buret jika bacaan awalnya adalah 3.00 cm<sup>3</sup>?*

- A** 20.00 cm<sup>3</sup>
- B** 23.00 cm<sup>3</sup>
- C** 40.00 cm<sup>3</sup>
- D** 43.00 cm<sup>3</sup>

- 41 Diagram 11 shows the apparatus set-up to purify an impure silver plate. 4.0 g of impure silver plate dissolved while 3.8 g of silver deposited at the pure silver plate.

Rajah 11 menunjukkan susunan radas untuk menuliskan kepingan argentum tak tulen. 4.0 g kepingan argentum tak tulen melarut manakala 3.8 g argentum terendap pada kepingan argentum tulen.

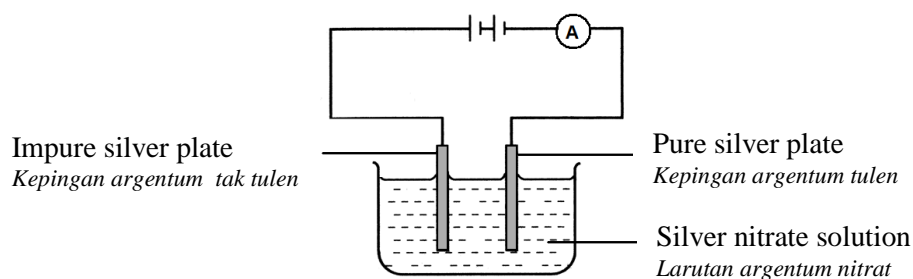


Diagram 11  
Rajah 11

What is the percentage of purity of the impure silver plate?  
Apakah peratus ketulenan bagi kepingan argentum tak tulen itu?

- A 5.0 %  
B 5.3 %  
C 51.3 %  
D 95.0 %
- 42 Diagram 12 shows the apparatus set-up for dilution of sodium hydroxide solution.  
Rajah 12 menunjukkan susunan radas bagi pencairan larutan natrium hidroksida.

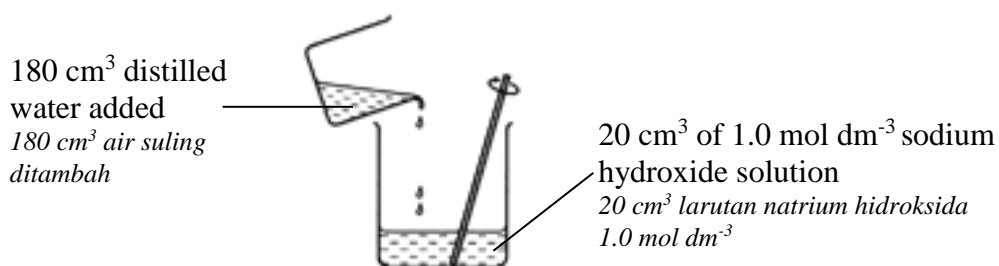


Diagram 12  
Rajah 12

What is the new concentration of sodium hydroxide solution?  
Apakah kepekatan larutan natrium hidroksida yang baru?

- A  $0.02 \text{ mol dm}^{-3}$   
B  $0.10 \text{ mol dm}^{-3}$   
C  $0.11 \text{ mol dm}^{-3}$   
D  $0.90 \text{ mol dm}^{-3}$

- 43 Diagram 13 shows a chemical cell.  
Rajah 13 menunjukkan satu sel kimia.

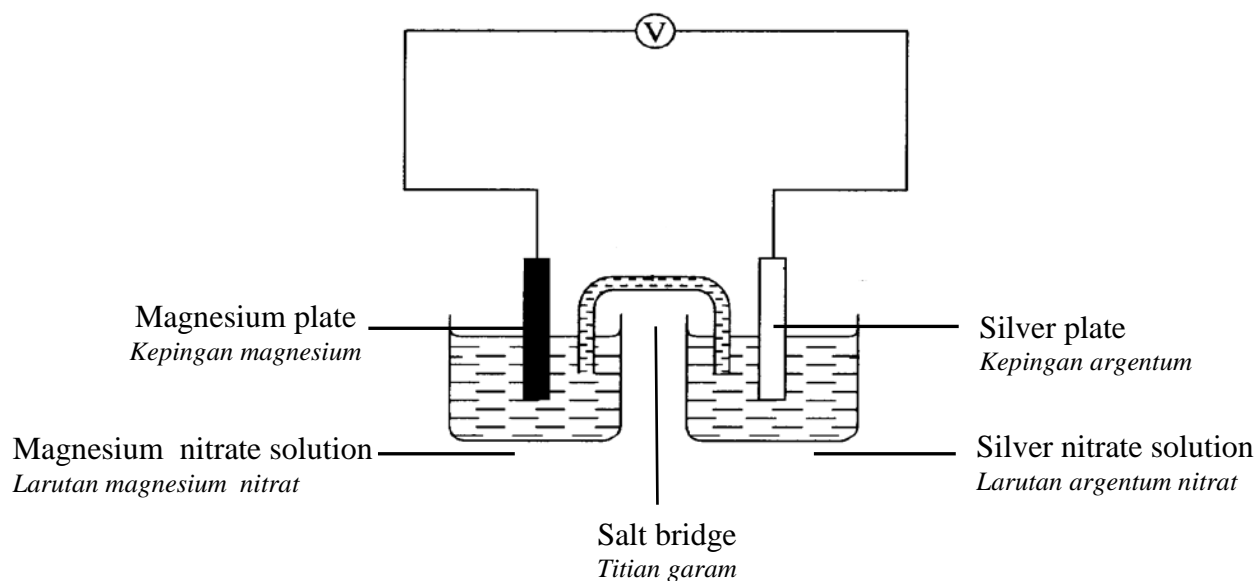


Diagram 13  
Rajah 13

Which half equations represent the reaction at the negative and positive terminal?  
Persamaan setengah yang manakah mewakili tindak balas di terminal negatif dan positif?

	Negative terminal <i>Terminal negatif</i>	Positive terminal <i>Terminal positif</i>
A	$\text{Ag}^+ + \text{e}^- \rightarrow \text{Ag}$	$\text{Mg} \rightarrow \text{Mg}^{2+} + 2\text{e}^-$
B	$\text{Mg} \rightarrow \text{Mg}^{2+} + 2\text{e}^-$	$\text{Ag}^+ + \text{e}^- \rightarrow \text{Ag}$
C	$\text{Ag} \rightarrow \text{Ag}^+ + \text{e}^-$	$\text{Mg}^{2+} + 2\text{e}^- \rightarrow \text{Mg}$
D	$4\text{OH}^- \rightarrow 2\text{H}_2\text{O} + \text{O}_2 + 4\text{e}^-$	$2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$



- 44 Diagram 14 shows the conversion of rubber Q to rubber R through Process P.  
*Rajah 14 menunjukkan penukaran getah Q kepada getah R melalui Proses P.*

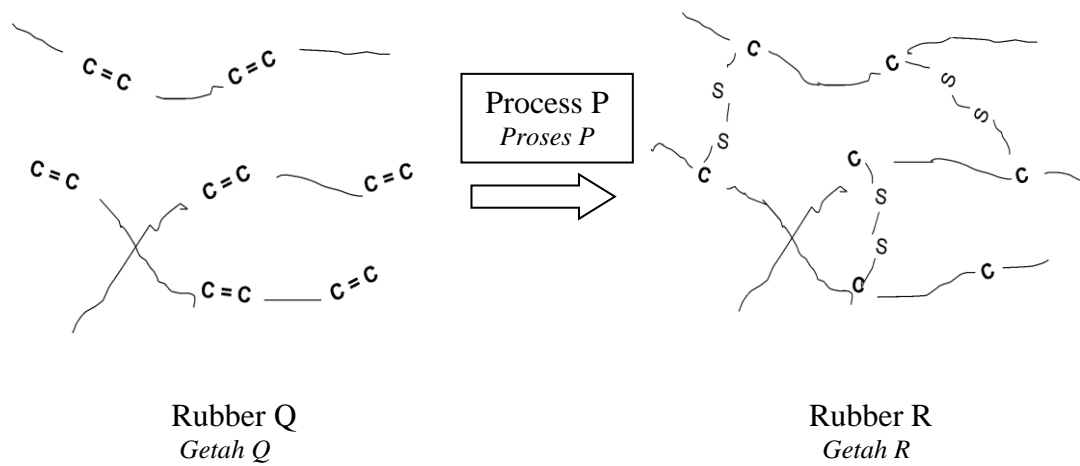


Diagram 14  
*Rajah 14*

Which of the following explains the purpose of Process P?  
*Antara berikut, yang manakah menerangkan tujuan Proses P?*

- A** To reduce the elasticity of rubber  
*Mengurangkan kekenyalan getah*
- B** To increase the size of rubber molecules  
*Meningkatkan saiz molekul getah*
- C** To decrease the melting point of rubber  
*Mengurangkan takat lebur getah*
- D** To increase the oxidation of rubber  
*Meningkatkan pengoksidaan getah*

- 45 Table 4 shows the result to identify the cation and anion for salt N solution.  
 Jadual 4 menunjukkan keputusan ujian untuk mengenalpasti kation dan anion bagi larutan garam N.

Reagents <i>Reagen</i>	Observation <i>Pemerhatian</i>
Add dilute sulphuric acid <i>Asid sulfurik cair ditambah</i>	White precipitate form <i>Mendakan putih terbentuk</i>
Add dilute nitric acid and add silver nitrate solution <i>Asid nitrik cair dan larutan argentum nitrat ditambah</i>	White precipitate form <i>Mendakan putih terbentuk</i>
Add a few drops of sodium hydroxide solution until excess <i>Larutan natrium hidroksida ditambah sedikit demi sedikit sehingga berlebihan.</i>	White precipitate forms and not dissolve in excess sodium hydroxide solution <i>Mendakan putih terbentuk dan tidak larut dalam larutan natrium hidroksida berlebihan</i>

Table 4  
 Jadual 4

Based on the results of the experiment, what is salt N?  
 Berdasarkan keputusan eksperimen, apakah garam N?

- A** Aluminium chloride  
*Aluminium klorida*
- B** Magnesium sulphate  
*Magnesium sulfat*
- C** Calcium chloride  
*Kalsium klorida*
- D** Zinc sulphate  
*Zink sulfat*

- 46 Diagram 15 shows curve I for the reaction between  $20 \text{ cm}^3$  of  $0.30 \text{ mol dm}^{-3}$  hydrochloric acid with excess zinc.

*Rajah 15 menunjukkan lengkung I bagi tindak balas diantara  $20 \text{ cm}^3$  asid hidroklorik  $0.30 \text{ mol dm}^{-3}$  dengan zink berlebihan.*

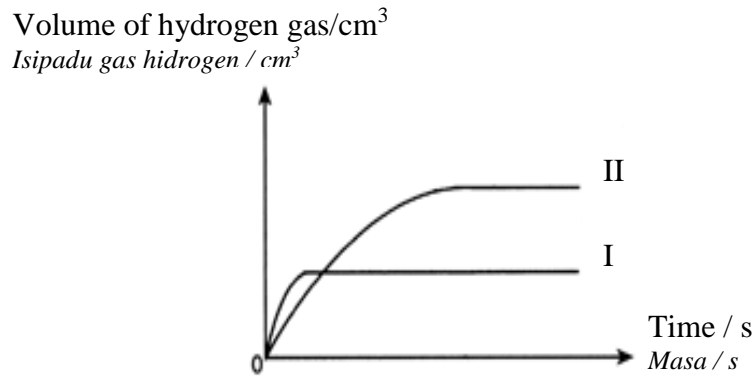


Diagram 15  
*Rajah 15*

If the experiment is repeated, which solution will produce curve II?  
*Jika eksperimen diulangi, larutan yang manakah akan menghasilkan lengkung II?*

- A**  $20 \text{ cm}^3$  of  $0.50 \text{ mol dm}^{-3}$  hydrochloric acid  
 *$20 \text{ cm}^3$  asid hidroklorik  $0.50 \text{ mol dm}^{-3}$*
- B**  $40 \text{ cm}^3$  of  $0.15 \text{ mol dm}^{-3}$  hydrochloric acid  
 *$40 \text{ cm}^3$  asid hidroklorik  $0.15 \text{ mol dm}^{-3}$*
- C**  $60 \text{ cm}^3$  of  $0.20 \text{ mol dm}^{-3}$  hydrochloric acid  
 *$60 \text{ cm}^3$  asid hidroklorik  $0.20 \text{ mol dm}^{-3}$*
- D**  $80 \text{ cm}^3$  of  $0.40 \text{ mol dm}^{-3}$  hydrochloric acid  
 *$80 \text{ cm}^3$  asid hidroklorik  $0.40 \text{ mol dm}^{-3}$*

- 47 Table 5 shows the observation when different mixtures of metals and metal oxides are heated strongly.

*Jadual 5 menunjukkan pemerhatian apabila campuran logam dan oksida logam yang berbeza dipanaskan dengan kuat.*

<b>Mixture</b> <i>Campuran</i>	<b>Observation</b> <i>Pemerhatian</i>
Metal P and metal Z oxide <i>Logam P dan oksida logam Z</i>	Glowing <i>Berbara</i>
Metal Q and metal R oxide <i>Logam Q dan oksida logam R</i>	No change <i>Tiada perubahan</i>
Metal Q and metal T oxide <i>Logam Q dan oksida logam T</i>	Glowing <i>Berbara</i>
Metal R and metal Z oxide <i>Logam R dan oksida logam Z</i>	No change <i>Tiada perubahan</i>

Table 5  
*Rajah 5*

Which of the following arrangement represents the reactivity of metal with oxygen in descending order?

*Antara susunan berikut, yang manakah mewakili kereaktifan logam terhadap oksigen dalam susunan menurun?*

- A** Z, R, Q, T, P
- B** P, Z, Q, T, R
- C** T, Q, R, Z, P
- D** P, Z, R, Q, T

- 48 Diagram 16 shows the structural formula of two compounds.  
*Rajah 16 menunjukkan formula struktur bagi dua sebatian.*

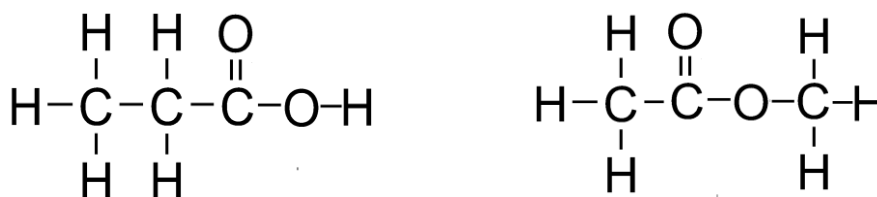


Diagram 16  
*Rajah 16*

What are the similarities and differences between these compounds?  
*Apakah persamaan dan perbezaan antara kedua-dua sebatian?*

	<b>Similarities</b> <i>Persamaan</i>	<b>Differences</b> <i>Perbezaan</i>
<b>A</b>	Molecular formula <i>Formula molekul</i>	Chemical properties <i>Sifat-sifat kimia</i>
<b>B</b>	Functional group <i>Kumpulan berfungsi</i>	Physical properties <i>Sifat-sifat fizikal</i>
<b>C</b>	Isomers <i>Isomer</i>	Molecular formula <i>Formula molekul</i>
<b>D</b>	General formula <i>Formula am</i>	Relative molecular masses <i>Jisim molekul relatif</i>

- 49 Table 6 shows two experiments between different halogens and potassium bromide solution. The mixture is then added with 1,1,1-trichloroethane.

Jadual 6 menunjukkan dua eksperimen antara halogen berlainan dengan larutan kalium bromida. Campuran itu kemudiannya ditambah dengan 1,1,1-trikloroetana.

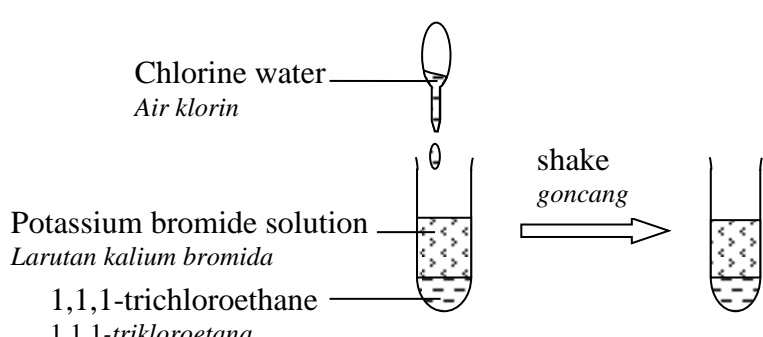
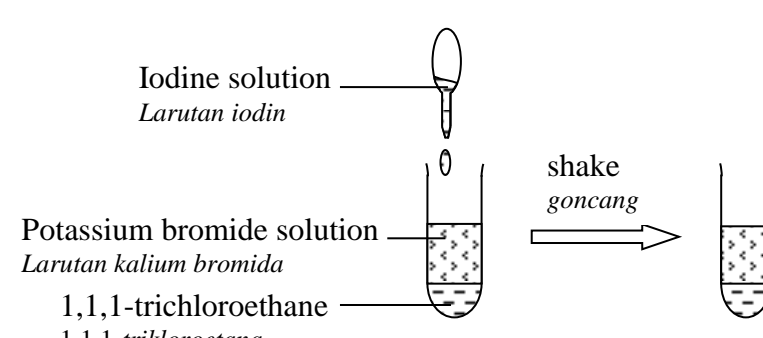
<p>Experiment I <i>Eksperimen I</i></p>	 <p>Chlorine water <i>Air klorin</i></p> <p>Potassium bromide solution <i>Larutan kalium bromida</i></p> <p>1,1,1-trichloroethane <i>1,1,1-trikloroetana</i></p> <p>shake <i>goncang</i></p>
<p>Experiment II <i>Eksperimen II</i></p>	 <p>Iodine solution <i>Larutan iodin</i></p> <p>Potassium bromide solution <i>Larutan kalium bromida</i></p> <p>1,1,1-trichloroethane <i>1,1,1-trikloroetana</i></p> <p>shake <i>goncang</i></p>

Table 6  
*Jadual 6*

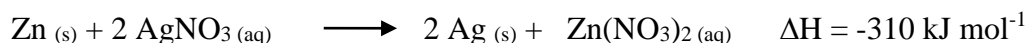
Which of the following are the correct observation for the 1,1,1-trichloroethane layer in both experiments?

Antara berikut, yang manakah pemerhatian yang betul bagi lapisan 1,1,1-trikloroetana dalam kedua-dua eksperimen?

	<p>Experiment I <i>Eksperimen I</i></p>	<p>Experiment II <i>Eksperimen II</i></p>
<p><b>A</b></p>	<p>Colourless layer <i>Lapisan tidak berwarna</i></p>	<p>Brown layer <i>Lapisan perang</i></p>
<p><b>B</b></p>	<p>Purple layer <i>Lapisan ungu</i></p>	<p>Brown layer <i>Lapisan perang</i></p>
<p><b>C</b></p>	<p>Colourless layer <i>Lapisan tidak berwarna</i></p>	<p>Purple layer <i>Lapisan ungu</i></p>
<p><b>D</b></p>	<p>Brown layer <i>Lapisan perang</i></p>	<p>Purple layer <i>Lapisan ungu</i></p>

- 50** The reaction between zinc and silver nitrate solution is represented by the following equation:

*Tindak balas antara zink dengan argentum nitrat diwakili dengan persamaan berikut :*



Which of the statements is true concerning the above reaction?

*Antara pernyataan berikut, yang manakah benar mengenai tindak balas di atas?*

- I The zinc metal is oxidised  
*Logam zink di oksidakan*
  - II Oxidation number of silver decreases from +1 to 0  
*Nombor pengoksidaan argentum berkurang dari +1 kepada 0*
  - III The temperature of the mixture decreases during reaction.  
*Suhu campuran menurun semasa tindak balas*
  - IV When 2.0 mol of silver is displaced, 620 kJ of heat is released.  
*Bila 2.0 mol argentum disesarkan, 620 kJ haba dibebaskan*
- A** I and III  
*I dan III*
  - B** II and IV  
*II dan IV*
  - C** I, II and III  
*I, II dan III*
  - D** I, II and IV  
*I, II dan IV*

**END OF QUESTION PAPER**  
***KERTAS SOALAN TAMAT***

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

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

1. This question paper consists of **50** questions.  
*Kertas soalan ini mengandungi 50 soalan.*
2. Answer **all** questions.  
*Jawab semua soalan.*
3. Answer each question by blackening the correct space on the answer sheet.  
*Jawab setiap soalan dengan menghitamkan ruangan yang betul pada kertas jawapan.*
4. Blacken only **one** space for each question.  
*Hitamkan satu ruangan sahaja pada setiap soalan.*
5. If you wish to change your answer, erase the blackened mark that you have made. Then blacken the new answer.  
*Sekiranya anda hendak menukar jawapan, padamkan tanda yang telah dibuat. Kemudian hitamkan jawapan yang baru.*
6. The diagrams in the questions provided are not drawn to scale unless stated.  
*Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan.*
7. You may use a scientific calculator.  
*Anda dibenarkan menggunakan kalkulator saintifik.*



4541/2  
Chemistry  
Paper 2  
September  
2015  
2 ½ hour

Name : .....

Index Number: .....

Class: .....



**MAKTAB RENDAH SAINS MARA**  
**PEPERIKSAAN SIJIL PENDIDIKAN MRSMA 2015**

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

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**CHEMISTRY**

**Paper 2**

Two hours and thirty minutes

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**DO NOT OPEN THE QUESTION BOOKLET  
UNTIL BEING TOLD TO DO SO**

1. Write your name and index number in the space provided.  
*Tuliskan nama dan angka giliran anda pada ruang yang disediakan.*
2. The question booklet is bilingual  
*Kertas soalan ini adalah dalam dwibahasa.*
3. Candidate is required to read the information on the last page.  
*Calon dikehendaki membaca maklumat di halaman belakang*

<i>Kod Pemeriksa</i>			
Section	Question	Full mark	Marks
A	1	9	
	2	9	
	3	10	
	4	10	
	5	11	
	6	11	
B	7	20	
	8	20	
C	9	20	
	10	20	
TOTAL		100	

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This question booklet contains 28 printed pages.

For  
Examiner's  
Use

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

[60 marks]

[60 markah]

Answer **all** questions in this section.

*Jawab semua soalan dalam bahagian ini*

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

- 1** Diagram 1.1 shows a few type of medicines that should be taken by a patient who is suffering from diabetes and fever.

*Rajah 1.1 menunjukkan beberapa jenis ubat-ubatan yang perlu diambil oleh seorang pesakit yang menghidap penyakit kencing manis dan demam.*



Diagram 1.1

*Rajah 1.1*

Based on Diagram 1.1, answer the following questions.

*Berdasarkan kepada Rajah 1.1, jawab soalan-soalan berikut.*

- (a) State the type and example of medicine that should be taken by the patient to relief his fever.

*Nyatakan jenis dan contoh ubat yang perlu diambil oleh pesakit tersebut bagi meredakan demamnya.*

Type of medicine <i>Jenis ubat</i>	Example <i>Contoh</i>

[2 marks]

[2 markah]

1(a)

2

*For  
Examiner's  
Use*

- (b) Sometimes the doctor also prescribes this patient with streptomycin. The patient has to finish up the medicine accordingly to the prescription. Explain why.

*Ada kalanya doktor juga mempreskripsi streptomisin kepada pesakit ini. Pesakit perlu menghabiskan ubat tersebut seperti yang telah dipreskripsikan oleh doktor. Jelaskan mengapa.*

.....

.....

.....

[2 marks]  
[2 markah]

<b>1(b)</b>	
	<b>2</b>

- (c) This patient also take a traditional medicine to cure his diabetes.  
*Pesakit ini juga mengambil ubat-ubatan tradisional bagi merawat penyakit kencing manisnya.*

- (i) State one example of the traditional medicine.  
*Nyatakan satu contoh sumber ubat tradisional ini.*

.....

[1 mark]  
[1 markah]

<b>1(c)(i)</b>	
	<b>1</b>

- (ii) Give the advantage of using the traditional medicine.  
*Beri satu kelebihan menggunakan ubat tradisional itu.*

.....

[1 mark]  
[1 markah]

<b>1(c)(ii)</b>	
	<b>1</b>

For  
Examiner's  
Use

- (d) Diagram 1.2 shows an article regarding a healthy life style.  
*Rajah 1.2 menunjukkan keratan akhbar berkaitan gaya hidup sihat.*

ARKIB : 06/11/2013

### Kurangkan gula, amal gaya hidup sihat

Oleh DR AMINUDIN MANSOR  
PENULIS ialah pengamal media berkelulusan PhD Persuratan Melayu, UKM.



Seorang pengguna membeli bekalan gula baru-baru ini. - BERNAMA

PEMANSUHAN 34 sen subsidi gula yang dibentangkan dalam Bajet 2014 baru-baru ini mempunyai matlamat yang jelas iaitu antaranya rakyat didahulukan untuk mengelakkan rakyat terbabat dengan pelbagai penyakit berbahaya akibat kencing manis.

Langkah ini dijangka dapat memanfaatkan kesihatan kepada golongan rakyat khususnya di bandar yang dapat menjurus kepada kehidupan yang sihat tanpa penyakit kencing manis. Justeru, pengurangan gula dalam makanan dan mengamalkan gaya hidup sihat akan membantu golongan rakyat hidup sejahtera.

Source: [www.utusan.com.my](http://www.utusan.com.my)

Diagram 1.2  
*Rajah 1.2*

Suggest an alternative sweetener that can replace sugar for diabetic patient.  
*Cadangkan satu pemanis alternatif yang boleh menggantikan gula bagi pesakit kencing manis.*

1(d)	
	1

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

- (e) Food additives is a natural or synthetic substance which is added to food to prevent spoilage or to improve its appearance, taste and texture.  
*Bahan tambah makanan ialah bahan semula jadi atau sintetik yang ditambahkan ke dalam makanan bagi mengelakkan kerosakan atau meningkatkan rupa, rasa dan teksturnya.*

Diagram 1.3 shows an example of a favourite food among teenagers.  
*Rajah 1.3 menunjukkan satu contoh makanan kegemaran remaja.*



Diagram 1.3  
*Rajah 1.3*

*For  
Examiner's  
Use*

- (i) Sodium nitrite is an example of food additive added to the meat in the burger.

State the type of food additive which sodium nitrite belongs to.

*Natrium nitrit adalah satu contoh bahan tambah makanan yang ditambahkan ke dalam daging burger.*

*Nyatakan jenis bahan tambah makanan bagi natrium nitrit.*

.....

[1 mark]  
[1 markah]

<b>1(e)(i)</b>	
	<b>1</b>

- (ii) What is the side effect of sodium nitrite on our health?

*Apakah kesan sampingan natrium nitrit ke atas kesihatan kita?*

.....

[1 mark]  
[1 markah]

<b>1(e)(ii)</b>	
	<b>1</b>

<b>TOTAL A1</b>	
	<b>9</b>

For  
Examiner's  
Use

- 2 Diagram 2.1 shows a weather balloon and an advertising light which is filled with different gases.  
*Rajah 2.1 menunjukkan belon kaji cuaca dan lampu iklan yang telah diisi dengan gas yang berbeza.*

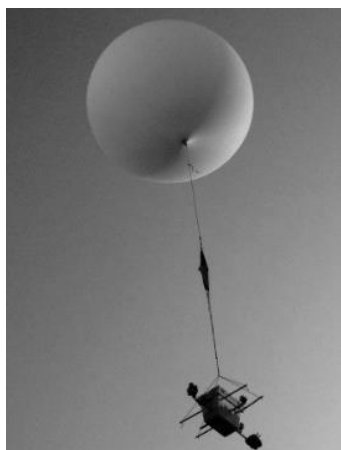


Diagram 2.1  
*Rajah 2.1*

- (a) The gases belong to the same group in the Periodic Table of Elements.  
Name the group.  
*Gas-gas itu terletak dalam kumpulan yang sama dalam Jadual Berkala Unsur.  
Namakan kumpulan tersebut.*

2(a)	
	1

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

- (b) Name the gas used in the weather balloon.  
Explain why.  
*Namakan gas yang digunakan dalam belon kaji cuaca.  
Terangkan mengapa.*

2(b)	
	2

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



For  
Examiner's  
Use

- 3 Diagram 3.1 shows the chemical reactions of Compound P.  
*Rajah 3.1 menunjukkan beberapa tindak balas kimia bagi Sebatian P.*

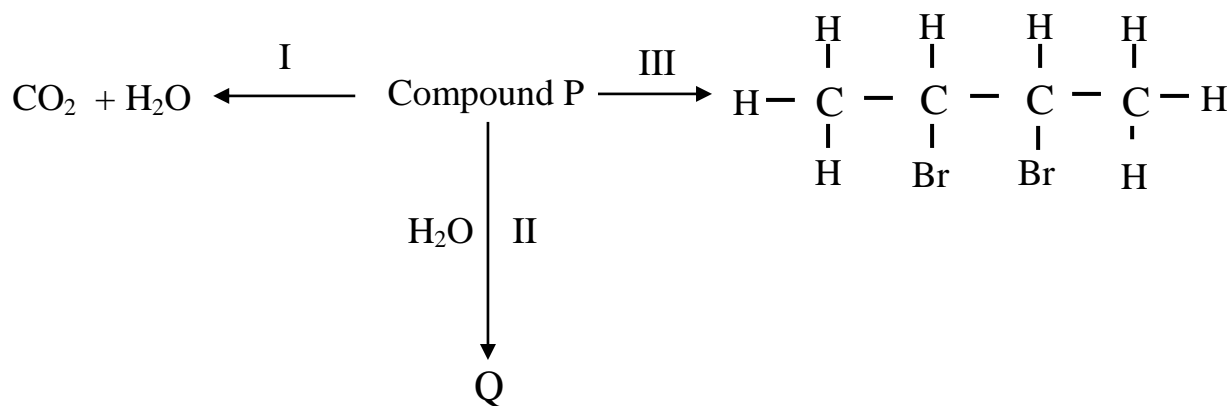


Diagram 3.1

*Rajah 3.1*

- (a) (i) Name the homologous series of Compound P.  
*Namakan siri homolog bagi Sebatian P.*

3(a)(i)

1

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

- (ii) Draw the structural formula of Compound P.  
*Lukiskan formula struktur Sebatian P.*

3(a)(ii)

1

[1 mark]  
[1 markah]

- (b) In reaction I, Compound P burns completely in oxygen.  
Write a balanced chemical equation for the reaction.  
*Dalam tindak balas I, Sebatian P terbakar lengkap dalam gas oksigen.  
Tuliskan persamaan kimia bagi tindak balas itu.*

3(b)

2

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



- (c) In reaction II, Compound P reacts with water to produce Q.  
State one of the conditions required.  
*Dalam tindak balas II, Sebatian P bertindak balas dengan air menghasilkan Q.  
Nyatakan salah satu keadaan yang diperlukan.*

[1 mark]  
[1 markah]

<b>3(c)</b>	
	1

- (d) Reaction III can be used to verify Compound P.  
*Tindak balas III boleh digunakan untuk menentusahkan Sebatian P.*

- (i) State the observation for reaction III.  
*Nyatakan pemerhatian bagi tindak balas III.*

[1 mark]  
[1 markah]

<b>3(d)(i)</b>	
	1

- (ii) Name the product formed.  
*Namakan hasil tindak balas yang terbentuk.*

[1 mark]  
[1 markah]

<b>3(d)(ii)</b>	
	1

- (iii) Describe briefly how reaction III can be carried out in the laboratory.  
*Huraikan secara ringkas bagaimana tindak balas III boleh dijalankan di dalam makmal.*

[2 marks]  
[2 markah]

<b>3(d)(iii)</b>	
	2

- (e) Compound Q can react with ethanoic acid to produce compound Y which has a smell of an apple.  
Name compound Y.  
*Sebatian Q boleh bertindak balas dengan asid etanoik menghasilkan bahan Y yang berbau seperti epal.  
Namakan sebatian Y.*

[1 mark]  
[1 markah]

<b>3(e)</b>	
	1

<b>TOTAL A3</b>	
	<b>10</b>

For  
Examiner's  
Use

- 4 Diagram 4.1 shows a flowchart to form Salt M.  
Rajah 4.1 menunjukkan carta alir bagi penghasilan Garam M.

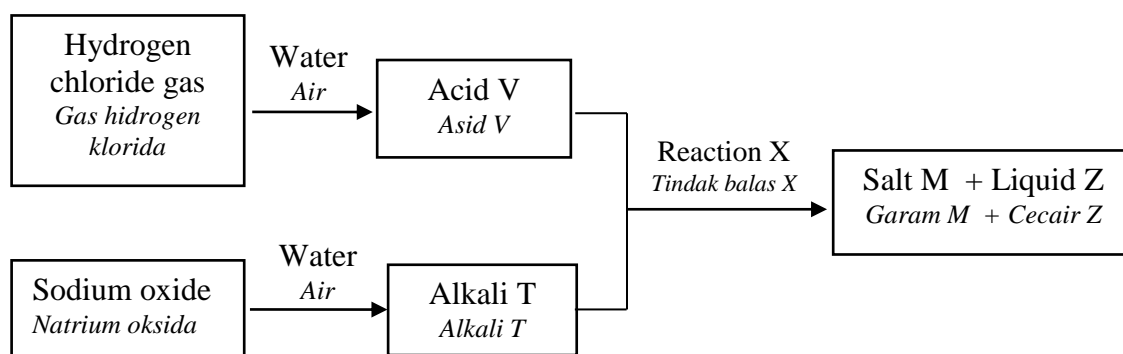


Diagram 4.1  
Rajah 4.1

Based on Diagram 4.1, answer the following questions:  
Berdasarkan Rajah 4.1, jawab soalan-soalan berikut:

- (a) State acid V and alkali T.  
Nyatakan asid V dan alkali T.

Acid V : .....  
Asid V  
Alkali T : .....  
Alkali T

[2 marks]  
[2 markah]

- (b) (i) Name reaction X.  
Namakan tindak balas X.

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

- (ii) Write the chemical equation for reaction X.  
Tuliskan persamaan kimia bagi tindak balas X.

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

4(a)

2

4(b)(i)

1

4(b)(ii)

1

For  
Examiner's  
Use

- (c) 25 cm<sup>3</sup> of alkali T is needed to neutralize 50 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> acid V. Calculate the concentration of alkali T.  
25 cm<sup>3</sup> alkali T diperlukan untuk meneutralkan 50 cm<sup>3</sup> asid V 0.1 mol dm<sup>-3</sup>.  
Hitungkan kepekatan alkali T.

[3 marks]  
[3 markah]

4(c)	
	3

- (d) Describe briefly how crystals of Salt M is obtained from its solution.  
Huraikan secara ringkas bagaimana hablur Garam M diperolehi dari larutannya.
- .....
- .....
- .....
- .....

[2 marks]  
[2 markah]

4(d)	
	2

- (e) If acid V is replaced with ethanoic acid, state the salt produced from reaction X.  
Jika asid V digantikan dengan asid etanoik, nyatakan garam yang terhasil dari tindak balas X.
- .....

[1 mark]  
[1 markah]

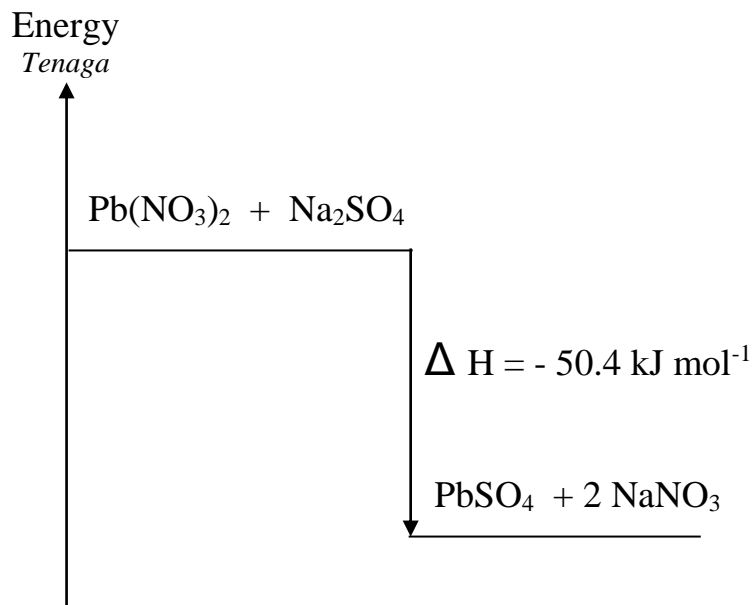
4(e)	
	1

TOTAL A4	
	10

For  
Examiner's  
Use

- 5 Diagram 5.1 shows the energy level diagram for the precipitation of lead(II) sulphate.

Rajah 5.1 menunjukkan gambar rajah aras tenaga bagi pemendakan plumbum(II) sulfat.



- (a) State the meaning for heat of precipitation of lead(II) sulphate.  
Nyatakan maksud haba pemendakan plumbum(II) sulfat.

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

- (b) State **one** information that can be obtained from the energy level diagram in Diagram 5.1.  
Nyatakan **satu** maklumat yang boleh diperolehi dari gambar rajah aras tenaga dalam Rajah 5.1

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

5(a)	
	1

5(b)	
	1

- (c) Diagram 5.2 shows an experiment to determine the heat of displacement of copper from its salt solution by zinc. The temperature increased by  $14^{\circ}\text{C}$ .  
[Specific heat capacity of solution =  $4.2 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$ ; density of solution =  $1.0 \text{ g cm}^{-3}$ ]

Rajah 5.2 menunjukkan satu eksperimen untuk menentukan haba penyesaran kuprum daripada larutan garamnya oleh logam zink. Kenaikan suhu direkodkan sebanyak  $14^{\circ}\text{C}$ .  
[Muatan haba tentu larutan =  $4.2 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$ ; Ketumpatan larutan =  $1.0 \text{ g cm}^{-3}$ ]

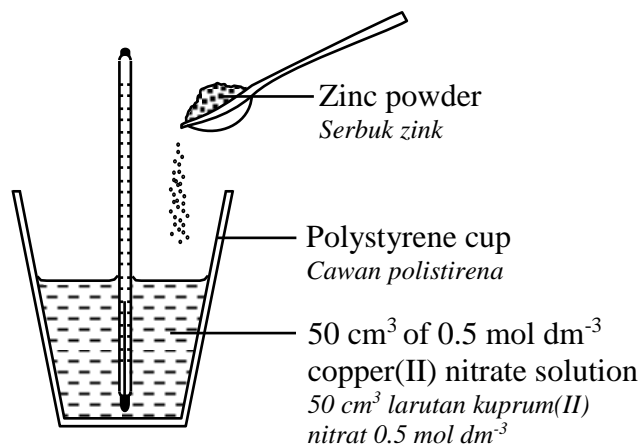


Diagram 5.2

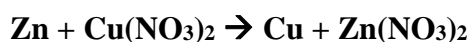
Rajah 5.2

- (i) Calculate the heat change in this experiment.  
*Hitungkan perubahan haba di dalam eksperimen ini.*

[1 mark]  
[1 markah]

5(c)(i)	
	1

- (ii) The chemical equation for the displacement reaction is shown below.  
*Persamaan kimia bagi tindak balas penyesaran tersebut ditunjukkan di bawah.*



Calculate the heat of displacement of copper from copper(II) nitrate solution by zinc.

*Hitungkan haba penyesaran kuprum dari larutan kuprum(II) nitrat oleh zink.*

[3 marks]  
[3 markah]

5(c)(ii)	
	3

For  
Examiner's  
Use

- (d) Table 5.3 shows the values of heat released for a reaction between excess potassium hydroxide solution with two different acids.

*Jadual 5.3 menunjukkan nilai haba yang dibebaskan bagi tindak balas antara larutan kalium hidroksida berlebihan dengan dua asid yang berbeza.*

<b>Experiment</b> <i>Eksperimen</i>	<b>Reactants</b> <i>Bahan tindak balas</i>	<b>Heat released for 1 mol of acid /kJ</b> <i>Haba yang terbebas untuk 1 mol asid / kJ</i>
I	Potassium hydroxide solution + hydrochloric acid <i>Larutan kalium hidroksida + asid hidroklorik</i>	- 57
II	Potassium hydroxide solution + sulphuric acid <i>Larutan kalium hidroksida + asid sulfurik</i>	- 114

Table 5.3

*Jadual 5.3*

Based on Table 5.3, explain why there is a difference in the values of heat released.

*Berdasarkan Jadual 5.3, terangkan mengapa nilai haba yang dibebaskan itu berbeza.*

.....

.....

.....

.....

[3 marks]

[3 markah]

5(d)

3

- (e) Table 5.4 shows a list of apparatus and materials.  
*Jadual 5.4 menunjukkan senarai alat radas dan bahan.*

Apparatus and Materials <i>Alat radas dan bahan</i>	
• Ethanol <i>Etanol</i>	• Copper can <i>Bekas kuprum</i>
• Water <i>Air</i>	• Thermometer <i>Termometer</i>
• Spirit lamp <i>Pelita</i>	• Tripod stand <i>Tungku kaki tiga</i>
• Wooden block <i>Bongkah kayu</i>	• Wind shield <i>Penghadang angin</i>

Table 5.4  
*Jadual 5.4*

Using the apparatus and materials listed, draw a labelled diagram to show the apparatus set-up to determine the heat of combustion of ethanol.  
*Menggunakan radas dan bahan yang disenaraikan, lukis gambarajah berlabel yang menunjukkan susunan radas bagi menentukan haba pembakaran etanol.*

[2 marks]  
[2 markah]

5(e)	
	2

TOTAL A5	
	11

For  
Examiner's  
Use

- 6 Diagram 6.1 shows the apparatus set-up for electrolysis of  $1.0 \text{ mol dm}^{-3}$  copper(II) sulphate solution using carbon electrodes P and Q.

Rajah 6.1 menunjukkan susunan radas bagi elektrolisis ke atas larutan kuprum(II) sulfat  $1.0 \text{ mol dm}^{-3}$  dengan menggunakan elektrod-elektrod karbon P dan Q.

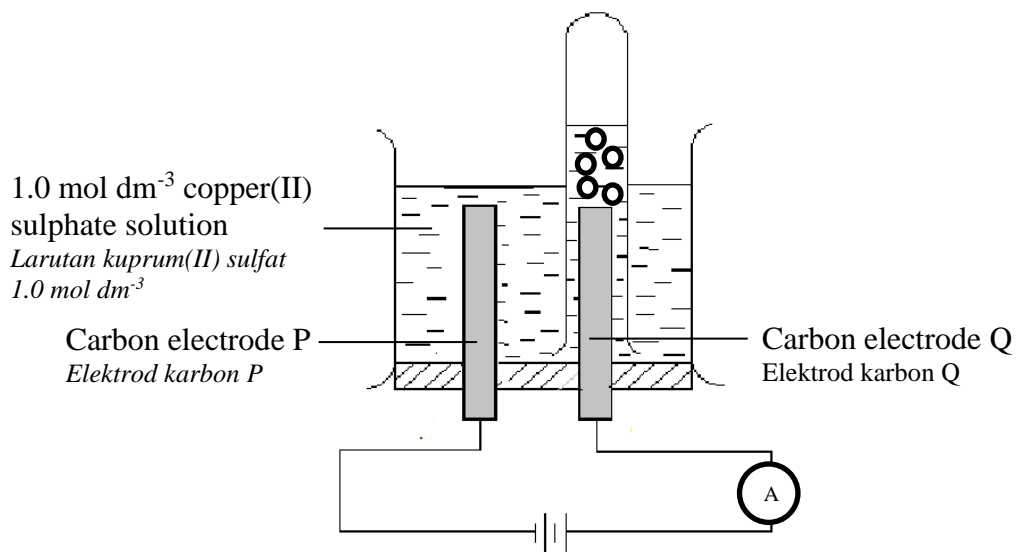


Diagram 6.1

Rajah 6.1

- (a) State the energy change in the cell.  
Nyatakan perubahan tenaga dalam sel ini.

6(a)

1

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

- (b) (i) State the observation at electrode P.  
Nyatakan pemerhatian di elektrod P.

6(b)(i)

1

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

- (ii) Write half equation for the reaction that takes place at electrode P.  
Tuliskan setengah persamaan bagi tindak balas yang berlaku di elektrod P.

6(b)(ii)

1

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

- (iii) State the change in oxidation number of copper in (b)(ii)  
Nyatakan perubahan dalam nombor pengoksidaan bagi kuprum dalam (b)(ii)

6(b)(iii)

1

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



*For  
Examiner's  
Use*

- (c) Name the gas released at electrode Q.  
Describe a chemical test to confirm the gas.  
*Namakan gas yang terbebas di elektrod Q.  
Huraikan ujian kimia untuk mengesahkan gas tersebut.*

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

[3 marks]  
[3 markah]

<b>6(c)</b>	
	3

- (d) State the observation on the colour of the copper(II) sulphate solution after 30 minutes. Explain.  
*Nyatakan pemerhatian ke atas warna larutan warna larutan kuprum(II) sulfat selepas 30 minit. Terangkan.*

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

[2 marks]  
[2 markah]

<b>6(d)</b>	
	2

- (e) The experiment is repeated using copper electrodes to replace carbon.  
*Eksperimen diulangi menggunakan elektrod kuprum untuk menggantikan elektrod karbon.*  
State the product formed at the anode.Explain.  
*Nyatakan hasil yang terbentuk di anod. Terangkan.*

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

[2 marks]  
[2 markah]

<b>6(e)</b>	
	2

<b>TOTAL A6</b>	
	<b>11</b>

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

[20 marks]

[20 markah]

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

- 7 Diagram 7.1 shows potassium manganate(VII) crystals are placed at the top of the agar and the test tube is closed and clamped to the retort stand. After 2 days, part of the agar turns purple.

Rajah 7.1 menunjukkan hablur kalium manganat(VII) diletakkan diatas agar-agar dan tabung uji ditutup serta diapit kepada kaki retort. Selepas 2 hari sebahagian agar-agar bertukar menjadi warna ungu.

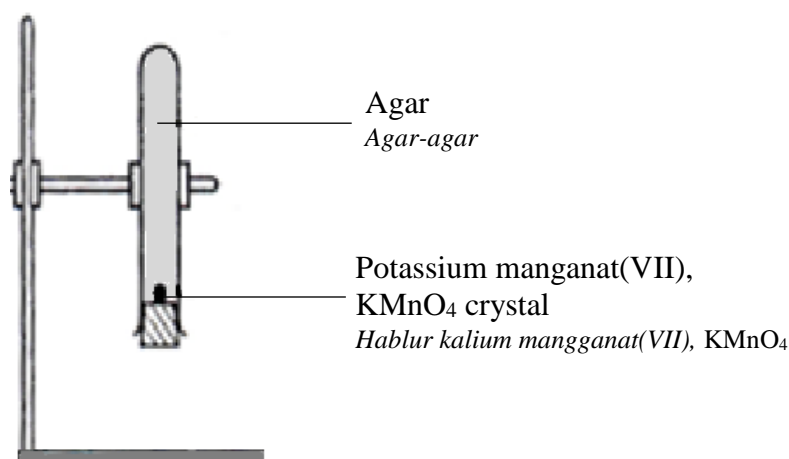


Diagram 7.1

Rajah 7.1

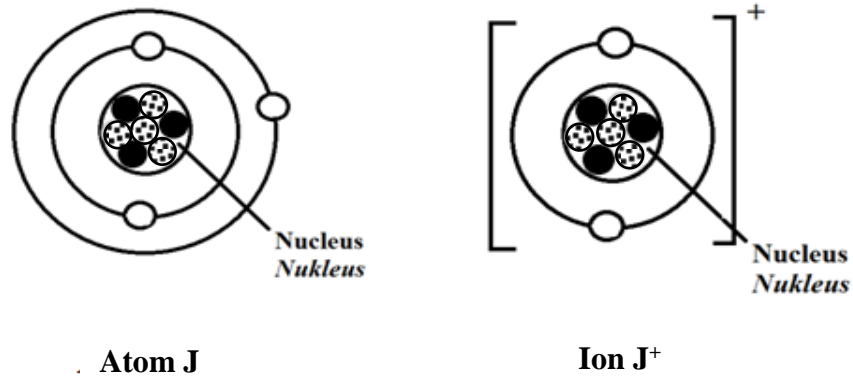
- (a) Name the process and using Kinetic Theory of Matter, describe briefly the changes that occur.

Namakan proses tersebut dan dengan menggunakan Teori Kinetik Jirim, huraikan secara ringkas perubahan yang berlaku.

[4 marks]

[4 markah]

- (b) Diagram 7.2 shows the structure of atom J and its ion.  
The letter used is not the actual symbol of the element.  
*Rajah 7.2 menunjukkan struktur atom J dan ionnya.*  
*Huruf yang digunakan bukan simbol sebenar bagi unsur itu.*



- = *proton*  
 ⊙ = *neutron*  
 ○ = *electron*

Diagram 7.2  
*Rajah 7.2*

- (i) Write the symbol for atom J in the form of  ${}^A_Z X$   
*Tulis simbol bagi atom J dalam bentuk  ${}^A_Z X$ .* [2 marks]  
[2 markah]
- (ii) Based on Diagram 7.2, explain why atom J is neutral while ion J is +1 charge.  
*Berdasarkan Rajah 7.2, terangkan mengapa atom J adalah neutral manakala ion J pula bercas +1.* [4 marks]  
[4 markah]

- (c) Diagram 7.3 shows the electron arrangement diagrams for magnesium oxide and carbon dioxide.  
*Rajah 7.3 menunjukkan gambarajah susunan elektron bagi magnesium oksida dan karbon dioksida.*

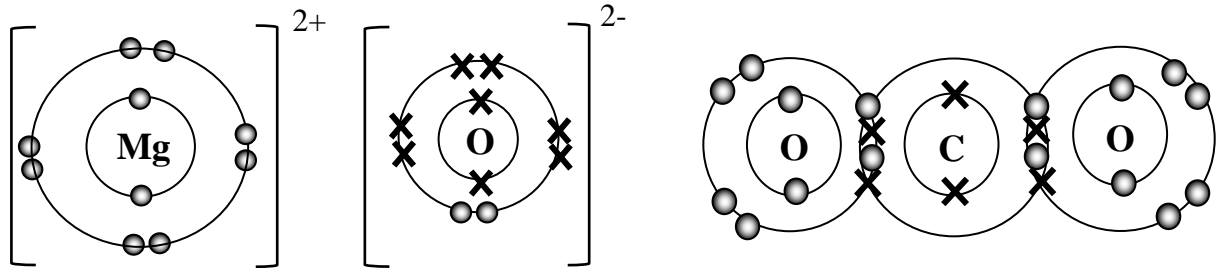


Diagram 7.3  
*Rajah 7.3*

Compare the two compounds and explain in terms of :-  
*Banding kedua-dua sebatian tersebut dan terang berdasarkan:-*

- (i) Melting point and boiling point  
*Takat lebur dan takat didih*

[5 marks]  
 [5 markah]

- (ii) Electrical conductivity  
*Kekonduksian elektrik*

[5 marks]  
 [5 markah]

- 8 (a) The smaller sized tapioca will cook faster than the bigger size.  
Explain why.  
*Ubi kayu yang bersaiz kecil akan masak dengan lebih cepat berbanding yang bersaiz besar. Terangkan.*

[3 marks]

[3 markah]

- (b) A group of students carried out three experiments to investigate the factors affecting the rate of reaction between hydrochloric acid and zinc.

Table 8.1 shows the results of the experiments.

*Sekumpulan pelajar membuat eksperimen bagi mengkaji faktor-faktor yang mempengaruhi kadar tindakbalas antara asid hidroklorik dan zink.*

*Jadual 8.1 menunjukkan keputusan eksperimen tersebut.*

Experiment Eksperimen	Reactants <i>Bahan tindak balas</i>	Time taken to collect 40 cm <sup>3</sup> of hydrogen gas (s) <i>Masa yang diambil untuk mengumpul 40 cm<sup>3</sup> gas hidrogen (s)</i>
I	50 cm <sup>3</sup> of 1.0 mol dm <sup>-3</sup> hydrochloric acid + zinc granule + a few drops of copper(II) sulphate solution <i>50 cm<sup>3</sup> asid hidroklorik 1.0 mol dm<sup>-3</sup> + ketulan zink + beberapa titis larutan kuprum(II) sulfat</i>	90
II	50 cm <sup>3</sup> of 1.0 mol dm <sup>-3</sup> hydrochloric acid + zinc granule <i>50 cm<sup>3</sup> asid hidroklorik 1.0 mol dm<sup>-3</sup> + ketulan zink</i>	150
III	50 cm <sup>3</sup> of 0.5 mol dm <sup>-3</sup> hydrochloric acid + zinc granule <i>50 cm<sup>3</sup> asid hidroklorik 0.5 mol dm<sup>-3</sup> + ketulan zink</i>	270

Table 8.1

*Jadual 8.1*

- (i) Calculate the average rate of reaction for Experiment I and Experiment II.

*Hitung kadar tindak balas purata bagi Eksperimen I dan Eksperimen II*

[2 marks]

[2 markah]

- (ii) On the same axis, sketch the graph for the three sets of experiments for the liberation of  $40 \text{ cm}^3$  of hydrogen gas  
*Pada paksi yang sama, lakar graf untuk ketiga-tiga set eksperimen bagi pembebasan  $40 \text{ cm}^3$  gas hidrogen*

[3 marks]

[3 markah]

- (iii) Write the ionic equation for the reaction between zinc and hydrochloric acid.

*Tulis persamaan ion bagi tindak balas di antara zink dan asid hidroklorik.*

[2 marks]

[2 markah]

- (iv) Based on Table 8.1, compare the rate of reaction between
- Experiment I and Experiment II
  - Experiment II and Experiment III

*Berdasarkan Jadual 8.1, bandingkan kadar tindak balas antara*

- *Eksperimen I dan eksperimen II*
- *Eksperimen II dan eksperimen III*

Explain the difference in the rate of reaction based on the Collision Theory.

*Terangkan perbezaan dalam kadar tindak balas berdasarkan Teori Perlanggaran.*

[10 marks]

[10 markah]

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

[20 marks]  
[20 markah]

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

- 9 (a) Reinforced concrete is a composite material which is more suitable to be used in the construction of high rise buildings, bridges and oil rigs compared to concrete.  
Explain why reinforced concrete is more suitable to be used in those constructions.

*Konkrit yang diperkukuhkan ialah suatu bahan komposit yang lebih sesuai digunakan dalam pembinaan bangunan tinggi, jambatan dan pelantar minyak berbanding dengan konkrit.*

*Terangkan mengapa konkrit yang diperkukuhkan lebih sesuai digunakan dalam pembinaan tersebut.*

[4 marks]  
[4 markah]

- (b) Diagram 9.1 shows emission of sulphur dioxide gas during the manufacturing of sulphuric acid.

*Rajah 9.1 menunjukkan pembebasan gas sulfur dioksida semasa penghasilan asid sulfurik.*



Diagram 9.1  
*Rajah 9.1*

Explain how sulphur dioxide gas causes problems to the environment.  
*Terangkan bagaimana gas sulfur dioksida dapat menyebabkan masalah alam sekitar.*

[6 marks]  
[6 markah]

(c) Diagram 9.2 shows uses of a few alloys in our daily life.

Alloy is stronger than its pure metal.

*Rajah 9.2 menunjukkan kegunaan beberapa jenis aloi dalam kehidupan seharian.*

*Aloi lebih kuat berbanding dengan logam tulennya.*



Diagram 9.2

*Rajah 9.2*

By giving a suitable example, describe a laboratory experiment to compare the hardness of alloy and its pure metal.

*Dengan menggunakan satu contoh yang sesuai, huraikan satu eksperimen untuk membandingkan kekerasan aloi dan logam tulennya.*

In your description, include the following aspects:-

*Dalam huraian anda, sertakan aspek-aspek berikut:-*

- Materials and apparatus  
*Bahan dan alat radas*
- Procedure of experiment  
*Prosedur eksperimen*
- Tabulation of data  
*Penjadualan data*
- Observation  
*Pemerhatian*

[10 marks]

[10 markah]



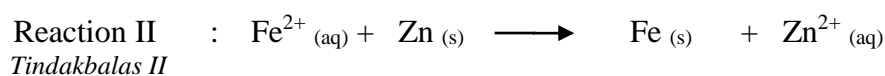
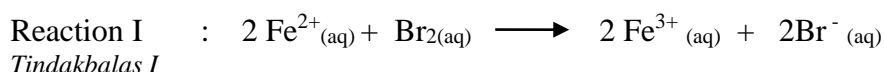
10 (a)

A reducing agent in a reaction can also become an oxidizing agent in another reaction.

*Agen penurunan dalam satu tindak balas boleh juga bertindak sebagai agen pengoksidaan dalam satu tindak balas yang lain.*

Discuss this statement based on the reactions represented by the following equations:-

*Bincangkan pernyataan ini berdasarkan kepada tindak balas yang diwakili oleh persamaan berikut:-*



[4 marks]

[4 markah]

(b) Table 10.1 shows two sets of experiments to determine the position of metal M, metal N and carbon in the Reactivity Series.

*Jadual 10.1 menunjukkan dua set eksperimen bagi menentukan kedudukan logam M, logam N dan karbon dalam Siri Kereaktifan.*

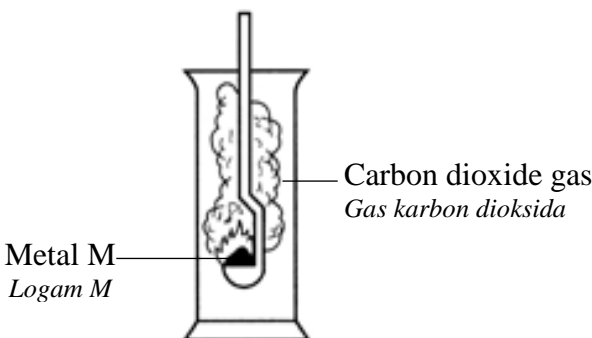
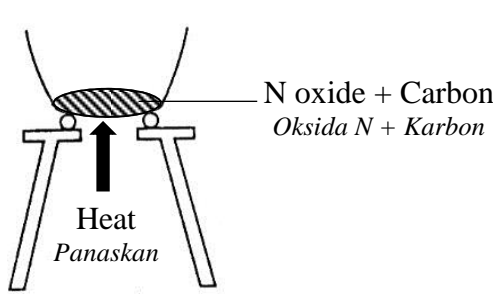
Experiment <i>Eksperimen</i>	Apparatus set-up <i>Susunan radas</i>	Observations <i>Pemerhatian</i>
I		i. Glaring white flame <i>Nyalaan putih berkilau</i> ii. Black spot is formed <i>Titik hitam terbentuk</i> iii. White solid is formed <i>Pepejal putih terbentuk</i>
II		i. Bright glow <i>Baraan terang</i> ii. Brown solid is formed <i>Pepejal perang terbentuk</i>

Table 10.1  
*Jadual 10.1*

Based on the observations in Table 10.1 arrange metal M, metal N and carbon in ascending order based on their reactivity.

Explain your answer and suggest metal M and metal N.

*Berdasarkan pemerhatian dalam Jadual 10.1 susun logam M, logam N dan karbon mengikut tertib menaik berdasarkan kereaktifannya.*

*Terangkan jawapan anda dan cadangkan logam M dan logam N.*

[6 marks]

[6 markah]

(c) Table 10.2 shows a list of apparatus and materials.

*Jadual 10.2 menunjukkan senarai alat radas dan bahan-bahan.*

Apparatus and Materials <i>Radas dan bahan</i>	
• U-tube <i>Tiub-U</i>	• Carbon electrodes <i>Elektrod karbon</i>
• Galvanometer <i>Galvanometer</i>	• Retort stand with clamps <i>Kaki retot dengan pengapit</i>
• Connecting wire <i>Wayar penyambung</i>	• Potassium iodide solution <i>Larutan kalium iodida</i>
• Cork <i>Gabus</i>	• Dilute sulphuric acid <i>Asid sulfurik cair</i>
• Dropper <i>Penitis</i>	• Starch solution <i>Larutan kanji</i>

Table 10.2

*Jadual 10.2*

Using a suitable named oxidizing agent, given apparatus and materials, describe an experiment to verify the following statement.

*Dengan menggunakan satu agen pengoksidaan yang dinamakan, radas dan bahan yang diberikan, huraikan satu eksperimen untuk mengesahkan pernyataan berikut.*

Electrons can be transferred at a distance.

*Elektron boleh dipindahkan pada suatu jarak.*

In your description include the following aspects:

*Dalam penjelasan anda sertakan aspek-aspek berikut:*

- Procedure of experiment  
*Prosedur eksperimen*
- Confirmatory test for the product  
*Ujian pengesahan bagi hasil tindak balas*
- Observations  
*Pemerhatian*

[10 marks]

[10 markah]

**END OF QUESTION PAPER**

**KERTAS SOALAN TAMAT**

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

# Periodic Table of Elements

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

<b>1</b>										<b>18</b>									
<b>1</b> <b>H</b> Hydrogen 1																	<b>2</b> <b>He</b> Helium 4		
<b>3</b> <b>Li</b> Lithium 7	<b>4</b> <b>Be</b> Beryllium 9											<b>5</b> <b>B</b> Boron 11	<b>6</b> <b>C</b> Carbon 12	<b>7</b> <b>N</b> Nitrogen 14	<b>8</b> <b>O</b> Oxygen 16	<b>9</b> <b>F</b> Fluorine 19	<b>10</b> <b>Ne</b> Neon 20		
<b>11</b> <b>Na</b> Sodium 23	<b>12</b> <b>Mg</b> Magnesium 24	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b> <b>Al</b> Aluminum 27	<b>14</b> <b>Si</b> Silicon 28	<b>15</b> <b>P</b> Phosphorus 31	<b>16</b> <b>S</b> Sulfur 32	<b>17</b> <b>Cl</b> Chlorine 35.5	<b>18</b> <b>Ar</b> Argon 40		
<b>19</b> <b>K</b> Potassium 40	<b>20</b> <b>Ca</b> Calcium 40	<b>21</b> <b>Sc</b> Scandium 45	<b>22</b> <b>Ti</b> Titanium 48	<b>23</b> <b>V</b> Vanadium 51	<b>24</b> <b>Cr</b> Chromium 52	<b>25</b> <b>Mn</b> Manganese 55	<b>26</b> <b>Fe</b> Iron 56	<b>27</b> <b>Co</b> Cobalt 59	<b>28</b> <b>Ni</b> Nickel 59	<b>29</b> <b>Cu</b> Copper 64	<b>30</b> <b>Zn</b> Zinc 65	<b>31</b> <b>Ga</b> Gallium 70	<b>32</b> <b>Ge</b> Germanium 73	<b>33</b> <b>As</b> Arsenic 75	<b>34</b> <b>Se</b> Selenium 79	<b>35</b> <b>Br</b> Bromine 80	<b>36</b> <b>Kr</b> Krypton 84		
<b>37</b> <b>Rb</b> Rubidium 86	<b>38</b> <b>Sr</b> Strontium 88	<b>39</b> <b>Y</b> Yttrium 89	<b>40</b> <b>Zr</b> Zirconium 91	<b>41</b> <b>Nb</b> Niobium 93	<b>42</b> <b>Mo</b> Molybdenum 96	<b>43</b> <b>Tc</b> Technetium 98	<b>44</b> <b>Ru</b> Ruthenium 101	<b>45</b> <b>Rh</b> Rhodium 103	<b>46</b> <b>Pd</b> Palladium 106	<b>47</b> <b>Ag</b> Silver 108	<b>48</b> <b>Cd</b> Cadmium 112	<b>49</b> <b>In</b> Indium 115	<b>50</b> <b>Sn</b> Tin 119	<b>51</b> <b>Sb</b> Antimony 122	<b>52</b> <b>Te</b> Tellurium 128	<b>53</b> <b>I</b> Iodine 127	<b>54</b> <b>Xe</b> Xenon 131		
<b>55</b> <b>Cs</b> Cesium 133	<b>56</b> <b>Ba</b> Barium 137	<b>57</b> <b>La</b> Lanthanum 139	<b>72</b> <b>Hf</b> Hafnium 179	<b>73</b> <b>Ta</b> Tantalum 181	<b>74</b> <b>W</b> Tungsten 184	<b>75</b> <b>Re</b> Rhenium 186	<b>76</b> <b>Os</b> Osmium 190	<b>77</b> <b>Ir</b> Iridium 192	<b>78</b> <b>Pt</b> Platinum 195	<b>79</b> <b>Au</b> Gold 197	<b>80</b> <b>Hg</b> Mercury 201	<b>81</b> <b>Tl</b> Thallium 204	<b>82</b> <b>Pb</b> Lead 207	<b>83</b> <b>Bi</b> Bismuth 209	<b>84</b> <b>Po</b> Polonium 209	<b>85</b> <b>At</b> Astatine 210	<b>86</b> <b>Rn</b> Radon 222		
<b>87</b> <b>Fr</b> Francium 223	<b>88</b> <b>Ra</b> Radium 226	<b>89</b> <b>Ac</b> Actinium 227																	

**Key:**

<b>10</b>	Proton Number
<b>Ne</b>	Symbol
Neon	Name of element
20	Relative Atomic Mass

## INFORMATION FOR CANDIDATES

### MAKLUMAT UNTUK CALON

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

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 answers for **Section A** in the spaces provided in the question paper.  
*Jawab semua soalan dalam Bahagian A. Tuliskan jawapan bagi Bahagian A dalam ruang yang disediakan dalam kertas soalan.*
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 answer.  
*Jawab mana-mana satu soalan daripada Bahagian B dan mana-mana satu soalan daripada Bahagian C. Tulis jawapan anda bagi Bahagian B dan Bahagian C dalam helaian tambahan yang dibekalkan oleh pengawas peperiksaan. Anda boleh menggunakan persamaan, gambar rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda.*
4. The diagrams in the questions are not drawn to scale unless stated.  
*Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan.*
5. Marks allocated for each question or part question are 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 cancel any answer, neatly cross out the answer.  
*Sekiranya anda hendak membatalkan sesuatu jawapan, buat garisan di atas jawapan itu.*
8. The Periodic Table of Elements is provided on page 27.  
*Jadual Berkala Unsur disediakan di halaman 27.*
9. You may use a non – programmable scientific calculator.  
*Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.*
10. The time suggested to complete **Section A** is 90 minutes, **Section B** is 30 minutes and **Section C** is 30 minutes  
*Masa yang dicadangkan untuk menjawab Bahagian A ialah 90 minit, Bahagian B ialah 30 minit dan Bahagian C ialah 30 minit.*
11. Tie the 'helaian tambahan' together with the question paper and hand in to the invigilator at the end of the examination.  
*Ikat helaian tambahan bersama-sama kertas soalan ini dan serahkan kepada pengawas peperiksaan pada akhir peperiksaan.*

**KERTAS SOALAN TAMAT**

Nama : .....

Kelas : .....

Angka Giliran : .....

**SULIT**  
**4541/3**  
**Kimia**  
**Kertas 3**  
**September**  
**2015**  
**1½ jam**



**MAKTAB RENDAH SAINS MARA**  
**PEPERIKSAAN SIJIL PENDIDIKAN MRSM 2015**  
<https://cikguadura.wordpress.com/>

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**KIMIA**

Kertas 3

Satu jam tiga puluh minit

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**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

1. *Tuliskan **nama**, **kelas** dan **angka giliran** anda pada ruang yang disediakan.*
2. *Buku soalan ini adalah dalam dwibahasa.*
3. *Calon dikehendaki menjawab semua soalan*

<i>Untuk Kegunaan Pemeriksa</i>		
Soalan	Markah Penuh	Markah diperolehi
1	21	
2	12	
3	17	
Total	50	

---

Kertas soalan ini mengandungi 11 halaman bercetak

[Lihat sebelah

- 1 A student carried out an experiment to investigate the effect of temperature on the rate of reaction between excess zinc powder and 25 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> hydrochloric acid.

The reaction is carried out at different temperatures; 25.0 °C, 40.0 °C, 50.0 °C and 60.0 °C. Time taken to collect 30.00 cm<sup>3</sup> of hydrogen gas is recorded.


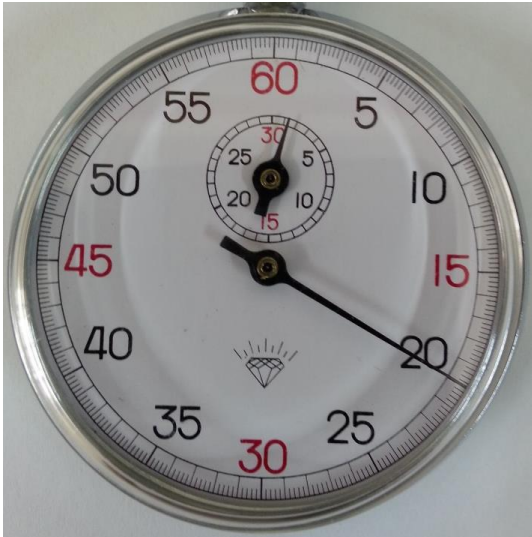
The stopwatch readings for each temperature are shown in Diagram 1.1.

*Seorang pelajar menjalankan suatu eksperimen untuk mengkaji kesan suhu ke atas kadar tindak balas di antara serbuk zink berlebihan dengan 25 cm<sup>3</sup> asid hidroklorik 0.1 mol dm<sup>-3</sup>.*

*Tindak balas dijalankan pada suhu yang berbeza; 25.0 °C, 40.0 °C, 50.0 °C and 60.0 °C.*

*Masa yang diambil untuk mengumpul 30.00 cm<sup>3</sup> gas hidrogen dicatatkan.*

*Bacaan jam randik bagi setiap suhu ditunjukkan dalam Rajah 1.1.*

Temperature/°C <i>Suhu/°C</i>	Stop watch reading <i>Bacaan jam randik</i>	Time taken / s <i>Masa yang diambil/s</i>
25.0		
30.0		

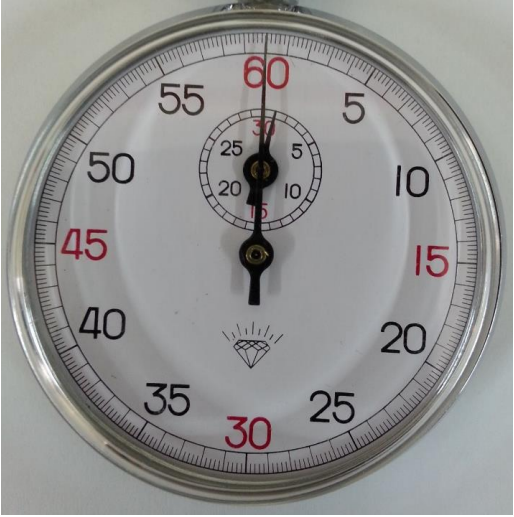
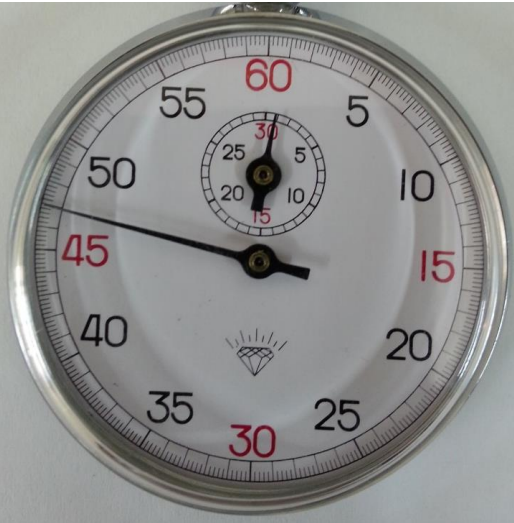
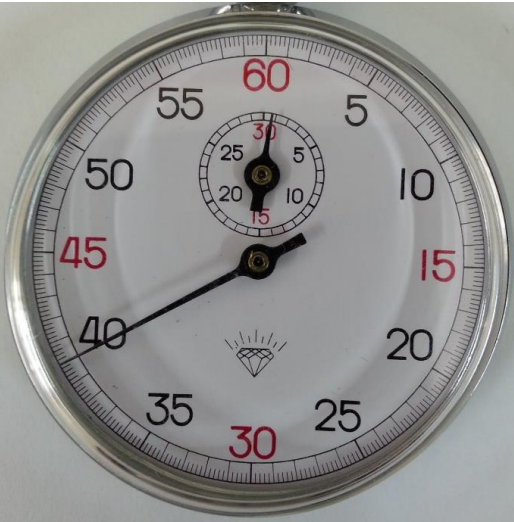
Temperature/ <sup>o</sup> C <i>Suhu<sup>o</sup>C</i>	Stop watch reading <i>Bacaan jam randik</i>	Time taken / s <i>Masa yang diambil/s</i>
40.0		
50.0		
60.0		

Diagram 1.1  
*Rajah 1.1*

For  
Examiner's  
Use

<b>1(a)</b>

- (a) Record the time for each temperature in Diagram 1.1.  
*Rekodkan masa bagi setiap suhu pada Rajah 1.1.*

[3 marks]  
[3 markah]

- (b) Tabulate the reading of temperature, time and 1/ time in the space provided.  
*Jadualkan bacaan suhu, masa dan 1/masa di dalam ruangan yang disediakan.*

<b>1(b)</b>

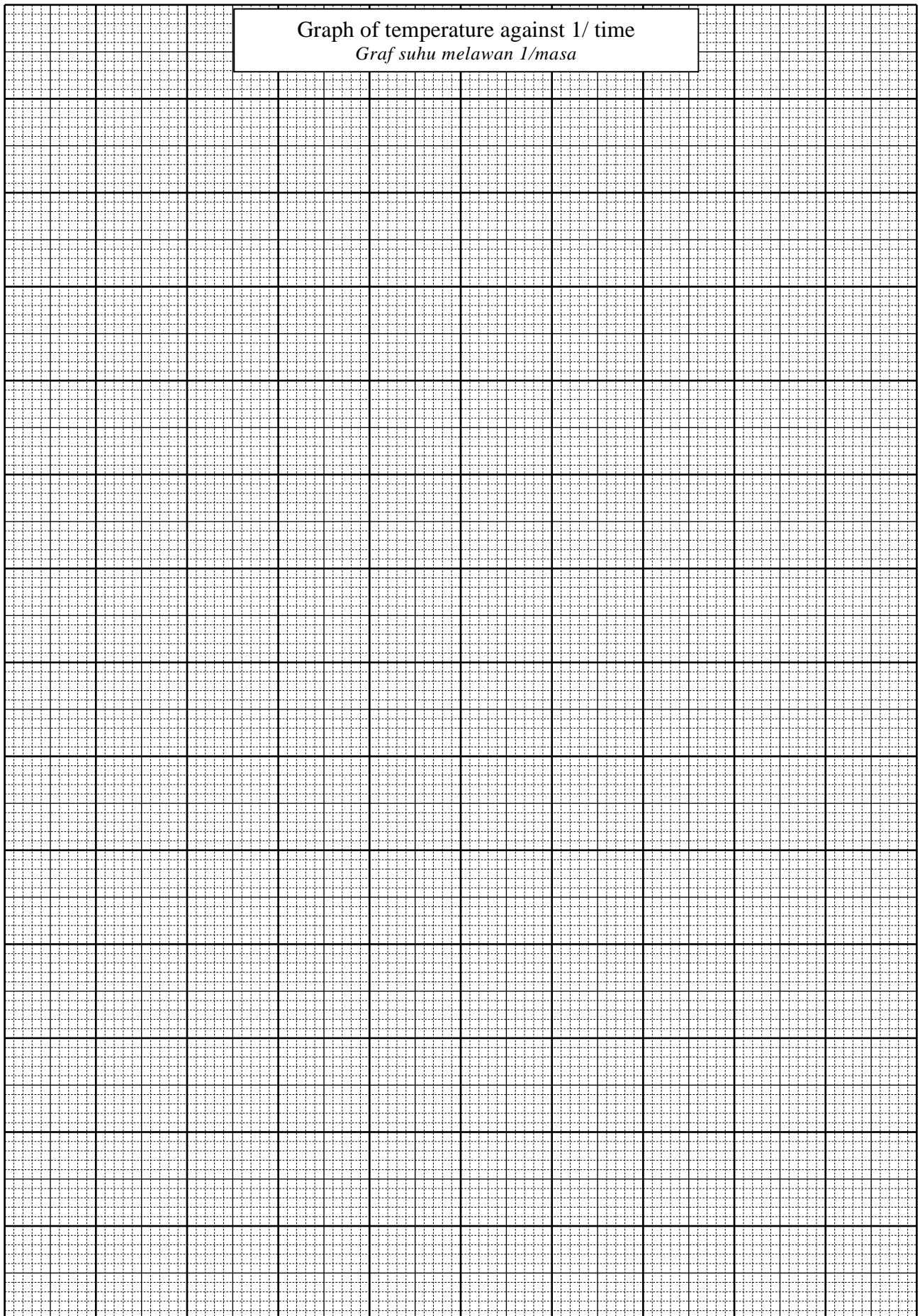
[3 marks]  
[3 markah]

<b>1(c)(i)</b>

- (c) (i) Draw a graph of temperature against 1/ time on the graph paper.  
*Lukiskan graf suhu melawan 1/masa pada kertas graf.*

[3 marks]  
[3 markah]





For  
Examiner's  
Use

(ii) State the relationship between temperature and the rate of reaction.

*Nyatakan perhubungan antara suhu dan kadar tindak balas .*

.....  
.....

[3 marks]

[3 markah]

1(c)(ii)

(iii) Predict the time taken for collecting 30.00 cm<sup>3</sup> of hydrogen gas when the experiment was carried out at 45.0 °C.

Show on the graph how you determine the answer.

*Ramalkan masa yang diambil untuk mengumpul 30.00 cm<sup>3</sup> gas hidrogen pada 45.0 °C. Tunjukkan pada graf bagaimana anda memperolehi jawapan.*

.....  
.....

[3 marks]

[3 markah]

1(c)(iii)

(d) State the operational definition for the rate of reaction in this experiment.

*Nyatakan definisi secara operasi bagi kadar tindak balas dalam eksperimen ini.*

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

[3 marks]

[3 markah]

1(d)

(e) The experiment at 30.0 °C is repeated by using zinc strip to replace the zinc powder. The time taken for the reaction to be completed is longer.

Explain why.

*Eksperimen pada suhu 30.0 °C diulangi dengan menggunakan kepingan zink untuk menggantikan serbuk zink. Masa yang diambil untuk tindak balas lengkap adalah lebih panjang .Terangkan mengapa.*

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

[3 marks]

[3 markah]

1(e)

**Total 1**

21

2 Table 2.1 shows the results for displacement reaction to construct the Electrochemical Series.

*Jadual 2.1 menunjukkan keputusan tindak balas penyerasan bagi membina Siri Elektrokimia.*

Metal Logam	Experiment I <i>Eksperimen I</i>	Experiment II <i>Eksperimen II</i>	Experiment III <i>Experiment II</i>
	Copper(II) nitrate <i>Kuprum(II) nitrat</i>	Zinc nitrate <i>Zink nitrat</i>	Silver nitrate <i>Argentum nitrat</i>
Copper <i>Kuprum</i>		No change <i>Tiada perubahan</i>	Shiny grey solid is formed <i>Pepejal kelabu berkilat terbentuk</i>
Zinc <i>Zink</i>	Brown solid is formed <i>Pepejal perang terbentuk</i>		Shiny grey solid is formed <i>Pepejal kelabu berkilat terbentuk</i>
Silver <i>Argentum</i>	No change <i>Tiada perubahan</i>	No change <i>Tiada perubahan</i>	

Table 2.1  
*Jadual 2.1*

(a) State the variables involved in Experiment III.  
*Nyatakan pembolehubah yang terlibat dalam Eksperimen III.*

Manipulated variable  
*Pembolehubah dimanipulasikan:*

.....

Responding variable  
*Pembolehubah bergerak balas:*

.....

Fixed variable  
*Pembolehubah dimalarkan:*

.....

[3marks]  
[3markah]

2(a)

(b) State one hypothesis based on the results in Experiment III.  
*Nyatakan satu hipotesis berdasarkan keputusan di dalam Eksperimen III.*

.....

.....

.....

[3marks]  
[3 markah]

2(b)

For  
Examiner's  
Use

2(c)

- (c) Based on the results in Table 2.1, arrange the metals in ascending order in the Electrochemical Series.  
*Berdasarkan keputusan di Jadual 2.1, susun semua logam dalam tertib menaik bagi Siri Elektrokimia.*

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

- (d) Classify the following metals into metals which are more electropositive and less electropositive than lead.  
*Kelaskan logam-logam berikut kepada logam yang lebih elektropositif dan logam kurang elektropositif dari plumbum.*

- |                                 |                             |                                 |
|---------------------------------|-----------------------------|---------------------------------|
| • Magnesium<br><i>Magnesium</i> | • Zinc<br><i>Zink</i>       | • Aluminium<br><i>Aluminium</i> |
| • Copper<br><i>Kuprum</i>       | • Silver<br><i>Argentum</i> | • Iron<br><i>Ferum</i>          |

Metals which are more electropositive than lead <i>Logam yang lebih elektropositif daripada plumbum</i>	Metals which are less electropositive than lead <i>Logam yang kurang elektropositif daripada plumbum</i>

2(d)

[3marks]  
[3 markah]

**Total 2**

	12
--	----

- 3 Diagram 3.1 shows a conversation between two students after attending a school activity near the beach.

*Rajah 3.1 menunjukkan perbualan antara dua orang pelajar selepas menghadiri aktiviti sekolah berdekatan dengan pantai.*

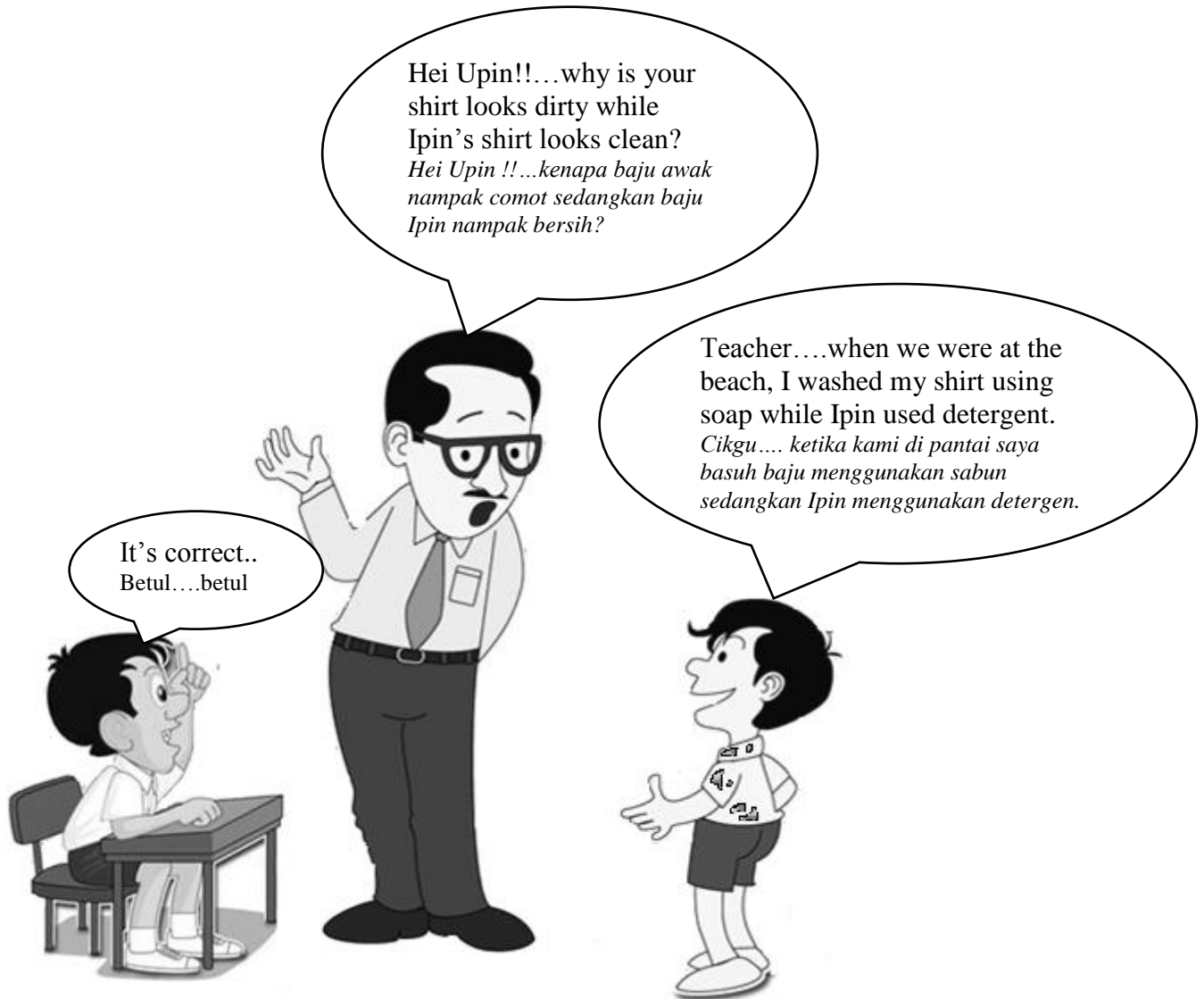


Diagram 3.1  
*Rajah 3.1*

Referring to the above conversation, plan a laboratory experiment to compare the effectiveness of soap and detergent in sea water.

*Merujuk kepada perbualan di atas, rancang satu eksperimen untuk membandingkan keberkesanan sabun dan detergen dalam air laut.*

You are provided with apparatus and materials such as beakers and two pieces of cloth with the same oily stains.

*Anda dibekalkan dengan radas dan bahan seperti bikar dan dua keping kain dengan kesan kotoran minyak yang sama.*

Your planning should include the following:

*Perancangan anda haruslah mengandungi perkara-perkara berikut :*

- (a) Statement of problem  
*Pernyataan masalah*
- (b) All the variables  
*Semua pembolehubah*
- (c) Statement of hypothesis  
*Pernyataan hipotesis*
- (d) List of substances and apparatus  
*Senarai bahan dan alat radas*
- (e) Procedure of 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

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

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 the questions. Write your answers for **Question 1** and **Question 2** in the spaces provided in this question paper.  
*Jawab semua soalan. Jawapan anda bagi Soalan 1 dan Soalan 2 hendaklah ditulis dalam ruang yang disediakan dalam kertas soalan*
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 answer.  
*Tuliskan jawapan anda bagi Soalan 3 dalam helaian tambahan yang dibekalkan oleh pengawas peperiksaan. Anda boleh menggunakan persamaan, gambar rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda.*
4. Show your working, it may help you to get marks.  
*Tunjukkan kerja mengira. Ini akan 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. Marks allocated for each question or part of a question are 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 menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.*
8. You may use a non-programmable scientific calculator.  
*Anda dibenarkan menggunakan kalkulator saintifik yang **tidak** boleh diprogramkan.*
9. You are advised to spend 60 minutes to answer **Question 1** and **Question 2** and 30 minutes for **Question 3**.  
*Anda dinasihati supaya mengambil masa 60 minit untuk menjawab Soalan 1 dan Soalan 2 dan 30 minit untuk menjawab Soalan 3.*
10. Tie the 'helaian tambahan' together with this question paper and hand in to the invigilator at the end of the examination.  
*Ikat helaian tambahan bersama-sama kertas soalan ini dan serahkan kepada pengawas peperiksaan pada akhir peperiksaan.*