4541/2
Chemistry
Paper 2
Sept 2010
2 ½ hour

Name : …….

Index Number: ….....…….

MAKTAB RENDAH SAINS MARA
SIJIL PELAJARAN MALAYSIA
TRIAL EXAMINATION
2010

CHEMISTRY

Paper 2

Two hours and thirty minutes

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 at the back page.
   Calon dikehendaki membaca maklumat di halaman belakang.

Kod Pemeriksa			
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			

For Examiner's Use

Section A
Bahagian A

[60 *marks*]
[*60 markah*]

Answer **all** questions in this section.
Jawab **semua** *soalan dalam bahagian ini.*

1 (*a*) Diagram 1.1 shows the step involved in an industrial process to produce ammonia.
Rajah 1.1 *menunjukkan langkah yang terlibat dalam industri untuk menyediakan ammonia.*

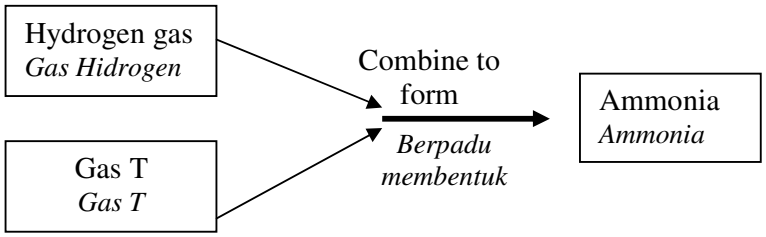


Diagram 1.1
Rajah 1.1

(i) Name the process in the production of ammonia.
Namakan proses dalam penghasilan ammonia.

1(*a*)(i)

……...
[1 *mark*]
[1 *markah*]

(ii) Name gas T.
Namakan gas T.

1(*a*)(ii)

……...
[1 *mark*]
[1 *markah*]

(iii) Write the chemical equation for the reaction between hydrogen and gas T to produce ammonia.
Tuliskan persamaan kimia bagi tindak balas antara hidrogen dan gas T *untuk menghasilkan ammonia.*

1(*a*)(iii)

……...
[1 *mark*]
[1 *markah*]

For Examiner's Use

(*b*) Table 1 shows two types of food additives used in food industry.
Jadual 1 *menunjukkan dua jenis bahan tambah makanan yang digunakan dalam industri makanan.*

Types of food additives ***Jenis bahan tambah makanan***	**Example** ***Contoh***	**Uses** ***Kegunaan***
U	Sodium benzoate *Natrium benzoat*	Food can last longer *Makanan tahan lebih lama*
Antioxidants *Anti pengoksida*	V	Neutralises free radicals and reduce risk of cancer *Meneutralkan radikal bebas dan mengurangkan risiko kanser*

Table 1
Jadual 1

(i) State the type of food additive U.
Nyatakan jenis bahan tambah makanan U.

1(*b*)(i)

……...
[1 *mark*]
[1 *markah*]

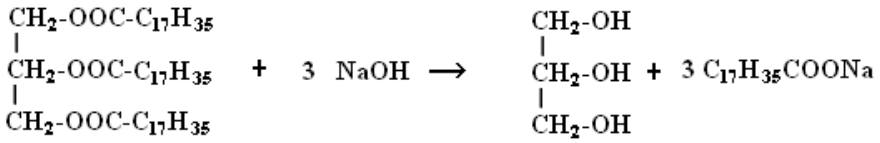
(ii) State the example of antioxidant that is represented by V.
Nyatakan contoh anti pengoksida yang diwakili oleh V.

1(*b*)(ii)

……...
[1 *mark*]
[1 *markah*]

For Examiner's Use

(*c*) Diagram 1.2 shows an equation representing the reaction between coconut oil (gliseryl tristearate) and concentrated sodium hydroxide.
Rajah 1.2 *menunjukkan satu persamaan yang mewakili tindak balas antara minyak kelapa* (*gliseril tristearat*) *dan natrium hidroksida pekat.*



Gliseryl tristearate
Gliseril tristearat

Glyserol
Gliserol

Soap
Sabun

Diagram 1.2
Rajah 1.2

Based on Diagram 1.2, answer the following questions:
Berdasarkan Rajah 1.2*, jawab soalan - soalan berikut:*

(i) Name the soap molecules produced.
Namakan molekul sabun yang terhasil.

……

[1 *mark*]
[1 *markah*]

1(*c*)(i) ☐

(ii) Name the process represented by the equation.
Namakan proses yang diwakili oleh persamaan tersebut.

……

[1 *mark*]
[1 *markah*]

1(*c*)(ii) ☐

(iii) Why are the soap molecules not effective in hard water?
Mengapakah molekul sabun tidak berkesan dalam air liat?

……

……

[2 *marks*]
[2 *markah*]

1(*c*)(iii) ☐

For Examiner's Use

2 (*a*) Table 2 shows the proton number and nucleon number of atoms P, Q and R.
Jadual 2 *menunjukkan nombor proton dan nombor nukleon bagi atom* P, Q *dan* R.

Atom of element *Atom unsur*	**Proton number** *Nombor proton*	**Nucleon number** *Nombor nukleon*
P	8	16
Q	9	19
R	8	17

Table 2
Jadual 2

Answer the following question based on Table 2,
Jawab soalan berikut berdasarkan Jadual 2*,*

(i) Which pair of atoms are isotopes?
Pasangan atom manakah merupakan isotop?

2(*a*)(i)

……..

[1 *mark*]
[1 *markah*]

(ii) Give the reason for your answer in (*a*)(i).
Berikan sebab bagi jawapan anda di (*a*)(i).

2(*a*)(ii)

……..

[1 *mark*]
[1 *markah*]

(iii) Draw the electron arrangement for atom Q.
Lukis gambar rajah susunan elektron bagi atom Q.

2(*a*)(iii)

[1 *mark*]
[1 *markah*]

For Examiner's Use

(*b*) When metals of Group 1 react with water, bubbles of colourless gas are evolved.
Diagram 2 shows the reaction of the first three alkali metals with water in three different beakers labeled as W, X and Y.

Apabila logam-logam Kumpulan 1 *bertindak balas dengan air, gelembung-gelembung gas tanpa warna dibebaskan.*
Rajah 2 *menunjukkan tindak balas bagi tiga logam alkali yang pertama dengan air di dalam tiga bikar berlabel* W, X *dan* Y.

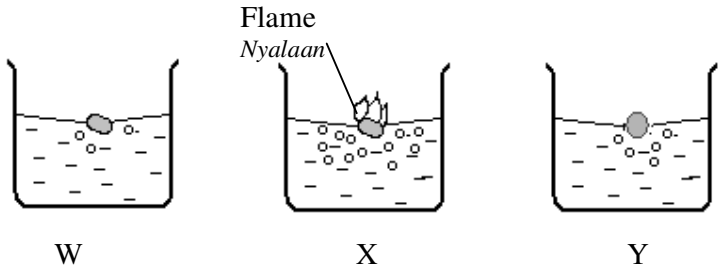


Diagram 2
Rajah 2

(i) In which beaker shows the reaction of potassium with water?
Bikar manakah menunjukkan tindak balas kalium dengan air?

2(*b*)(i)

……
[1 *mark*]
[1 *markah*]

(ii) Based on Diagram 2, name the gas evolved when metals of Group1 react with water.
Berdasarkan Rajah 2, *namakan gas yang terbebas apabila logam Kumpulan* 1 *bertindak balas dengan air.*

2(*b*)(ii)

……
[1 *mark*]
[1 *markah*]

(iii) State one observation when a few drops of phenolphthalein indicator is added into the solution formed in W, X and Y.
Explain your answer.

Nyatakan satu pemerhatian apabila beberapa titik penunjuk fenolftalein dimasukkan ke dalam larutan yang terhasil di W, X *dan* Y.
Terangkan jawapan anda.

2(*b*)(iii)

……...

……...
[2 *marks*]
[2 *markah*]

For Examiner's Use

(iv) Complete the following chemical equation:
Lengkapkan persamaan kimia berikut:

…… Na + …… H_2O → ……..… + ……..

[1 *mark*]
[1 *markah*]

2(*b*)(iv)

(v) Based on Diagram 2, what can you infer about the density of Group 1 metals compared to water?
Berdasarkan Rajah 2*, apakah yang dapat disimpulkan mengenai ketumpatan logam-logam Kumpulan* 1 *berbanding air?*

……

[1 *mark*]
[1 *markah*]

2(*b*)(v)

For Examiner's Use

3 Diagram 3.1 and 3.2 shows the set-up of apparatus to investigate the electrolysis of molten lead(II) oxide and silver nitrate solution.

Rajah 3.1 *dan Rajah* 3.2 *menunjukkan susunan radas untuk mengkaji elektrolisis leburan plumbum*(II) *oksida dan larutan argentum nitrat.*

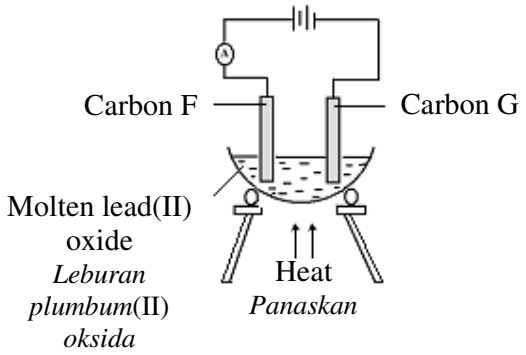


Diagram 3.1
Rajah 3.1

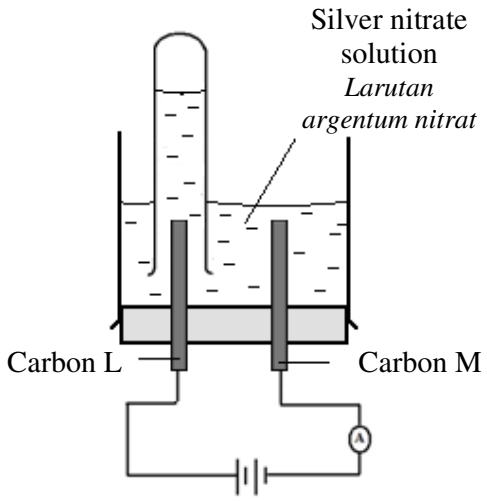


Diagram 3.2
Rajah 3.2

(*a*) What is meant by electrolyte?
Apakah yang dimaksudkan dengan elektrolit?

3(*a*)

.....

[1 *mark*]
[1 *markah*]

(*b*) Based on Diagram 3.1,
Berdasarkan Rajah 3.1,

(i) Name the product formed at electrode G.
Namakan hasil yang terbentuk di elektrod G.

3(*b*)(i)

.....

[1 *mark*]
[1 *markah*]

(ii) Write the half equation for the reaction that occurs at electrode F.
Tuliskan persamaan separa bagi tindak balas yang berlaku di elektrod F.

3(*b*)(ii)

.....

[1 *mark*]
[1 *markah*]

For Examiner's Use

(*c*) Based on Diagram 3.2,
Berdasarkan Rajah 3.2*,*

(i) State the ions present in silver nitrate solution.
Nyatakan ion - ion yang hadir dalam larutan argentum nitrat.

3(*c*)(i)

……
[1 *mark*]
[1 *markah*]

(ii) What would you observe at carbon electrode M?
Apakah yang anda perhatikan di elektrod karbon M*?*

3(*c*)(ii)

……
[1 *mark*]
[1 *markah*]

(iii) Explain your answer in (*c*)(ii).
Terangkan jawapan anda di (*c*)(ii)*.*

……

3(*c*)(iii)

……
[2 *marks*]
[2 *markah*]

(iv) Describe how you can verify the product formed at carbon electrode L.
Huraikan bagaimana anda boleh mengesahkan hasil yang terbentuk di elektrod karbon L*?*

……

3(*c*)(iv)

……
[2 *marks*]
[2 *markah*]

(*d*) State one application of electrolysis in industries.
Nyatakan satu kegunaan elektrolisis dalam industri.

3(*d*)

.....……
[1 *mark*]
[1 *markah*]

For Examiner's Use

4 (*a*) Table 4 shows example of strong acid and weak acid with the concentration of 0.1 mol dm^{-3}.
Jadual 4 *menunjukkan contoh asid kuat dan asid lemah dengan kepekatan* 0.1 mol dm^{-3}.

Type of acid *Jenis asid*	Example *Contoh*	pH
Strong acid *Asid kuat*	Hydrochloric acid *Asid hidroklorik*	1.0
Weak acid *Asid lemah*	Oxalic acid *Asid oksalik*	3.0

Table 4
Jadual 4

Based on the information shown in Table 4, answer the following questions:
Berdasarkan maklumat di dalam Jadual 4*, jawab soalan-soalan berikut:*

(i) What is meant by a weak acid?
Apakah dimaksudkan dengan asid lemah?

……

……
[1 *mark*]
[1 *markah*]

4(*a*)(i)

(ii) Why is the pH value of hydrochloric acid lower than the pH value of oxalic acid?
Mengapakah nilai pH asid hidroklorik lebih rendah dari nilai pH asid oksalik?

……

……
[2 *marks*]
[2 *markah*]

4(*a*)(ii)

For Examiner's Use

(*b*) Diagram 4.1 shows the apparatus set-up for a titration between sodium hydroxide solution and dilute hydrochloric acid.
Rajah 4.1 *menunjukkan susunan radas bagi pentitratan antara larutan natrium hidroksida dan asid hidroklorik cair.*

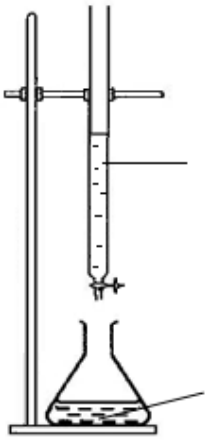


Diagram 4.1
Rajah 4.1

(i) Write a chemical equation to represent the reaction.
Tulis persamaan kimia mewakili tindak balas ini.

4(*b*)(i)

……

[1 *mark*]
[1 *markah*]

(ii) 25 cm^3 of 0.1 mol dm^{-3} sodium hydroxide solution is required to react completely with 12.50 cm^3 of dilute hydrochloric acid.
Calculate the molarity of the dilute hydrochloric acid used.

25 cm^3 *larutan natrium hidroksida* 0.1 mol dm^{-3} *diperlukan untuk bertindak balas lengkap dengan* 12.50 cm^3 *asid hidroklorik cair.*
Hitungkan kemolaran asid hidroklorik cair yang digunakan.

4(*b*)(ii)

[3 *marks*]
[3 *markah*]

For Examiner's Use

(*c*) Diagram 4.2 shows a series of reaction to prepare zinc carbonate.
Rajah 4.2 *menunjukkan satu siri tindak balas untuk menyediakan zink karbonat.*

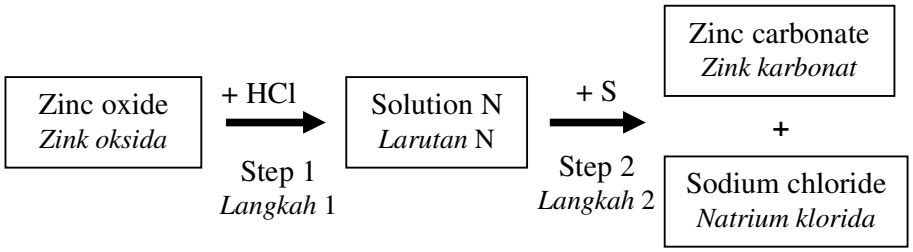


Diagram 4.2
Rajah 4.2

(i) Name the following solutions:
Namakan larutan- larutan berikut:

N: ……..……

S: ..……

[2 *marks*]
[2 *markah*]

4(*c*)(i)

(ii) State the type of reaction in Step 2.
Nyatakan jenis tindak balas bagi Langkah 2.

……

[1 *mark*]
[1 *markah*]

4(*c*)(ii)

For Examiner's Use

5 (*a*) Diagram 5.1 shows a reaction between lithium and chlorine gas.
Rajah 5.1 *menunjukkan satu tindak balas antara litium dan gas klorin.*

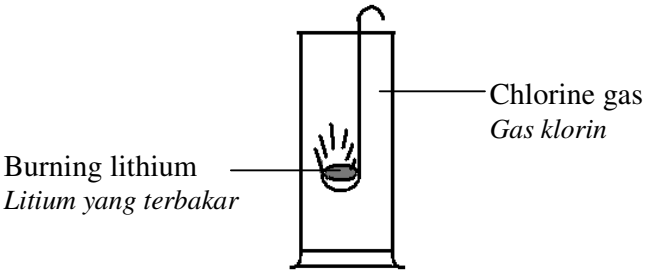


Diagram 5.1
Rajah 5.1

(i) Write a chemical equation for the reaction.
Tulis persamaan kimia bagi tindak balas ini.

5(*a*)(i)

……

[1 *mark*]
[1 *markah*]

(ii) State the changes in oxidation number for chlorine.
Nyatakan perubahan nombor pengoksidaan bagi klorin.

5(*a*)(ii)

……

[1 *mark*]
[1 *markah*]

(iii) Explain why lithium acts as the reducing agent in terms of electron transfer.
Terangkan mengapa litium bertindak sebagai agen penurunan dari segi pemindahan elektron.

5(*a*)(iii)

……

……

[1 *mark*]
[1 *markah*]

For Examiner's Use

(*b*) Diagram 5.2 shows the addition of bromine water into a test tube containing potassium iodide solution until in excess.

Rajah 5.2 *menunjukkan penambahan air bromin ke dalam tabung uji mengandungi larutan kalium iodida sehingga berlebihan.*

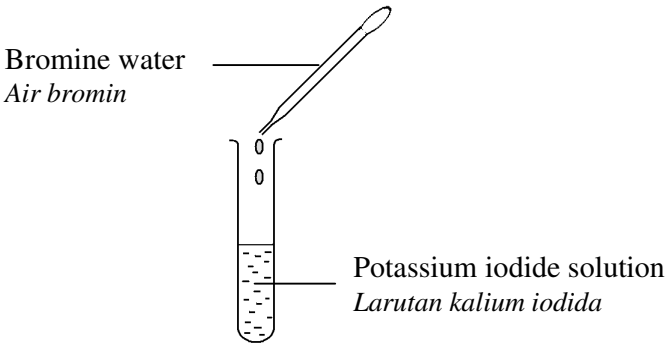


Diagram 5.2
Rajah 5.2

(i) A small amount of 1,1,1-trichloroethane liquid is added to the product in the test tube and the mixture is shaken.
What is the colour of 1,1,1-trichloroethane layer?

Sedikit cecair 1,1,1-*trikloroetana ditambah kepada hasil di dalam tabung uji dan campuran digoncang.*
Apakah warna lapisan 1,1,1-*trikloroetana?*

5(*b*)(i)

……

[1 *mark*]
[1 *markah*]

(ii) Write the ionic equation for the reaction between bromine and potassium iodide solution.
Tulis persamaan ion bagi tindak balas antara bromin dengan larutan kalium iodida.

5(*b*)(ii)

……

[1 *mark*]
[1 *markah*]

(iii) What is the role of bromine water in this reaction?
Apakah peranan air bromin dalam tindak balas ini?

5(*b*)(iii)

……

[1 *mark*]
[1 *markah*]

For Examiner's Use

(c) Diagram 5.3 shows the set-up of apparatus for an experiment to compare the reactivity of reactions between metal oxides and hydrogen gas.

Rajah 5.3 *menunjukkan susunan radas bagi satu eksperimen untuk membandingkan kereaktifan tindak balas antara oksida logam dan gas hidrogen.*

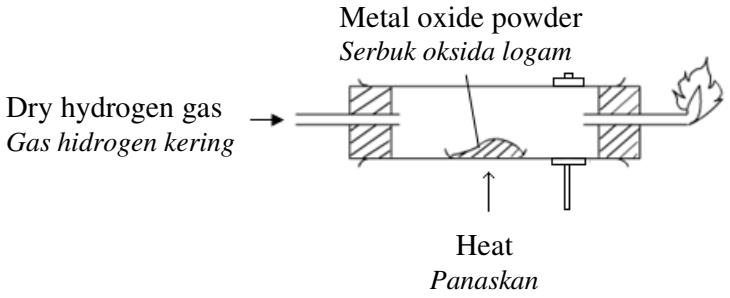


Diagram 5.3
Rajah 5.3

Table 5 shows the result of the experiment:
Jadual 5 *menunjukkan keputusan eksperimen:*

Experiment ***Eksperimen***	**Result** ***Keputusan***
Hydrogen + oxide of metal J *Hidrogen + oksida logam* J	Metal oxide powder glows brightly. Black powder turned brown. *Serbuk oksida logam berbara dengan terang.* *Serbuk hitam menjadi perang.*
Hydrogen + oxide of metal T *Hidrogen + oksida logam* T	No reaction. Powder turns yellow when hot and white when cold. *Tiada tindak balas.* *Serbuk bertukar kuning apabila panas dan putih apabila sejuk.*
Hydrogen + magnesium oxide *Hidrogen + magnesium oksida*	No reaction. White powder remained. *Tiada tindak balas.* *Serbuk putih kekal.*

Table 5
Jadual 5

For Examiner's Use

(i) Suggest a name for metal T.
Cadangkan nama bagi logam T.

5(*c*)(i)

……

[1 *mark*]
[1 *markah*]

(ii) Arrange the reactivity of J, T, Magnesium and Hydrogen in ascending order.
Susun kereaktifan J, T, *Magnesium dan Hidrogen dalam susunan menaik.*

5(*c*)(ii)

……

[1 *mark*]
[1 *markah*]

(iii) Based on the observations, explain how you obtain the arrangement in (*c*)(ii).
Berdasarkan pemerhatian, terangkan bagaimana susunan dalam (*c*) (ii) *diperolehi.*

……

……

……

……

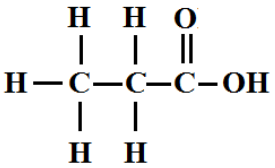
5(*c*)(iii)

……

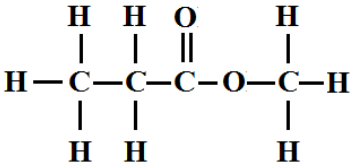
[3 *marks*]
[3 *markah*]

For Examiner's Use

6 Diagram 6 shows the structural formula of two organic compounds K and L.
Rajah 6 *menunjukkan formula struktur bagi dua sebatian organik* K *dan* L.



Compound K
Sebatian K



Compound L
Sebatian L

Diagram 6
Rajah 6

Compound K and L belong to two different homologous series.
Sebatian K *dan* L *tergolong dalam dua siri homolog yang berbeza.*

(*a*) Write the general formula for the homologous series of compound K.
Tulis formula am bagi siri homolog untuk sebatian K.

6(*a*)

.....

[1 *mark*]
[1 *markah*]

(*b*) Name compound L.
Namakan sebatian L.

6(*b*)

.....

[1 *mark*]
[1 *markah*]

(*c*) Compare two physical properties of compounds K and L by completing the following table:
Bandingkan dua sifat fizik bagi sebatian K *dan* L *dengan melengkapkan jadual berikut:*

Physical property *Sifat fizik*	Compound K *Sebatian* K	Compound L *Sebatian* L
Odour *Bau*		
Solubility *Keterlarutan*		

6(*c*)

[2 *marks*]
[2 *markah*]

For Examiner's Use

(*d*) Compound L can be produced from K in the laboratory.
Sebatian L *boleh dihasilkan dari* K *di dalam makmal.*

(i) Describe briefly how this process can be carried out.
Huraikan secara ringkas bagaimana proses ini dapat dijalankan.

……

……

……

……

……

[3 *marks*]
[3 *markah*]

6(*d*)(i)

(ii) Write the equation for the reaction
Tulis persamaan bagi tindak balas ini.

……

[2 *marks*]
[2 *markah*]

6(*d*)(ii)

(iii) Compound K is produced from the oxidation of propanol.
Draw all possible isomers for propanol.
Sebatian K *dihasilkan dari pengoksidaan propanol.*
Lukis semua isomer yang mungkin bagi propanol.

[2 *marks*]
[2 *markah*]

6(*d*)(iii)

Section B
Bahagian B

[20 *marks*]
[20 *markah*]

Answer any **one** question from this section.
Jawab mana-mana **satu** *soalan daripada bahagian ini.*

7 (*a*) Diagram 7 shows a graph of volume of gas against time for the reaction between excess magnesium carbonate and hydrochloric acid.

Rajah 7 *menunjukkan graf isipadu gas melawan masa bagi tindak balas antara magnesium karbonat berlebihan dan asid hidroklorik.*

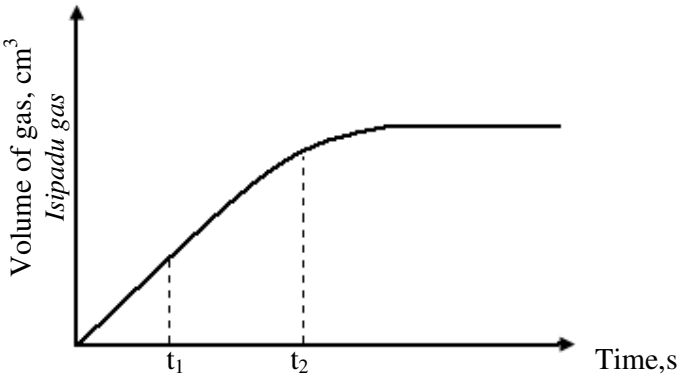


Diagram 7
Rajah 7

Compare the rate of reaction at t_1 and t_2.
Based on the graph, explain your answer.

Bandingkan kadar tindak balas pada t_1 *dan* t_2.
Berdasarkan graf, terangkan jawapan anda.

[3 *marks*]
[3 *markah*]

(*b*) The following chemical equation shows the reaction between calcium carbonate and hydrochloric acid.

Persamaan kimia berikut menunjukkan tindak balas antara kalsium karbonat dengan asid hidroklorik.

$$2HCl + CaCO_3 \longrightarrow CaCl_2 + CO_2 + H_2O$$

Determine the mass of calcium carbonate needed in the reaction if 480 cm^3 of gas is released at room condition.
(The molar volume of gas at room condition: 24 $dm^3\ mol^{-1}$,
Relative atomic mass: C = 12 g, O= 16 g, Ca = 40 g)

Tentukan jisim kalsium karbonat yang diperlukan dalam tindak balas jika 480 cm^3 *gas dibebaskan pada keadaan bilik.*
(*Isipadu molar gas pada keadaan bilik:* 24 $dm^3\ mol^{-1}$,
Jisim atom relatif: C=12 g, O= 16 g, Ca= 40 g)

[3 *marks*]
[3 *markah*]

(*c*) Two experiments are carried out to study the effect of the size of calcium carbonate on the rate of reaction.

Dua eksperimen dijalankan untuk mengkaji kesan saiz kalsium karbonat ke atas kadar tindak balas.

Experiment I : 1 g of calcium carbonate chips react with 20.0 cm^3 of 0.2 mol dm^{-3} hydrochloric acid.

Eksperimen I : 1 g *ketulan kalsium karbonat bertindak balas dengan* 20.0 cm^3 *asid hidroklorik* 0.2 mol dm^{-3}.

Experiment II : 1 g of calcium carbonate powder react with 20.0 cm^3 of 0.2 mol dm^{-3} hydrochloric acid.

Eksperimen II : 1 g *serbuk kalsium karbonat bertindak balas dengan* 20.0 cm^3 *asid hidroklorik* 0.2 mol dm^{-3}.

The volume of gas released is recorded in Table 7.1
Isipadu gas yang terhasil direkodkan dalam Jadual 7.1

	Time / s ***Masa*/ s**	0	60	120	180	240	300	360
Volume of gas / cm^3 ***Isipadu gas* / cm^3**	**Experiment I**	0.00	25.90	33.00	37.00	40.50	42.00	42.00
	Experiment II	0.00	28.00	36.50	41.00	42.00	42.00	42.00

Table 7.1
Jadual 7.1

(i) Plot a graph of volume of gas against time for both experiments in the graph paper provided on page 28.

Plot graf isipadu gas melawan masa bagi kedua-dua eksperimen pada kertas graf yang disediakan di muka surat 28.

[5 *marks*]
[5 *markah*]

(ii) Based on the graph, determine the rate of reaction at 90 sec for Experiment I.
Berdasarkan graf, tentukan kadar tindak balas pada 90 *saat bagi Eksperimen* I.

[2 *marks*]
[2 *markah*]

(*d*) Another set of experiment was carried out to study the effect of temperature on the rate of reaction between sodium thiosulphate solution and sulphuric acid as shown in Table 7.2

Satu set eksperimen lain dijalankan untuk mengkaji kesan suhu ke atas kadar tindak balas antara larutan natrium tiosulfat dan asid sulfurik seperti ditunjukkan dalam Jadual 7.2

Experiment ***Eksperimen***	I	II
Temperature of sodium thiosulphate / ^{o}C ***Suhu natrium tiosulfat***	40	50

Table 7.2
Jadual 7.2

(i) Write the ionic equation for the reaction.
Tulis persamaan ion bagi tindak balas ini.

[2 *marks*]
[2 *markah*]

(ii) Compare the rate of reaction between Experiment I and II by using Collision Theory.
Bandingkan kadar tindak balas antara Eksperimen I *dan* II *menggunakan Teori Perlanggaran.*

[5 *marks*]
[5 *markah*]

8 (*a*)

The molecular formula of butane is C_4H_{10} and its empirical formula is C_2H_5. *Formula molekul bagi butana ialah* C_4H_{10} *dan formula empiriknya ialah* C_2H_5

Based on the statement, explain the meaning of empirical formula and molecular formula.
Berdasarkan kenyataan tersebut, terangkan maksud formula empirik dan formula molekul.

[4 *marks*]
[4 *markah*]

(*b*) The decomposition of copper(II) nitrate is shown in the following equation:
Penguraian kuprum(II) *nitrat ditunjukkan dalam persamaan berikut:*

$$2\ Cu(NO_3)_2 \longrightarrow 2\ CuO + 4\ NO_2 + O_2$$

(Relative atomic mass: N=14, O=16, Cu=64,
molar volume of gas at room condition; 24 $dm^3\ mol^{-1}$)
(*Jisim atom relatif:* N=14, O=16, Cu=64,
isipadu molar gas pada keadaan bilik; 24 $dm^3\ mol^{-1}$)

(i) Determine the percentage composition by mass of oxygen in copper(II) nitrate.
Tentukan peratus mengikut jisim bagi oksigen dalam kuprum(II) *nitrat.*

[3 *marks*]
[3 *markah*]

(ii) If 3.2 g of copper(II) oxide is produced during the heating process, calculate the volume of oxygen gas evolved at room condition.
Jika 3.2 g *kuprum*(II) *oksida dihasilkan semasa proses pemanasan, hitung isipadu gas oksigen yang terbebas pada keadaan bilik.*

[3 *marks*]
[3 *markah*]

(*c*) A student carried out two experiments to determine the empirical formulae for magnesium oxide and copper(II) oxide.
Diagram 8 shows the apparatus set-up for both experiments.

Seorang pelajar menjalankan dua eksperimen untuk menentukan formula empirik bagi magnesium oksida dan kuprum(II) *oksida.*
Rajah 8 *menunjukkan susunan radas bagi kedua-dua eksperimen.*

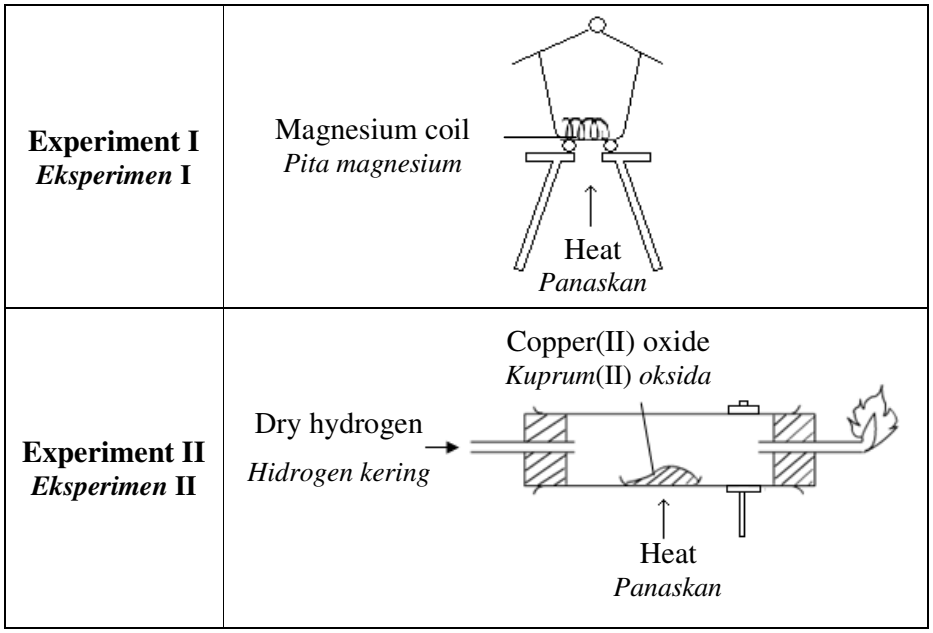


Diagram 8
Rajah 8

Explain the differences in the method used for the determination of the empirical formulae for both oxides.

Terangkan perbezaan kaedah untuk menentukan formula empirik bagi kedua-dua oksida itu.

[4 *marks*]
[4 *markah*]

(*d*) The following equations show two redox reactions involving iron(II) ion, Fe^{2+}.

Persamaan berikut menunjukkan dua tindak balas redoks yang melibatkan ion ferum(II), Fe^{2+}.

I $2\,Fe^{2+} + Br_2 \rightarrow 2\,Fe^{3+} + 2\,Br^-$

II $Fe^{2+} + Zn \rightarrow Fe + Zn^{2+}$

Compare the role of Fe^{2+} ion in both reactions.
Explain your answer.

Bandingkan peranan ion Fe^{2+} *dalam kedua-dua tindak balas.*
Terangkan jawapan anda.

[6 *marks*]
[6 *markah*]

Section C
Bahagian C

[20 marks]
[20 *markah*]

Answer any **one** question from this section.
*Jawab mana-mana **satu** soalan daripada bahagian ini.*

9 (*a*) The reaction between sodium and chlorine forms a compound with a high melting point.
Determine the mass of the compound formed when 2.3 g sodium reacts with excess chlorine.
[Relative atomic mass Na= 23, Cl= 35.5]

Tindak balas antara natrium dengan klorin menghasilkan satu sebatian yang mempunyai takat lebur yang tinggi.
Tentukan jisim sebatian yang terbentuk apabila 2.3 g *natrium bertindak balas dengan klorin berlebihan.*
[*Jisim atom relatif* Na= 23, Cl= 35.5]

[4 *marks*]
[4 *markah*]

(*b*) Table 9 shows the observation when iron reacts with chlorine and bromine gases.
Jadual 9 *menunjukkan pemerhatian apabila ferum bertindak balas dengan gas klorin dan gas bromin.*

Reaction ***Tindak balas***	**Reactants** ***Bahan Tindak balas***	**Observation** ***Pemerhatian***
I	Iron + Chlorine gas *Ferum + Gas klorin*	The hot iron wool ignites rapidly with a bright flame. A brown solid is formed. *Wul besi panas menyala dengan cepat dan terang.* *Pepejal perang terhasil.*
II	Iron + Bromine gas *Ferum + Gas bromin*	The hot iron wool glows moderately bright and moderately fast. A brown solid is formed. *Wul besi panas berbara sederhana terang dan sederhana cepat.* *Pepejal perang terhasil.*

Table 9
Jadual 9

Based on Table 9,
Berdasarkan Jadual 9*,*

(i) Write the chemical equation for either of the reactions.
Tulis persamaan kimia bagi salah satu tindak balas.

[2 *marks*]
[2 *markah*]

(ii) Compare the reactivity of both reactions.
Explain your answer.
[The proton number of Cl =17, Br = 35]
Bandingkan kereaktifan kedua-dua tindak balas.
Terangkan jawapan anda.
[*Nombor proton:* Cl =17, Br = 35]

[4 *marks*]
[4 *markah*]

(c) Diagram 9 shows the standard representation for the atoms of three elements; Li, C and Cl.
Rajah 9 *menunjukkan wakilan piawai bagi atom tiga unsur;* Li, C *dan* Cl.

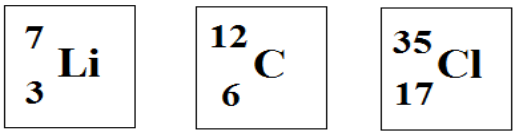


Diagram 9
Rajah 9

Using the given information, describe the formation of two compounds with different types of bonding.
Menggunakan maklumat yang diberikan, huraikan pembentukan dua sebatian dengan jenis ikatan berbeza.

[10 *marks*]
[10 *markah*]

10 (*a*) Diagram 10 shows an energy level diagram.
Rajah 10 *menunjukkan gambar rajah aras tenaga.*

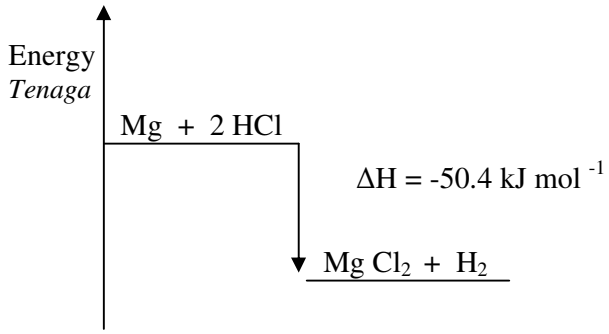


Diagram 10.1
Rajah 10.1

Determine the temperature change when 50 cm^3 of 1.0 mol dm^{-3} of hydrochloric acid reacts with excess magnesium.
[Specific heat capacity of solution: 4.2 J g^{-1} $^oC^{-1}$,
density of solution: 1 g cm^{-3}]

Tentukan perubahan suhu apabila 50 cm^3 *asid hidroklorik* 1.0 mol dm^{-3} *bertindak balas dengan magnesium berlebihan.*
[*Muatan haba tentu larutan:* 4.2 J g^{-1} $^oC^{-1}$, *ketumpatan larutan:* 1 g cm^{-3}]

[4 *marks*]
[4 *markah*]

(*b*) Table 10 shows the molecular formula and the heat of combustion for propanol and butanol.
Jadual 10 *menunjukkan formula molekul dan haba pembakaran bagi propanol dan butanol.*

Alcohol ***Alkohol***	**Molecular Formula** ***Formula molekul***	**Heat of combustion/ kJ mol^{-1}** ***Haba pembakaran***
Propanol	C_3H_7OH	-2100
Butanol	C_4H_9OH	-2877

Table 10
Jadual 10

Based on the information in Table 10,
Berdasarkan maklumat dalam Jadual 10*,*

(i) Write the equation for the complete combustion of either one of the alcohol.
Tulis persamaan bagi tindak balas pembakaran lengkap bagi salah satu alkohol

[2 *marks*]
[2 *markah*]

(iii) Compare the heat of combustion between propanol and butanol. Explain your answer.
Bandingkan haba pembakaran di antara propanol dan butanol. Terangkan jawapan anda.

[4 *marks*]
[4 *markah*]

(c) Describe a laboratory experiment to determine the heat of combustion of a named alcohol.
Your answer should include:

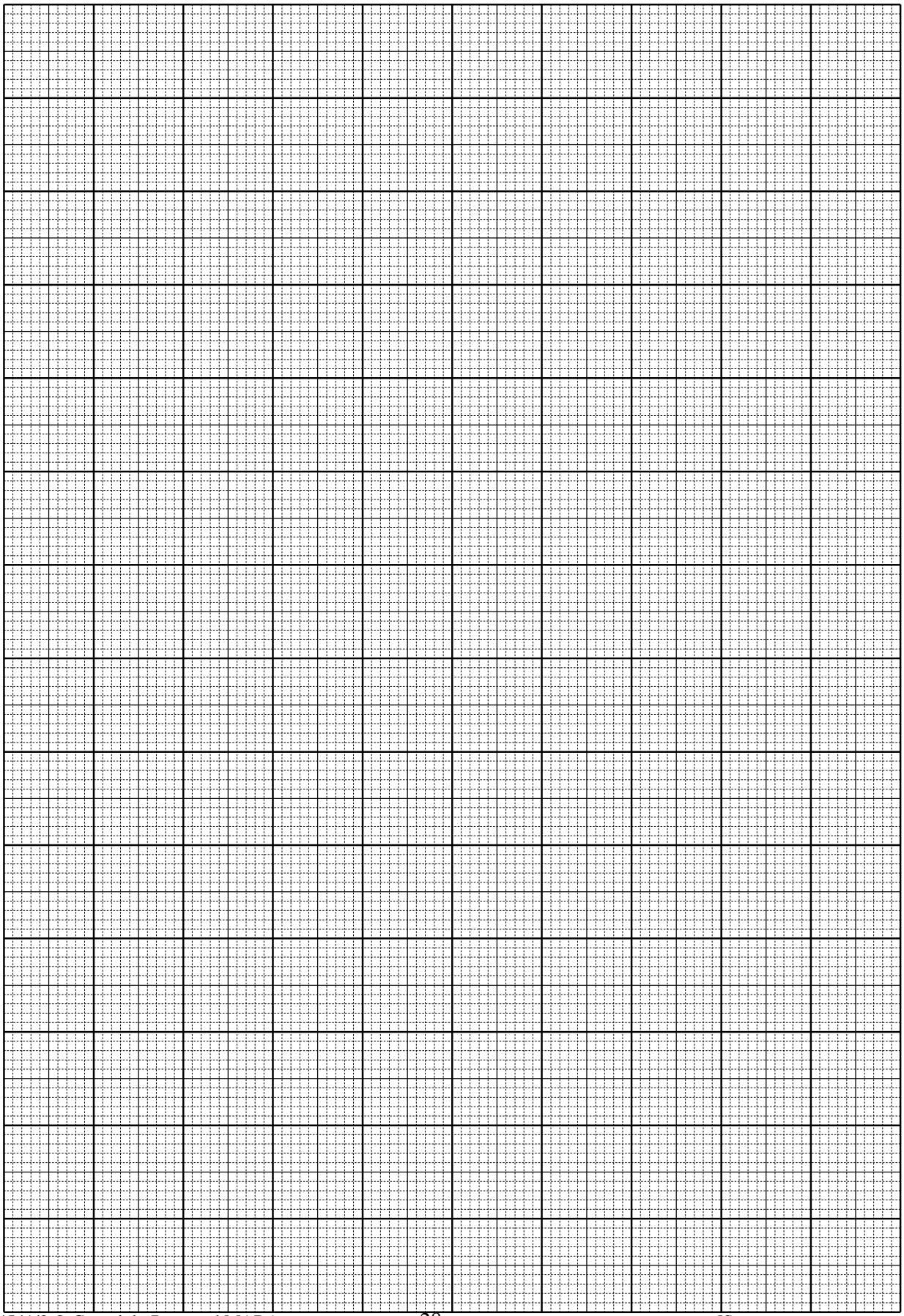
- a labeled diagram
- procedure

Huraikan satu eksperimen makmal untuk menentukan haba pembakaran bagi satu alkohol yang dinamakan.
Huraian anda perlu disertakan dengan:

- *gambar rajah berlabel.*
- *prosedur*

[10 *marks*]
[10 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT



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INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of **three** sections: **Section A, B** and **C.**
*Kertas soalan ini mengandungi tiga bahagian**: Bahagian A, B** dan **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 one question from **Section B** and **one** question from **Section C**. Write your answers for **Section B** and **C** on the lined pages at the end of the question paper. Answer questions in **Section B** and **C** in detail. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answer.

*Jawab **satu** soalan daripada **Bahagian B** dan **satu** soalan daripada **Bahagian C**. Tuliskan jawapan bagi **Bahagian B** dan **C** pada halaman bergaris di bahagian akhir kertas soalan ini. Jawab **Bahagian B** dan **C** dengan terperinci. 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 membantu anda mendapatkan markah.

5. If you wish to cancel any answer, neatly cross out the answer.
Sekiranya anda hendak membatalkan sesuatu jawapan, buat garisan di atas jawapan itu.

6. The diagrams in the questions are not drawn to scale unless stated.
Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan.

7. Marks allocated for each question or part question are shown in brackets.
Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.

8. 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.*

9. You may use a non – programmable scientific calculator.
Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.

10. Hand in all your answer sheets at the end of the examination.
Serahkan semua kertas jawapan anda di akhir peperiksaan.