Section A
Bahagian A

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

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

1 Table 1 shows the apparatus set-up and observation for two sets of experiments to determine the solubility of compound M and compound N in water and methylbenzene.
Jadual 1 *menunjukkan susunan radas dan pemerhatian bagi dua set eksperimen untuk menentukan keterlarutan sebatian* M *and sebatian* N *dalam air dan metilbenzena*.

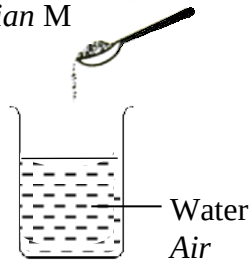
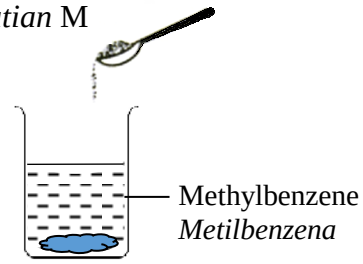
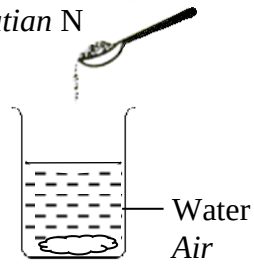
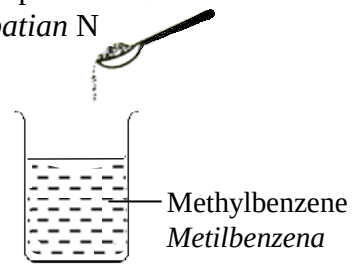
Set ***Set***	**Apparatus set-up and observation** ***Susunan radas dan pemerhatian***	
I	Compound M *Sebatian* M  Blue solution formed *Larutan biru terbentuk*	Compound M *Sebatian* M  Blue solid remained *Pepejal biru kekal*
II	Compound N *Sebatian* N  White solid remained *Pepejal putih kekal*	Compound N *Sebatian* N  Colourless solution formed *Larutan tidak berwarna terbentuk*

Table 1
Jadual 1

(a) (i) State the type of bond in compounds M and N.
Nyatakan jenis ikatan dalam sebatian M *dan sebatian* N.

.....
[2 *marks*]

(ii) State the type of particles in compound N.
Nyatakan jenis zarah dalam sebatian N.

.....
[1 *mark*]

(iii) Suggest the name of compounds M and N.
Cadangkan nama bagi sebatian M *dan sebatian* N.

.....
[2 *marks*]

(b) Diagram 1 shows the electron arrangement of atom P, Q and R.
Rajah 1 *menunjukkan susunan elektron bagi atom* P, Q *dan* R.

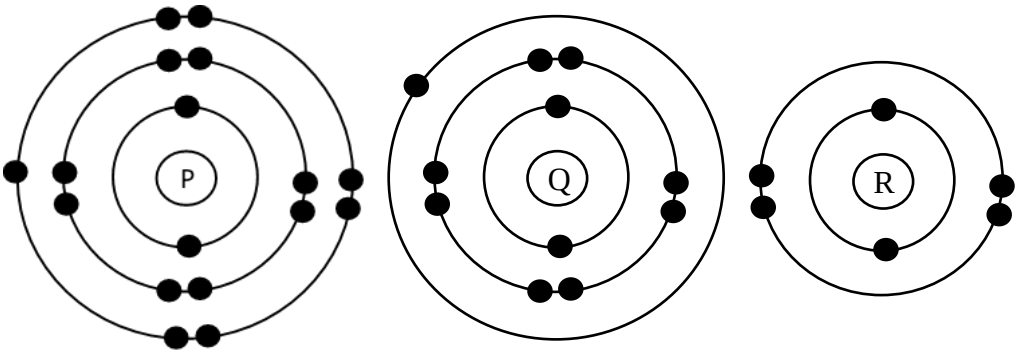


Diagram 1
Rajah 1

By using atom P, Q and R in Diagram 1,
Dengan menggunakan atom P, Q *dan* R *dalam Rajah* 1,

(i) Draw the electron arrangement for the compound formed between Q and P.
Lukis susunan elektron bagi sebatian yang terbentuk antara Q *dan* P.

[2 *marks*]

[Lihat halaman sebelah

(ii) Draw the electron arrangement for the compound formed between R and Q.
Lukis susunan elektron bagi sebatian yang terbentuk antara R *dan* Q.

[2 *marks*]

2 Diagram 2 shows a part of a Periodic Table of Elements. P, Q, R, S, T and U are not the actual symbols of the elements.
Rajah 2 *menunjukkan sebahagian daripada Jadual Berkala Unsur.* P, Q, R, S, T *dan* U *bukan simbol sebenar unsur tersebut.*

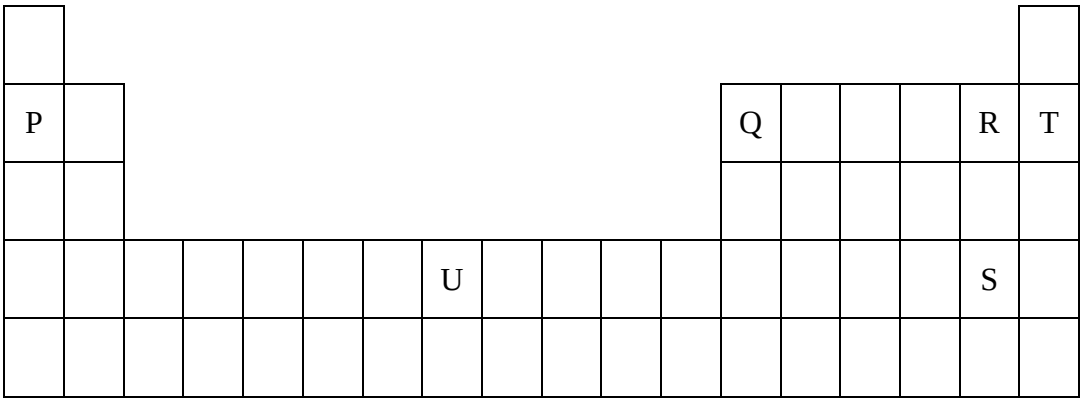


Diagram 2
Rajah 2

(a) Write the electron arrangement for R atom.
Tulis susunan elektron bagi atom R.

.....

[1 *mark*]

(b) (i) Elements R and S are placed in the same group in the Periodic Table of Elements.
What is the name of the group?
Unsur R *dan* S *terletak dalam kumpulan yang sama dalam Jadual Berkala Unsur.*
Apakah nama bagi kumpulan itu?

.....

[1 *mark*]

(ii) Compare the electronegativity of element R and S.
Bandingkan keelektronegatifan bagi unsur R *dan* S.

.....

[1 *mark*]

(iii) Explain your answer in **2**(b)(ii).
Terangkan jawapan anda di **2**(b)(ii).

.....

.....

.....

.....

[3 *marks*]

(c) Which element is chemically inert?
Unsur yang manakah lengai secara kimia?

.....

[1 *mark*]

(d) State **one** special characteristic of element U.
Nyatakan ***satu*** *ciri istimewa bagi unsur* U.

…….....

[1 *mark*]

(e) Arrange the atomic size of the elements P, Q, R, S, T and U in an ascending order.
Susun saiz atom bagi unsur-unsur P, Q, R, S, T *dan* U *mengikut tertib menaik.*

.....

[1 *mark*]

3 Diagram 3.1 shows the inter-conversion of the two states of matter of substance Q.
Rajah 3.1 *menunjukkan perubahan dua keadaan jirim bagi bahan* Q.

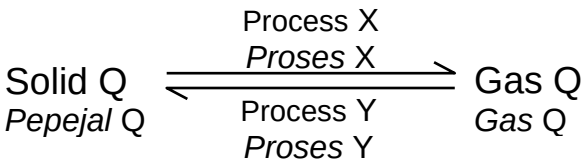


Diagram 3.1
Rajah 3.1

(a) Name process X.
Namakan proses X.

.....
[1 *mark*]

(b) When substance Q changes from gas to solid, state the change in term of :
Apabila bahan Q *berubah daripada keadaan gas kepada pepejal, nyatakan perubahan dari segi* :

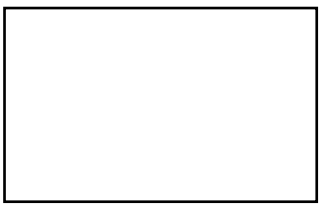
(i) the energy of the particles.
tenaga kinetik zarah-zarah.

.....
[1 *mark*]

(ii) the forces of attraction between the particles.
daya tarikan antara zarah-zarah.

.....
[1 *mark*]

(c) Draw the arrangement of particles of substance Q in solid state.
Lukiskan susunan zarah-zarah bahan Q *dalam keadaan pepejal.*



[1 *mark*]

(d) Diagram 3.2 and Diagram 3.3 shows the apparatus set-up of two experiments.
Rajah 3.2 *dan Rajah* 3.3 *menunjukkan susunan radas bagi dua eksperimen.*

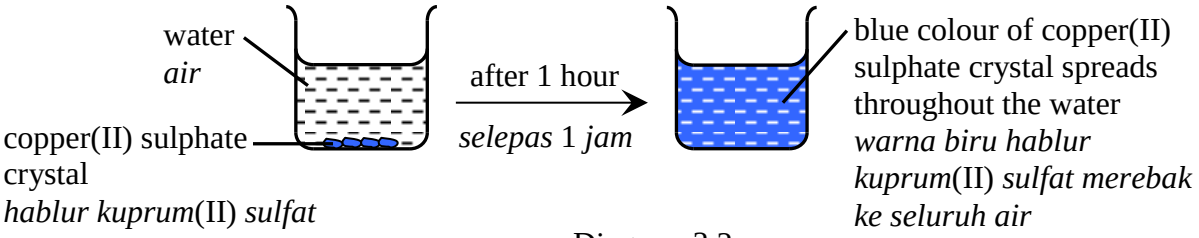


Diagram 3.2
Rajah 3.2

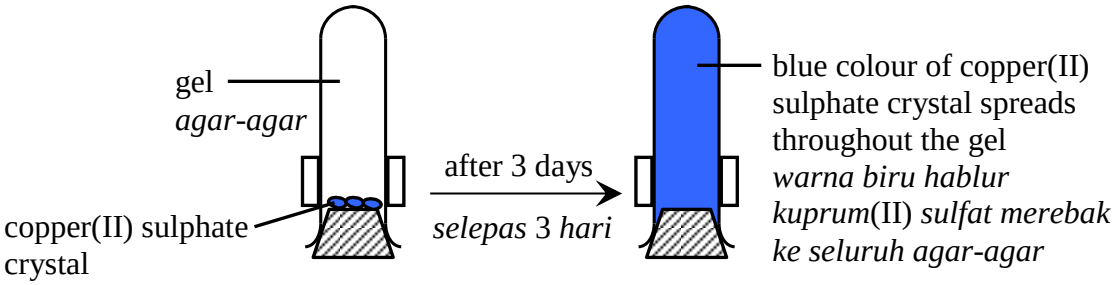


Diagram 3.3
Rajah 3.3

(i) State the name of the process involved in both experiments.
Nyatakan nama proses yang terlibat dalam kedua-dua eksperimen.

.....
[1 *mark*]

(ii) State the type of particles in copper(II) sulphate crystal.
Nyatakan jenis zarah yang terdapat dalam hablur kuprum(II) *sulfat.*

.....
[1 *mark*]

(iii) Based on Diagram 3.2 and Diagram 3.3, explain the differences in the observation by using kinetic theory of matter.
Berdasarkan Rajah 3.2 *dan Rajah* 3.3, *terangkan perbezaan dalam pemerhatian dengan menggunakan teori kinetik jirim.*

.....

.....

.....
[4 *marks*]

4 The graph in Diagram 4 shows the curve of experiment I and II that was carried out to study the rate of reaction between magnesium and hydrochloric acid.
Graf di Rajah 4 *menunjukkan lengkung bagi eksperimen* I *dan* II *yang dijalankan bagi mengkaji kadar tindak balas antara magnesium dan asid hidroklorik*

.

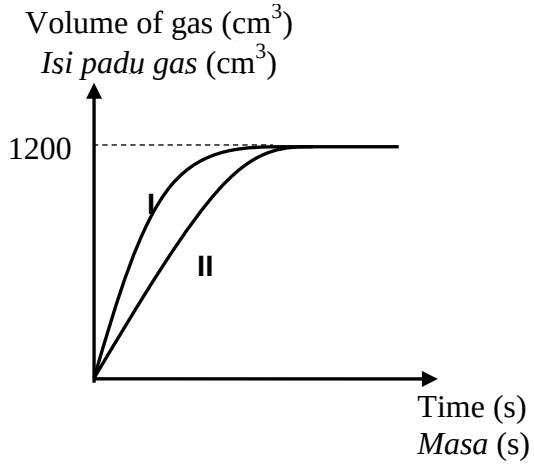


Diagram 4
Rajah 4

(a) (i) Name the gas released in the experiment.
Namakan gas yang *terbebas dalam eksperimen ini*.

……
[1 *mark*]

(ii) Write a chemical equation for the reaction between magnesium and hydrochloric acid.
Tulis persamaan kimia bagi tindak balas antara magnesium dengan asid hidroklorik.

……
[2 *marks*]

(iii) Calculate the mass of magnesium that reacted with excess hydrochloric acid.
Hitung jisim bagi magnesium yang bertindak balas dengan asid hidroklorik berlebihan.

[Relative atomic mass: Mg = 24; volume of 1 mol of gas at room temperature = 24 dm^3]
[*Jisim atom relatif:* Mg = 24; *isi padu* 1 mol *gas pada suhu bilik* = 24 dm^3]

[3 *marks*]

(b) Compare the rate of reaction between experiment I and experiment II. Explain.
Bandingkan kadar tindak balas antara eksperimen I *dan eksperimen* II. *Terangkan.*

……

……
[2 *marks*]

(c) State two other factors that can affect the rate of reaction in this experiment.
Nyatakan dua faktor lain yang boleh mempengaruhi kadar tindak balas dalam eksperimen ini.

……

……
[2 *marks*]

5 Diagram 5.1 shows the structure of anion parts of cleaning agents A and B. These anions consist of parts X and Y.
Rajah 5.1 *menunjukkan struktur bagi bahagian anion bagi agen pencuci* A *dan agen pencuci* B. *Anion-anion ini terdiri daripada bahagian* X *dan bahagian* Y.

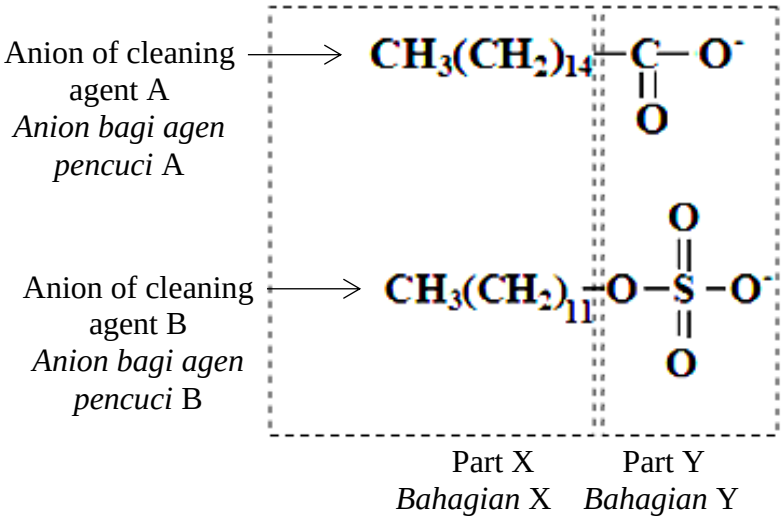


Diagram 5.1
Rajah 5.1

(a) State the type of cleaning agent:
Nyatakan jenis agen pencuci:

A: …….....

B: …….....
[2 *marks*]

(b) State the property of parts X and Y.
Nyatakan sifat bagi bahagian X *dan bahagian* Y.

.....

.....
[2 *marks*]

(c) The cleansing action of cleaning agent B is more effective than cleaning agent A in hard water. Explain why.
Tindakan pencucian agen pencuci B *adalah lebih berkesan daripada agen pencuci* A *dalam air liat. Terangkan mengapa.*

…….....

…….....
[2 *marks*]

(d) Table 2 the function of three types of modern medicine.
Jadual 2 *menunjukkan fungsi tiga jenis ubat moden.*

Function ***Fungsi***	**Type of medicine** ***Jenis ubat***
Relief pain *Mengurangkan kesakitan*	P: …….....
Kills or prevents the reproduction of bacteria *Membunuh atau menghalang pembiakan bakteria*	Q: ……..……..
Changes the emotions and behaviour of the patient *Mengubah perasaan dan kelakuan pesakit*	R: ……..…..

Table 2
Jadual 2

(i) Complete Table 2.
Lengkapkan Jadual 2. [3 *marks*]

(ii) Diagram 5.2 shows the conversation between a doctor and a patient.
Rajah 5.2 *menunjukkan perbualan antara seorang doktor dan seorang pesakit.*

Diagram 5.2
Rajah 5.2

What will happen if the patient did not do as what the doctor's said?
Apakah yang akan berlaku jika pesakit itu tidak mengikut apa yang dipesan oleh doktor?

.....
[1 *mark*]

(iii) Tranquilizer is an example of medicine of type R.
Give **one** change that might be happen to a patient's emotions when treated using this medicine.
Trankuilizer adalah satu contoh ubat jenis R.
*Berikan **satu** perubahan yang mungkin berlaku kepada perasaan pesakit yang dirawat menggunakan ubat ini.*

.....
[1 *mark*]

[Lihat halaman sebelah

6 Diagram 6.1 shows two different types of manufactured substances in industry.
Rajah 6.1 *menunjukkan dua jenis bahan buatan dalam industri.*

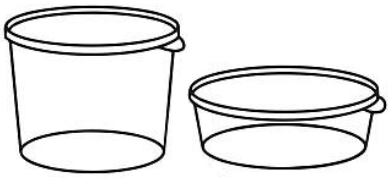
Type of manufactured substance ***Jenis bahan buatan***	**Example** ***Contoh***	**Component** ***Komponen***
……	 Plastic containers *Bekas plastik*	Polythene *Politena*
Alloy *Aloi*	 National Monument *Tugu Negara*	……

Diagram 6.1
Rajah 6.1

(a) (i) State type of manufactured substances in Diagram 6.1.
Nyatakan jenis bahan buatan dalam Rajah 6.1.

.....

[1 *mark*]

(ii) Diagram 6.2 shows the structural formula of polythene
Rajah 6.2 *menunjukkan formula struktur bagi politena.*

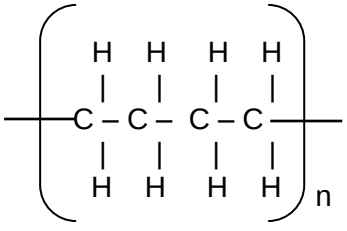


Diagram 6.2
Rajah 6.2

Draw the structural formula and state the name for the monomer of polythene.
Lukis formula struktur dan nyatakan nama bagi monomer bagi politena.

[2 *marks*]

(iii) State one reason why polythene should **not** be disposed by open burning?
*Nyatakan satu sebab mengapa politena **tidak** sepatutnya dilupuskan secara pembakaran terbuka?*

.....
[1 *mark*]

(b) (i) Name the type of alloy to make National Monument.
Namakan jenis aloi dalam pembuatan Tugu Negara.

.....
[1 *mark*]

(ii) State two elements used to make alloy in **6**(b)(i).
Nyatakan dua unsur yang digunakan dalam pembuatan aloi dalam **6**(b)(i).

.....
[1 *mark*]

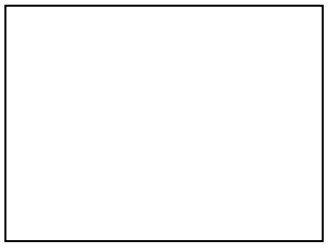
(iii) Alloy in **6**(b)(i) is harder than its pure metal. Explain.
Aloi dalam **6**(b)(i) *lebih keras daripada logam tulennya. Terangkan.*

.....

.....

.....
[3 *marks*]

(iv) Draw a labeled diagram that shows the arrangement of particles in alloy **6**(b)(i).
Lukis gambar rajah berlabel yang menunjukkan susunan zarah-zarah dalam aloi **6**(a)(i).



[2 *marks*]

[Lihat halaman sebelah

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) A group of students carry out an electrolysis of ethanoic acid solution, CH_3COOH by using carbon electrodes.
Sekumpulan pelajar menjalankan suatu elektrolisis larutan asid etanoik, CH_3COOH, *menggunakan elektrod karbon.*

By using your knowledge of factors affecting the selective discharge of ions at the electrodes,
Dengan menggunakan pengetahuan anda tentang faktor-faktor yang mempengaruhi pemilihan ion untuk dinyahcaskan di elektrod,

(i) Identify the ion that is selectively discharge at anode and cathode.
Kenal pasti ion yang dipilih menyahcas di anod dan katod.

(ii) Write half equation for the reactions occurred at anode and cathode.
Tuliskan persamaan setengah yang berlaku di anod dan katod.

(iii) Describe a chemical test to verify the product formed at cathode.
Huraikan satu ujian kimia bagi mengesahkan hasil yang terbentuk di katod.

[6 *marks*]

(b) Table 3.1 shows the apparatus set-up to electroplate iron spoon.
Jadual 3.1 *menunjukkan susunan radas bagi menyadurkan sudu besi.*

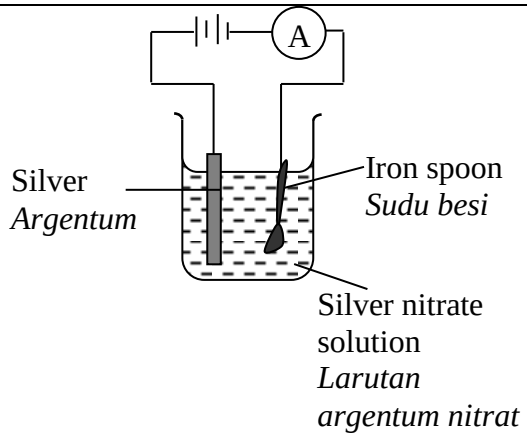
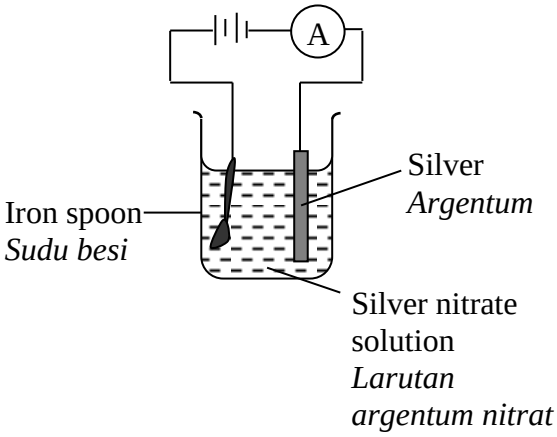
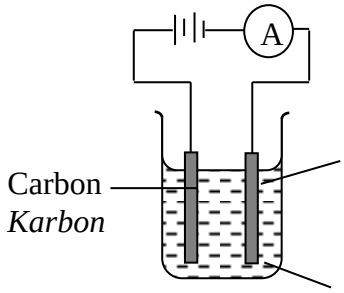
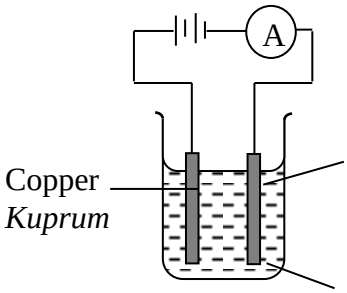
Set ***Set***	**Apparatus set up** ***Susunan radas***	**Observation on iron spoon** ***Pemerhatian terhadap sudu besi***
I		A shiny grey solid deposited *Pepejal kelabu berkilat terenap*
II		No changes *Tiada perubahan*

Table 3.1
Jadual 3.1

Based on the observation in Table 3.1, explain the differences in Set I and Set II.
Berdasarkan pemerhatian dalam Jadual 3.1, *terangkan mengapa terdapat perbezaan dalam Set* I *dan Set* II.

[4 *marks*]

(c) Table 3.2 shows the apparatus set-up and observation for four different of cells using 1.0 mol dm^{-3} copper(II) sulphate solution
Jadual 3.2 *menunjukkan susunan radas dan pemerhatian bagi empat sel yang berbeza menggunakan larutan kuprum*(II) *sulfat* 1.0 mol dm^{-3}.

Cell ***Sel***	**Set up of apparatus** ***Susunan radas***	***Observation*** ***Pemerhatian***
I	 Copper(II) sulphate solution *Larutan kuprum*(II) *sulfat*	Anode: *Anod:* Bubbles of gas released *Gelembung-gelembung gas terbebas* Electrolyte: *Elektrolit:* The intensity of blue colour of copper(II) sulphate solution decreases *Keamatan warna biru larutan kuprum*(II) *sulfat berkurang*
II	 Copper(II) sulphate solution *Larutan kuprum*(II) *sulfat*	Anode : *Anod :* Copper plate becomes thinner *Kepingan kuprum menipis* Electrolyte: *Elektrolit:* The intensity of blue colour of copper(II) sulphate solution remain *Keamatan warna biru larutan kuprum*(II) *sulfat kekal*

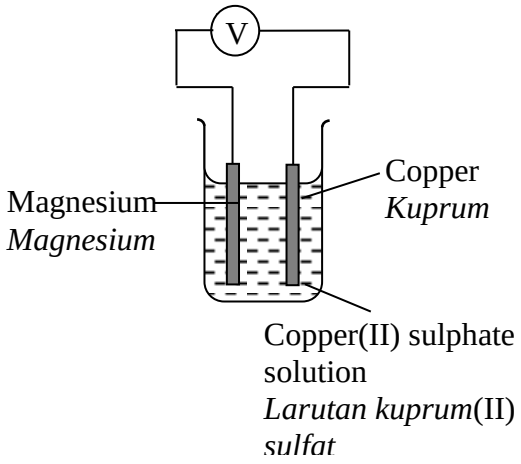
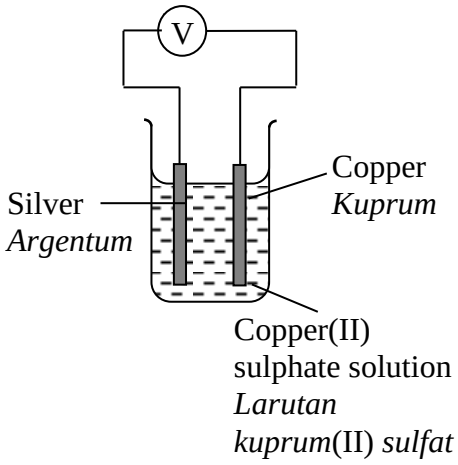
Cell *Sel*	Set up of apparatus *Susunan radas*	*Observation* *Pemerhatian*
III		<u>Anode:</u> <u>*Anod:*</u> Magnesium plate becomes thinner *Kepingan magnesium menipis* <u>Electrolyte</u>: <u>*Elektrolit:*</u> The intensity of blue colour of copper(II) sulphate solution decreases *Keamatan warna biru larutan kuprum*(II) *sulfat berkurang*
IV		<u>Anode:</u> <u>*Anod*:</u> Copper plate becomes thinner *Kepingan kuprum menipis* <u>Electrolytes</u> : <u>*Elektrolit:*</u> The intensity of blue colour of copper(II) sulphate solution increases *Keamatan warna biru larutan kuprum*(II) *sulfat bertambah*

Table 3.2
Jadual 3.2

Based on Table 3.2:
Berdasarkan Jadual 3.2*:*

Explain why there are differences in the observation between
Terangkan mengapa terdapat perbezaan pemerhatian di antara

(i) Cell I and Cell II
Sel I *dan Sel* II

(ii) Cell III and Cell IV
Sel III *dan Sell* IV

[10 *marks*]

[Lihat halaman sebelah

8 (a) Diagram 7 shows the apparatus set-up and the observations of three sets of the experiments to study the displacement of halogen. The products formed are then added with 1,1,1-trichloroethane.
Rajah 7 *menunjukkan susunan radas dan pemerhatian bagi tiga set eksperimen untuk mengkaji penyesaran halogen. Kemudian, hasil yang terbentuk ditambah dengan* 1,1,1-*trikloroetana.*

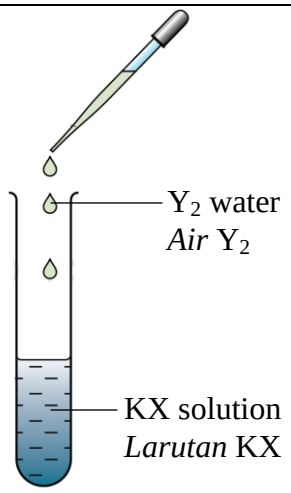
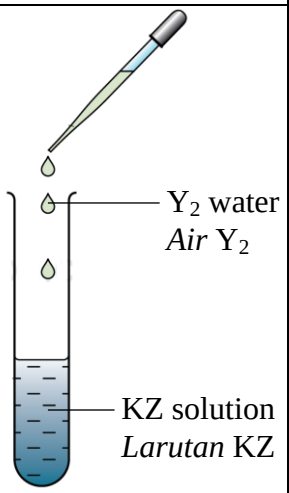
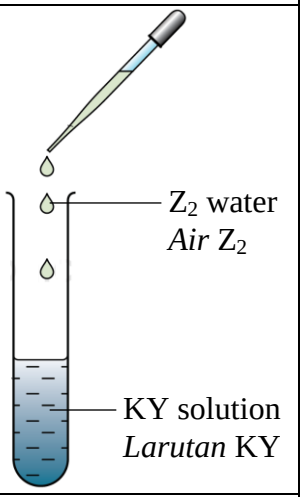
Set ***Set***	I	II	III
Apparatus set-up ***Susunan radas***			
Observation ***Pemerhatian***	Colourless solution turns brown. The product forms a layer of purple colour in 1,1,1-trichloroethane. *Larutan tidak berwarna menjadi perang. Hasil membentuk lapisan berwarna ungu dalam* 1,1,1-*trikloroetana.*	No change. Forms a layer of brown colour in 1,1,1-trichloroethane. *Tiada perubahan. Membentuk lapisan berwarna perang dalam* 1,1,1-*trikloroetana.*	Colourless solution turns brown. The product forms a layer of brown colour in 1,1,1-trichloroethane. *Larutan tidak berwarna menjadi perang. Hasil membentuk lapisan berwarna perang dalam* 1,1,1-*trikloroetana.*

Diagram 7
Rajah 7

(i) State the name of halogen X, halogen Y and halogen Z.
*Nyatakan nama bagi halogen*X, *halogen* Y *dan halogen* Z.

Arrange X, Y and Z in descending order of their reactivity.
Susun X, Y *dan* Z *dalam tertib kereaktifan menurun.* [4 *marks*]

(ii) By using the reaction in set I, explain the meaning of redox reaction in terms of the oxidation number.
Write the chemical equation for the reaction.
Dengan menggunakan tindak balas dalam set I, *terangkan maksud tindak balas redoks dari segi nombor pengoksidaan.*
Tuliskan persamaan kimia bagi tindak balas itu. [5 *marks*]

(b) Table 4 shows the results of two experiments to study the effects of metals P and Q on the rusting of iron.
Jadual 4 *menunjukkan keputusan bagi dua eksperimen untuk mengkaji kesan logam* P *dan logam* Q *terhadap pengaratan besi.*

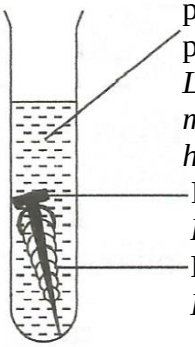
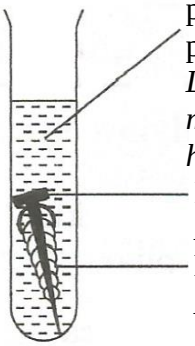
Experiment ***Eksperimen***	**Observation** ***Pemerhatian***
I  Hot agar solution containing potassium hexacyanoferrate(III) and phenolphthalein *Larutan agar-agar panas mengandungi larutan kalium heksasianoferat*(III) *dan fenolftalein* Iron nail *Paku besi* Metal P *Logam* P	Dark blue spots formed. *Tompok biru tua terbentuk.*
II  Hot agar solution containing potassium hexacyanoferrate(III) and phenolphthalein *Larutan agar-agar panas mengandungi larutan kalium heksasianoferat*(III) *dan fenolftalein* Iron nail *Paku besi* Metal Q *Logam* Q	Pink colour formed. *Warna merah jambu terbentuk.*

Table 4
Jadual 4

(i) Explain why there is a difference in observations in both experiments and include the half equations.
Terangkan mengapa terdapat perbezaan pemerhatian dalam kedua-dua eksperiment dan sertakan setengah persamaan. [8 *marks*]

(ii) State the metal that is oxidised in both experiments.
Nyatakan logam yang dioksidakan dalam kedua-dua eksperimen.

Arrange in descending order metals P, Q and iron based on the electropositivity of the metals.
Susunkan secara menurun logam P, *logam* Q *dan besi berdasarkan keelektropositifan logam.* [3 *marks*]

Section C
Bahagian C

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

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

9 The following equation represents the reaction between magnesium and acid P. Acid P is a monoprotic acid.

$$Mg + \text{Acid P} \rightarrow \text{Salt Q} + H_2$$

Persamaan berikut mewakili tindak balas antara magnesium dengan asid P. *Asid* P *adalah asid monobes.*

$$Mg + \textit{Asid}\ \text{P} \rightarrow \textit{Garam}\ \text{Q} + H_2$$

Based on the equation,
Berdasarkan persamaan itu,

(a) (i) Suggest acid P and identify salt Q.
Cadangkan asid P *dan kenal pasti garam* Q.

[2 *marks*]

(ii) From your answer in **9**(a)(i) , write the chemical equation for the reaction.
Daripada jawapan anda di **9**(a)(i) , *tulis persamaan kimia bagi tindak balas itu.*

[2 *marks*]

(b) Diagram 8 shows a flow chart of magnesium salts.
Rajah 8 *menunjukkan carta alir bagi garam magnesium*

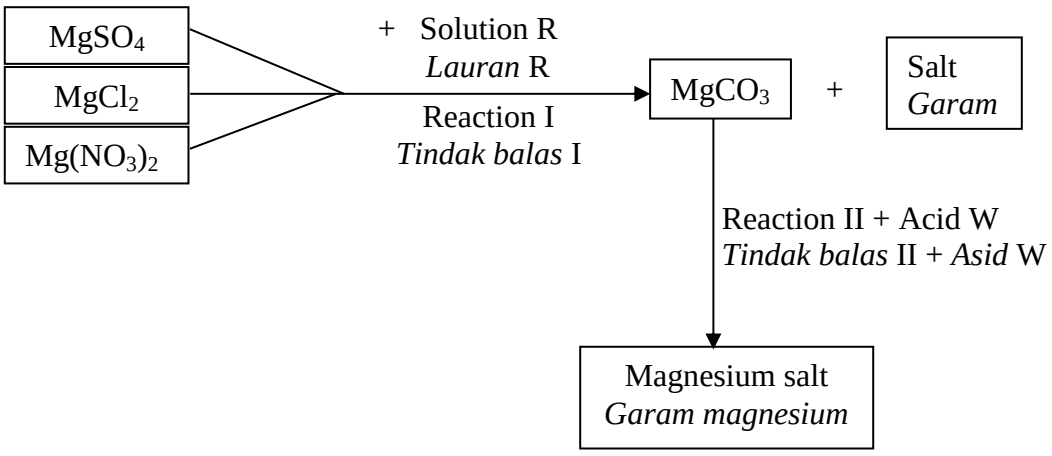


Diagram 8
Rajah 8

All the three salts, $MgSO_4$, $MgCl_2$ and $Mg(NO_3)_2$ in Diagram 8 can be converted to $MgCO_3$ by reaction I, then $MgCO_3$ reacts with acid W to form a Magnesium salt through reaction II.
Ketiga-tiga garam, $MgSO_4$, $MgCl_2$ *dan* $Mg(NO_3)_2$ *dalam Rajah* 8 *boleh ditukar kepada* $MgCO_3$ *melalui tindak balas* I*, kemudian* $MgCO_3$ *bertindak balas dengan asid* W *membentuk satu garam magnesium melalui tindak balas* II.

(i) By choosing one of the three salts in Diagram 8, suggest solution R to prepare magnesium carbonate, $MgCO_3$.
Write the chemical equation involved and describe a laboratory experiment to prepare magnesium carbonate, $MgCO_3$.
Dengan memilih satu garam di Rajah 8*, cadangkan larutan* R *untuk menyediakan magnesium karbonat,* $MgCO_3$.
Tulis persamaan kimia yang terlibat dan huraikan eksperimen makmal untuk menyediakan magnesium karbonat, $MgCO_3$.

[8 *marks*]

(ii) Suggest acid W to prepare any **one** of the three magnesium salt in Diagram 8.
Write a chemical equation involved and describe a laboratory experiment to prepare the salt.
Cadangkan asid W *untuk menyediakan salah* ***satu*** *daripada tiga garam magnesium di Rajah* 8.
Tulis persamaan kimia yang terlibat dan huraikan eksperimen makmal untuk menyediakan garam itu.

[8 *marks*]

10 Mr. Ali is a rubber plantation entrepreneur. Rubber factory A wants to buy latex in liquid form while rubber factory B wants to buy latex in solid form to produce tyres.
En. Ali adalah seorang pengusaha ladang getah. Kilang getah A *mahu membeli lateks dalam bentuk cecair manakala kilang getah* B *mahu membeli lateks dalam bentuk pepejal untuk pembuatan tayar.*

Diagram 9 shows a flow chart to prepare the rubber for rubber factory A and rubber factory B by Mr. Ali.
Rajah 9 *menunjukkan carta alir untuk menyediakan getah bagi kilang getah* A *dan kilang getah* B *oleh En. Ali.*

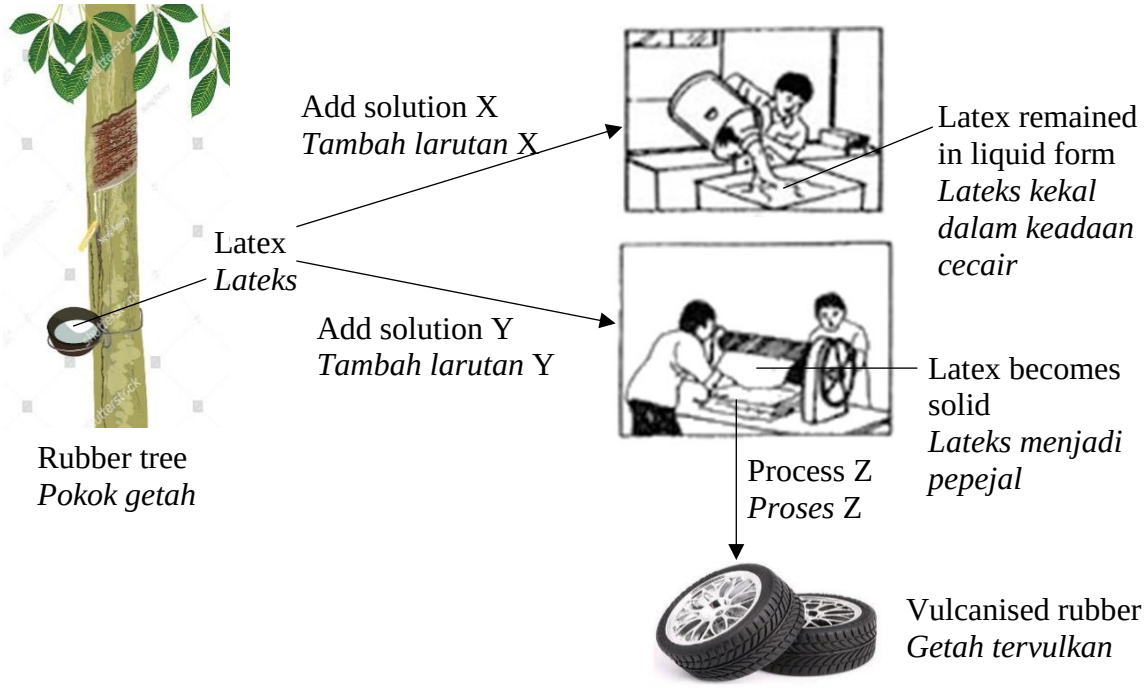


Diagram 9
Rajah 9

(a) (i) Based on the Diagram 9, suggest solution X, solution Y and process Z.
Berdasarkan Rajah 9, *cadangkan larutan* X, *larutan* Y *dan proses* Z.
[3 *marks*]

(ii) Explain
- why physical state of latex different when solution X and solution Y are added into fresh latex.
kenapa keadaan fizikal lateks berbeza apabila larutan X *dan larutan* Y *ditambahkan ke dalam lateks segar*.

- how process Z can increase the elasticity of natural rubber.
bagaimana proses Z *boleh meningkatkan kekenyalan getah asli*.
[9 *marks*]

(b)

Vulcanised rubber is more elastic than natural rubber. *Getah tervulkan lebih kenyal daripada getah asli.*

Describe an experiment to verify the above statement by listing the materials and apparatus.
Huraikan satu eksperimen untuk menentusahkan pernyataan di atas dengan menyenaraikan bahan dan radas.

[8 *marks*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

THE PERIODIC TABLE OF ELEMENTS

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

Proton number
Symbol
Name of element
Relative atomic mass

10 Ne Neon 20

58 Ce Cerium 140	59 Pr Praseo-dymium 141	60 Nd Neodymium 144	61 Pm Promethium 147	62 Sm Samarium 150	63 Eu Europium 152	64 Gd Gadolinium 157	65 Tb Terbium 159	66 Dy Dysprosium 163	67 Ho Holmium 165	68 Er Erbium 167	69 Tm Thulium 169	70 Yb Ytterbium 173	71 Lu Lutetium 175
90 Th Thorium 232	91 Pa Proactinium 231	92 U Uranium 238	93 Np Neptunium 237	94 Pu Pluronium 244	95 Am Americium 243	96 Cm Curium 247	97 Bk Berkelium 247	98 Cf Californium 249	99 Es Ein-steinium 254	100 Fm Fermium 253	101 Md Mendele-vium 256	102 No Nobelium 254	103 Lr Lawrensium 257

Reference: Chang, Raymond (1991). Chemistry. McGraw-Hill, Inc.

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of three sections: **Section** A, **Section B** and **Section** C.
Kertas peperiksaan 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 this question paper.
Jawab **semua** *soalan dalam* ***Bahagian* A.** *Jawapan anda bagi* Bahagian **A** *hendaklah ditulis pada ruang yang disediakan dalam kertas peperiksaan.*

3. Answer any **one** question from **Section B** and any **one** question from **Section C.** Write your answers for **Section B** and **Section** C on the 'helaian tambahan' provided by the invigilators. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answers.
Jawab 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, 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 dilukis mengikut skala kecuali dinyatakan.

5. Marks allocated for each question or sub-part of a question are shown in brackets.
Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.

6. Show your working. It may help you to get marks.
Tunjukkan kerja mengira. Ini membantu anda mendapatkan markah.

7. If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.
Jika anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baharu.

8. The Periodic Table of Elements is provided on page **24**.
Jadual Berkala Unsur disediakan di halaman **24**.

9. You may use a scientific calculator.
Anda dibenarkan menggunakan kalkulator saintifik.

10. You are advised to spend 90 minutes to answer questions in **Section A,** 30 minutes for **Section B** and 30 minutes for **Section** C.
Anda dinasihati supaya mengambil masa 90 *minit untuk menjawab soalan dalam* ***Bahagian* A,** 30 *minit untuk* ***Bahagian* B** *dan* 30 *minit untuk* ***Bahagian* C**.

11. Detach **Section B** and **Section** C from this question paper. Tie the "helaian tambahan" together with this question paper and hand in to the invigilator at the end of the examination.
Ceraikan Bahagian **B** *dan Bahagian* C *daripada kertas peperiksaan ini. Ikat helaian tambahan bersama-sama kertas peperiksaan ini dan serahkan kepada pengawas peperiksaan pada akhir peperiksaan.*

