

4541/2

Kimia

Kertas 2

SEPT 2024

2 ½ jam

NAMA : KELAS :



**PEPERIKSAAN PERCUBAAN SPM
TINGKATAN 5**

KIMIA
KERTAS 2

DUA JAM TIGA PULUH MINIT

**JANGAN BUKA KERTAS SOALAN INI SEHINGGA
DIBERITAHU**

1. Tuliskan nama dan tingkatan pada ruang yang disediakan.
2. Jawab **semua** soalan daripada **Bahagian A**. Tuliskan jawapan anda dalam ruang yang disediakan
3. Pilih **satu** soalan daripada **Bahagian B**
4. Jawab **semua** soalan daripada **Bahagian C**.
5. Jawapan **Bahagian B** dan **Bahagian C** hendaklah ditulis pada kertas tulis.
6. Anda diminta menjawab dengan lebih terperinci untuk Bahagian B dan Bahagian C. Persamaan, gambar rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda boleh digunakan.
7. Penggunaan kalkulator saintifik yang tidak boleh diprogramkan adalah dibenarkan

<i>Untuk Kegunaan Pemeriksa</i>			
Bahagian	Soalan	Markah penuh	Markah diperoleh
A	1	5	
	2	5	
	3	6	
	4	7	
	5	8	
	6	9	
	7	10	
	8	10	
B	9	20	
	10	20	
C	11	20	
Jumlah			

KERTAS SOALAN INI MENGANDUNGI 23 HALAMAN BERCETAK

Bahagian A
Section A

[60 markah/marks]

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

- 1 Rajah 1 menunjukkan satu pingat yang diperbuat daripada gangsa.
Diagram 1 shows a medal made of bronze.



Rajah 1 / Diagram 1

- (a) Namakan unsur yang ditambah kepada kuprum untuk membentuk gangsa.
Name the element added to copper to form bronze.

.....

[1 markah/mark]

- (b) Lukis susunan atom dalam gangsa.
Draw the arrangement of atoms in bronze.



[2 markah/marks]

- (c) Mengapakah gangsa adalah lebih sesuai untuk membuat pingat berbanding dengan kuprum?
Why is bronze more suitable for making medals compared to copper?

.....

[1 markah/mark]

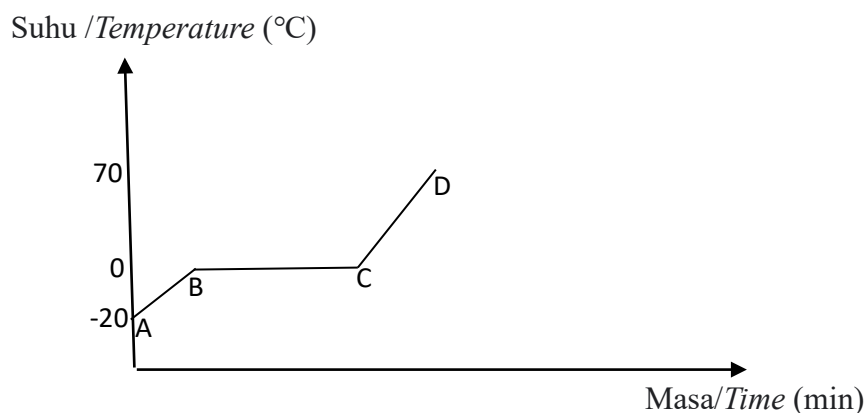
- (d) Namakan satu aloi lain bagi kuprum.
Name one other alloy of copper.

.....

[1 markah/mark]

- 2 Rajah 2 menunjukkan lengkung pemanasan pada ais.

Diagram 2 shows the heating curve on ice.



Rajah 2 / Diagram 2

- (a) Nyatakan jenis zarah dalam ais.

State the type of particles in ice.

.....

[1 markah/mark]

- (b) Apakah maksud takat lebur?

What is the meaning of melting point?

.....

.....

[1 markah/mark]

- (c) Nyatakan keadaan fizik bagi ais semasa proses peleburan.

State the physical state of ice during the melting process.

.....

[1 markah/mark]

- (d) Mengapakah suhu kekal malar di antara B dan C walaupun pemanasan diteruskan?

Why does the temperature remain constant between B and C even if the heating continues?

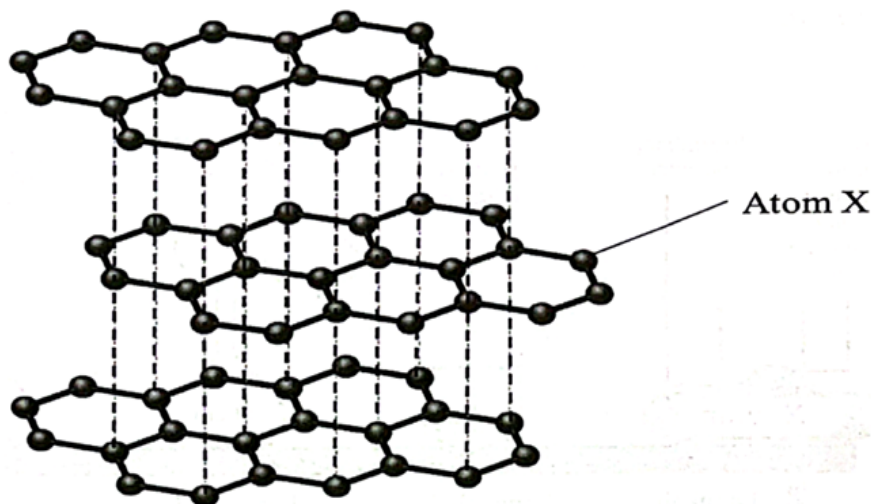
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.....

[2 markah/marks]

- 3 Rajah 3 menunjukkan struktur grafen yang digunakan dalam satu industri. Grafen adalah bahan yang terpenting dalam bidang nanosains dan nanoteknologi kerana saiznya yang berukuran 0.1 nm.

Diagram 3 shows the structure of graphene used in an industry. Graphene is an important material in the field of nanoscience and nanotechnology due to its 0.1 nm in size.



Rajah 3 / Diagram 3

- (a) Apakah maksud nanoteknologi?
What is the meaning of nanotechnology?

.....
.....

[1 markah/mark]

- (b) Namakan satu bidang yang menggunakan grafen.
Name one field that used graphene.

.....

[1 markah/mark]

- (c) Nyatakan satu sifat fizik bagi grafen.
State one physical property of graphene.

.....

[1 markah/mark]

- (d) Apakah ciri istimewa bagi grafen yang menjadikannya sesuai dalam penghasilan sensor?
What is the special characteristics of graphene that make it suitable for the production of sensors?

.....

[1 markah/mark]

- (e) Berdasarkan Rajah 3, namakan atom X dan jenis ikatan terbentuk.
Based on Diagram 3, name atom X and the type of bond formed.

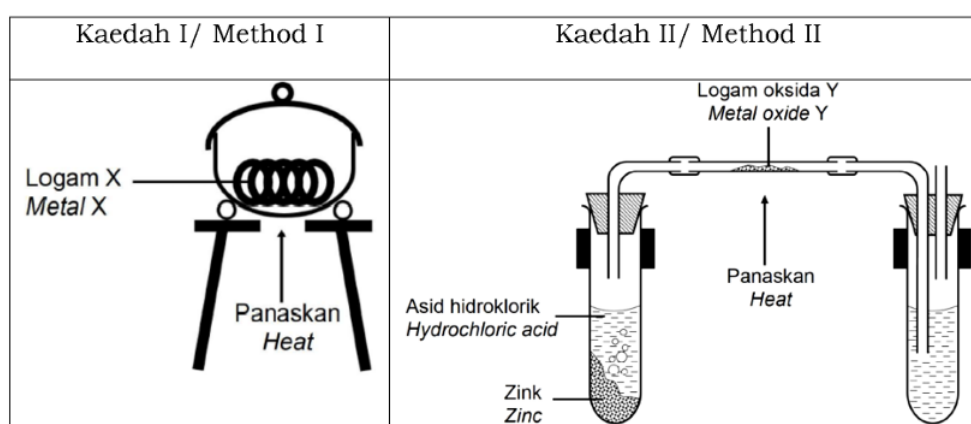
Nama atom X :
Name of atom X :

Jenis ikatan :
Type of bond :

[2 markah/marks]

- 4 Rajah 4 menunjukkan dua kaedah yang digunakan untuk menentukan formula empirik bagi oksida logam X dan oksida logam Y.

Diagram 4 shows two methods used to determine the empirical formula for metal oxide X and metal oxide Y.



Rajah 4 / Diagram 4

- (a) Apakah maksud formula empirik?
What is meant by empirical formula?

.....
.....

[1 markah/mark]

- (b) Berdasarkan Rajah 4, cadangkan kaedah yang manakah sesuai digunakan untuk menentukan formula empirik bagi
Based on figure 4, suggest which method is suitable to use to determine the empirical formula for

Magnesium oksida :
Magnesium oxide

Oksida plumbum :
Lead oxide

[2 markah/marks]

- (c) Jadual 1 menunjukkan maklumat yang diperolehi dari satu eksperimen menggunakan kaedah II dalam Rajah 4.

Table 1 shows the information obtained from an experiment using Method II in Diagram 4.

Perkara/ <i>Description</i>	Jisim/ <i>Mass (g)</i>
Salur kaca <i>Glass tube</i>	4.128
Salur kaca + oksida logam Y <i>Glass tube + oxide of metal Y</i>	4.318
Salur kaca + logam Y <i>Glass tube + metal Y</i>	4.280

Jadual 1 / *Table 1*

- (i) Tentukan formula empirik bagi oksida Y.
Determine the empirical formula for oxide Y.
 [Jisim atom relatif/ *Relative atomic mass* : O = 16, Y = 64]

[3 markah/marks]

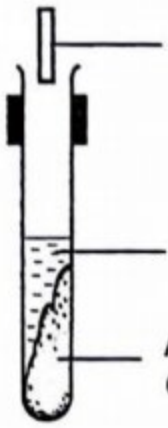
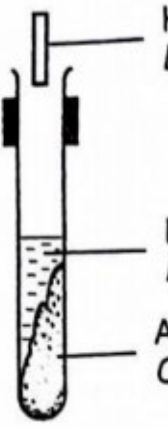
- (ii) Gas hidrogen dialirkan selama 10 saat sebelum pemanasan dimulakan. Jelaskan mengapa.
Hydrogen gas is flowed for 10 seconds before heating is started. Explain why.

.....

[1 markah/mark]

- 5 (a) Rajah 5 menunjukkan susunan radas yang digunakan dalam eksperimen untuk mengkaji sifat keasidan asid oksalik.

Diagram 5 shows the apparatus set up used in experiment to study the acidic properties of an oxalic acid.

Eksperimen Experiment	Susunan radas Apparatus set-up	Pemerhatian Observation
I	 Kertas litmus biru Blue litmus paper Air water Asid oksalik Oxalic acid	Kertas litmus biru bertukar merah Blue litmus paper turns red
II	 Kertas litmus biru Blue litmus paper Propanon Propanone Asid oksalik Oxalic acid	Tiada perubahan No change

Rajah 5 / Diagram 5

- (i) Nyatakan maksud asid.
State the meaning of acid.

.....

[1 markah / mark]

- (ii) Terangkan perbezaan bagi pemerhatian antara Eksperimen I dengan Eksperimen II.
Explain the differences in the observation between Experiment I and Experiment II.

.....

[1 markah / mark]

- (b) Asid A adalah asid monoprotik. Asid A yang telah dicelup dengan pH meter telah memberi bacaan pH 1.
Acid A is a monoprotic acid. Acid A that has been dipped with a pH meter has been giving a pH 1 reading.

- (i) Cadangkan asid A
Suggest acid A

.....
[1 markah / mark]

- (ii) 25 cm³ asid A melengkapkan peneutralan 50 cm³ 0.5 mol/dm³ larutan natrium hidroksida, NaOH. Dengan menggunakan asid A yang dinamakan di 5(b)(i), tulis persamaan kimia seimbang bagi tindak balas peneutralan itu.
Seterusnya tentukan kepekatan asid A.
25 cm³ of acid A completely neutralises 50 cm³ of 0.5 mol/dm³ sodium hydroxide solution, NaOH. By using the named of acid A at 5(b)(i), write a balanced chemical equation for the neutralisation reaction.
Next, determine the concentration of acid A.

[3 markah / marks]

- (c) Rajah 5.1 menunjukkan Sarah telah disengat oleh seekor lebah di lengannya semasa berada dikawasan rumahnya.
Diagram 5.1 shows Sarah was stung by a bee on her arm while in her home area.



Rajah 5.1 / Diagram 5.1

Cadangkan apakah bahan yang ada di rumah Sarah yang boleh digunakan untuk rawatan awal.

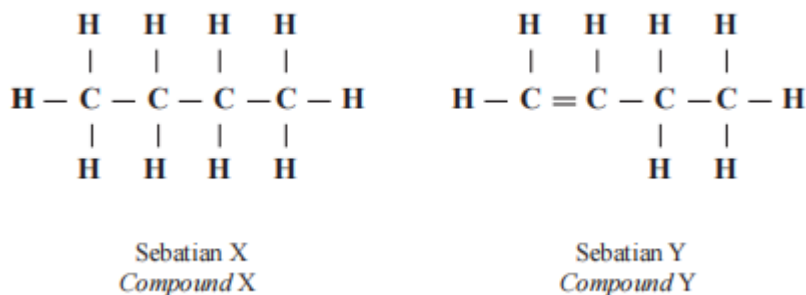
Wajarkan penggunaan bahan tersebut.

Suggest what materials Sarah has at home that can be used for initial treatment.

Justify the use of the material.

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

- 6 (a) Rajah 6.1 menunjukkan formula struktur bagi dua hidrokarbon
Diagram 6.1 shows the structural formulae of two hydrocarbons.



Rajah 6.1 / Diagram 6.1

- (i) Nyatakan maksud isomer.
State the meaning of isomer.

.....
 [1 markah / mark]

- (ii) Nyatakan nama sebatian X dan sebatian Y dengan menggunakan penamaan IUPAC.
State the names of compound X and compound Y by using IUPAC nomenclature.

Sebatian X :
 Compound X

Sebatian Y :
 Compound Y

[2 markah / marks]

- (iii) Lukis formula struktur untuk satu lagi isomer sebatian X.
Draw the structural formula for another isomer of compound X.

[1 markah / mark]

- (b) (i) Hidrokarbon X dan Y menghasilkan jelaga apabila terbakar.
 Bandingkan kejelagaan nyalaan semasa pembakaran hidrokarbon X dan Y dalam keadaan gas oksigen berlebihan.
Hydrocarbon X and Y produce soot when burnt.
Compare the sootiness of the flame during combustion of hydrocarbon X and Y in excess of oxygen gas.

.....

 [1 markah / mark]

- (ii) Terangkan mengapa terdapat perbezaan kejelagaan hidrokarbon X dan Y?

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

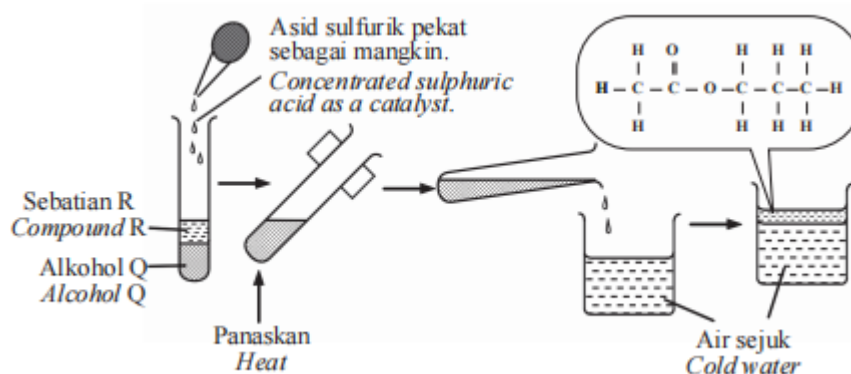
Explain why there is a difference in the sootiness of the flame of hydrocarbon X and hydrocarbon Y?

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

[2 markah / marks]

- (c) Pengusaha sebuah kilang gula-gula ingin mengeluarkan gula-gula berperisa pir. Seorang ahli kimia di kilang tersebut diarahkan untuk menyediakan satu sampel ester dengan perisa pir melalui tindak balas pengesteran antara alkohol Q dengan sebatian R. Rajah 6.1 menunjukkan langkah penyediaan sampel ester tersebut di dalam makmal.

The owner of a candy factory wants to manufacture pear flavoured candies. A chemist in the factory is instructed to prepare a sample of ester with pear flavour through the esterification reaction between alcohol Q and compound R. Diagram 6.1 shows the steps of preparation for the sample of the ester in the laboratory.



Rajah 6.2 / Diagram 6.2

Berdasarkan Rajah 6.2,
Based on the Diagram 6.2,

- (i) Tulis satu persamaan kimia bagi tindak balas pengesteran antara alkohol Q dengan sebatian R.

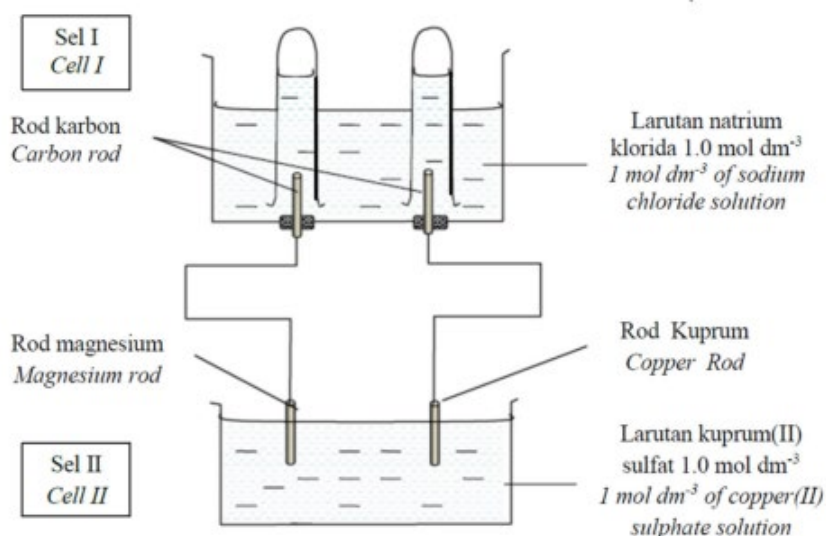
Write a chemical equation for the esterification reaction between alcohol Q and compound R.

.....
[1 markah / mark]

- (ii) Wajarkan penggunaan ester dalam gula-gula.
Justify the usage of ester in candy.

.....
[1 markah / mark]

- 7 Rajah 7 menunjukkan gabungan satu sel kimia dengan satu sel elektrolisis.
 Diagram 7 shows the combination between a chemical cell and an electrolytic cell.



Rajah 7 / Diagram 7

- (a) Apakah maksud elektrolisis?
 What is the meaning of electrolysis?

[1 markah/mark]

- (b) Merujuk kepada Sel I,
 Referring to Cell I,
 (i) nyatakan semua ion yang hadir dalam larutan natrium klorida.
 state all the ions present in the sodium chloride solution.

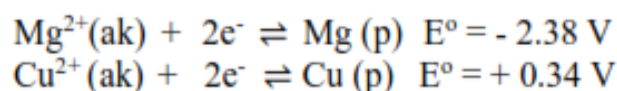
[1 markah/mark]

- (ii) nyatakan pemerhatian di anod.
 state the observation at anode.

[1 markah/mark]



- (c) Merujuk kepada Sel II dan keupayaan elektrod piawai, E° bagi setengah sel di bawah:
Referring to Cell II and standard electrode potential, E° of the half cell below :



kenal pasti terminal negatif dan terminal positif bagi sel tersebut.
identify the negative terminal and positive terminal of the cell.

- (i) terminal negatif/ *negative terminal*

.....
 [1 markah/mark]

- (ii) terminal positif/ *positive terminal* :

.....
 [1 markah/mark]

- (d) (i) Ubahsuai Sel II di Rajah 7 supaya dapat berfungsi sebagai sel Daniell. Anda dibekalkan dengan bahan tambahan iaitu larutan magnesium sulfat 1.0 moldm^{-3} dan larutan asid sulfurik 1.0 moldm^{-3} beserta radas lain bersesuaian.
Modify Cell II in Diagram 7 so that it can function as a Daniell cell. You are supplied with additional materials which are magnesium sulphate solution 1.0 moldm^{-3} and sulfuric acid solution 1.0 moldm^{-3} along with other appropriate apparatus.

[2 markah/marks]

- (ii) tuliskan notasi sel dan hitungkan voltan sel bagi sel Daniell dalam (d)(i).
write the cell notation and calculate the cell voltage for Daniell cell in (d)(i).

Notasi sel :
Cell notation

Voltan sel :
Cell voltage

[3 markah/ marks]

- 8 Jadual 2 menunjukkan maklumat bagi eksperimen I, eksperimen II dan eksperimen III.
Table 2 shows the information of experiment I, experiment II and experiment III.

Eksperimen <i>Experiment</i>	Keadaan bahan tindak balas <i>Condition of reactants</i>	Masa yang di ambil untuk mengumpul 40 cm ³ gas (s) <i>Time taken to collect 40 cm³ of gas (s)</i>
I	Ketulan zink berlebihan + 25 cm ³ asid hidroklorik 0.2 mol dm ⁻³ <i>Excess zinc granules + 25 cm³ of 0.2 mol dm⁻³ hydrochloric acid</i>	90
II	Serbuk zink berlebihan + 25 cm ³ asid hidroklorik 0.2 mol dm ⁻³ <i>Excess zinc powder + 25 cm³ of 0.2 mol dm⁻³ hydrochloric acid</i>	55
III	Serbuk zink berlebihan + 25 cm ³ asid hidroklorik 0.2 mol dm ⁻³ + larutan kuprum(II) sulfat <i>Excess zinc powder + 25 cm³ of 0.2 mol dm⁻³ hydrochloric acid + copper(II) sulphate solution</i>	30

Jadual 2 / Table 2

Berdasarkan maklumat yang diberikan dalam Jadual 2:
Based on the information given in Table 2:

- (a) Nyatakan maksud kadar tindak balas dalam eksperimen ini.
State the meaning of rate of reaction for this experiment.

.....
 [1 markah/mark]

- (b) (i) Eksperimen yang manakah menunjukkan kadar tindak balas paling tinggi?
Which experiment shows the highest rate of reaction?

.....
 [1 markah/mark]

- (ii) Hitung kadar tindak balas di b(i).
Calculate average rate of reaction in b(i).

[1 markah/mark]

- (c) Nyatakan faktor yang mempengaruhi kadar tindak balas bagi eksperimen II dan III.
State the factor that influence the rate of reaction for experiment III.

.....
[1 markah/mark]

- (d) Tulis persamaan kimia bagi tindak balas antara zink dan asid hidroklorik.
Write the chemical equation for the reaction between zinc and hydrochloric acid.

.....
[2 markah/marks]

- (e) Bandingkan kadar tindak balas bagi eksperimen I dan eksperimen II.
Dengan menggunakan teori pelanggaran,terangkan jawapan anda.
Compare the rate of reaction for experiment I and experiment II.By using collision theory, explain your answer.

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

[4 markah/marks]

Bahagian B
Section B
[20 markah/marks]

Jawab mana-mana **satu** soalan dalam bahagian ini.
Answer any **one** question in this section.

- 9 Rajah 8 menunjukkan gambar rajah aras tenaga bagi dua tindak balas pemendakan.
Diagram 8 shows energy level diagrams for two sets of precipitation reaction.

Set Set	Gambar rajah aras tenaga Energy level diagram
I	Tenaga Energy $2\text{NaCl} + \text{Pb}(\text{NO}_3)_2$ $\Delta H = -x \text{ kJmol}^{-1}$ $\text{PbCl}_2 + 2\text{NaNO}_3$
II	Tenaga Energy $\text{K}_2\text{CO}_3 + \text{MgCl}_2$ $\Delta H = +23.1 \text{ kJmol}^{-1}$ $\text{MgCO}_3 + 2\text{KCl}$

Rajah 8/ Diagram 8

- (a) Berdasarkan Rajah 8,
Based on Diagram 8.

- (i) Tindak balas yang manakah membebaskan tenaga haba ke persekitaran semasa tindak balas berlaku? Terangkan.
Which reaction release heat energy to the surrounding during the reaction?
Explain.

[2 markah/marks]

- (ii) Dalam Set I, apabila 50 cm^3 larutan natrium klorida 1.0 mol dm^{-3} ditambahkan kepada 50 cm^3 larutan plumbum(II) nitrat 1.0 mol dm^{-3} , suhu meningkat sebanyak 3.5°C .
Tentukan bahan tindak balas yang manakah berlebihan. Hitungkan nilai x.
[Ketumpatan air = 1.0 g cm^{-3} , muatan haba tentu air, $c = 4.2 \text{ Jg}^{-1}\text{C}^{-1}$]

In Set I, when 50 cm³ of 1.0 mol dm⁻³ sodium chloride solution is added into 50 cm³ of 1.0 mol dm⁻³ lead (II) nitrate solution, temperature increases by 3.5°C. Determine which reactant is in excess. Calculate the value of x. [Density of water = 1.0 g cm⁻³, specific heat capacity of water, c = 4.2 Jg⁻¹ °C⁻¹]

[5 markah/marks]

- (iii) Ahmad menjalankan eksperimen Set II dengan menambahkan 50 cm³ larutan kalium karbonat 1.0 mol dm⁻³ ke dalam 50 cm³ larutan magnesium klorida 1.0 mol dm⁻³. Perubahan suhu dicatat dan seterusnya haba pemendakan bagi eksperimen tersebut dihitung. Akan tetapi, nilai haba pemendakan yang diperoleh tidak sama seperti dalam Rajah 8..
Nyatakan maksud haba pemendakan dan terangkan mengapa nilai haba pemendakan ini berbeza? Tuliskan persamaan termokimia bagi tindak balas ini. Nyatakan warna mendakan yang terbentuk dalam tindak balas ini.
Ahmad conducted the experiment in Set II by adding 50 cm³ of 1.0 mol dm⁻³ potassium carbonate solution into 50 cm³ of 1.0 mol dm⁻³ magnesium chloride solution. The temperature change is recorded and then the heat of precipitation for the reaction is calculated. However, the value of heat of precipitation obtained is not the same as in Diagram 14.
State the meaning of heat of precipitation and explain why these heat values of precipitation are different? Write a thermochemical equation for the reaction. State the colour of precipitate formed in this reaction.

[5 markah/marks]

- (b) Jadual 3 menunjukkan bahan tindak balas yang digunakan oleh Jeffrey semasa menjalankan eksperimen untuk menentukan haba penyesaran kuprum.
Table 3 shows the reactants used by Jeffrey when carrying out an experiment to determine the heat of displacement of copper.

Set Set	Bahan tindak balas Reactants
I	Serbuk magnesium berlebihan + 50 cm ³ larutan kuprum(II) nitrat 0.5 mol dm ⁻³ <i>Excess magnesium powder + 50 cm³ of 0.5 mol dm⁻³ copper(II) nitrate solution</i>
II	Serbuk ferum berlebihan + 50 cm ³ larutan kuprum(II) nitrat 0.5 mol dm ⁻³ <i>Excess iron powder + 50 cm³ of 0.5 mol dm⁻³ copper(II) nitrate solution</i>

Jadual 3/Table 3

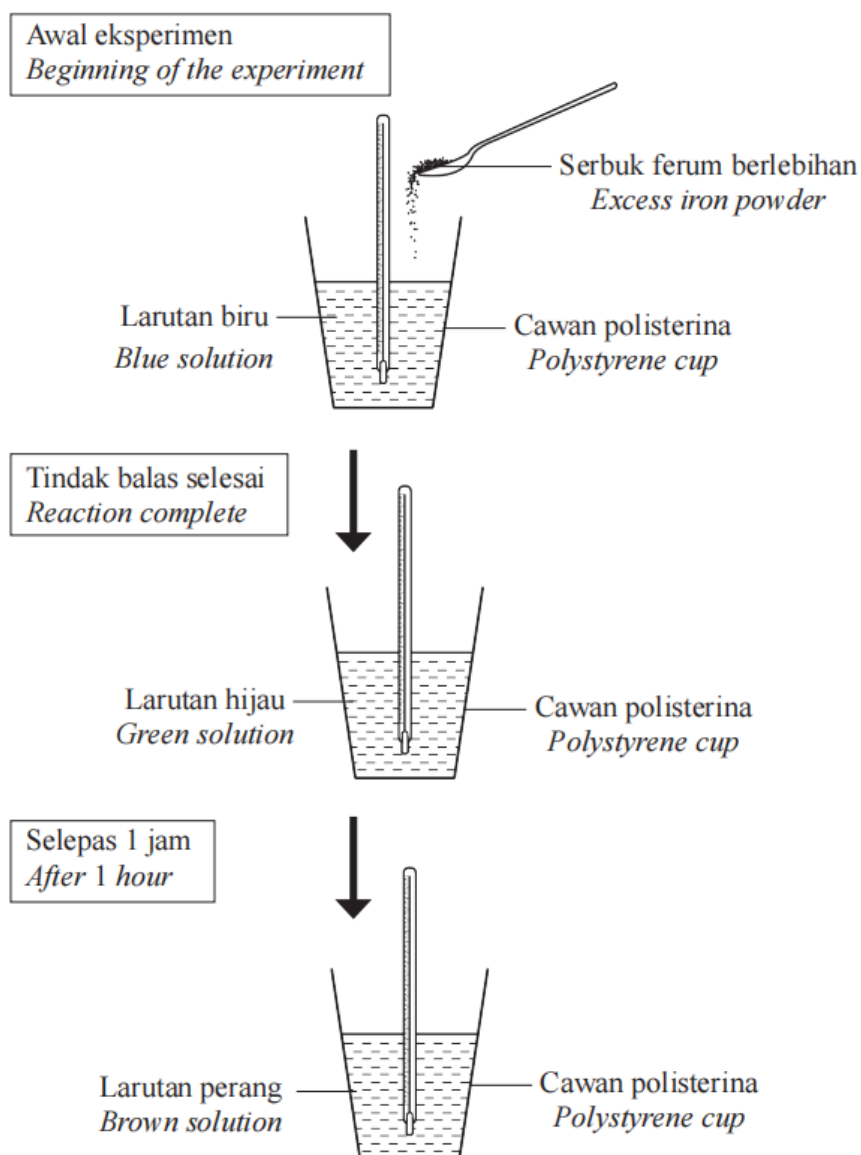
- (i) Nyatakan dua pemerhatian daripada Set I.
State two observations from Set I.
- (ii) Bandingkan haba penyesaran Set I dan Set II. Terangkan.
Compare the heat of displacement of Set I and Set II. Explain.

[2 markah/marks]

[2 markah/marks]

- (iii) Rajah 15 menunjukkan perubahan warna larutan dalam Set II selepas tindak balas selesai.

Diagram 15 shows the colour change of solution in Set II after the reaction complete.

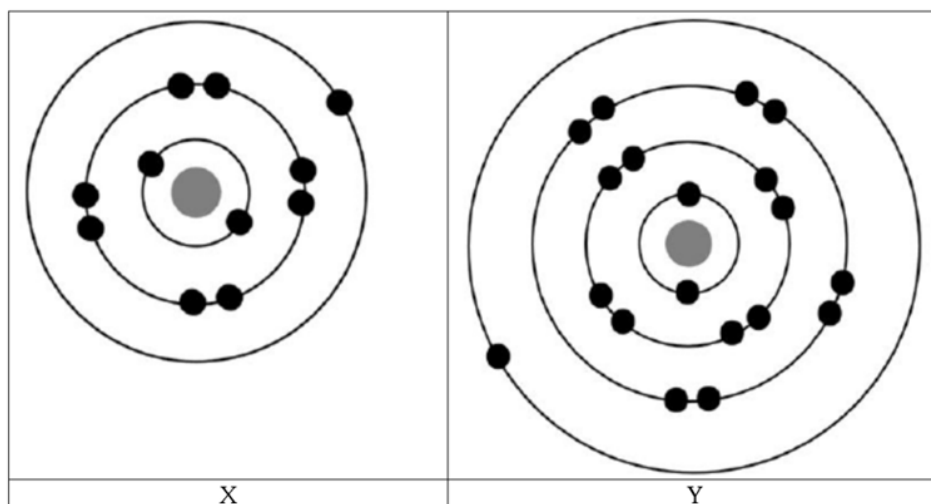


Rajah 9 / Diagram 9

Terangkan perubahan warna larutan ini.
Explain the colour change of the solution.

[4 markah]

- 10 (a) Rajah 10.1 menunjukkan susunan elektron bagi atom unsur X dan unsur Y yang terletak dalam kumpulan yang sama dalam Jadual Berkala Unsur.
Diagram 10.1 shows the electron arrangement for atoms of element X and element Y which are located in the same group in the Periodic Table of Elements.



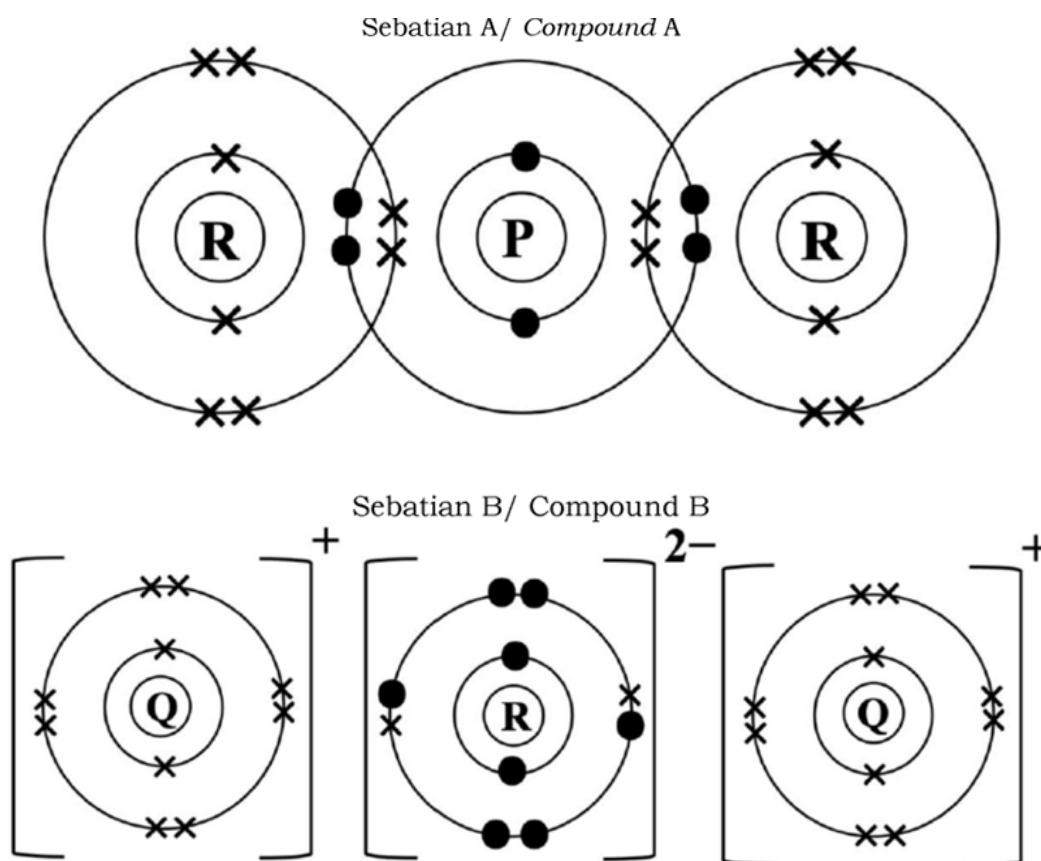
Rajah 10.1 / Diagram 10.1

Berdasarkan Rajah 10.1, / Based on Diagram 10.1,

- (i) Nyatakan maksud bagi elektron valens dan nyatakan kumpulan di mana terletakinya unsur X dan unsur Y dalam Jadual Berkala Unsur.
State the meaning of valence electron and state the group where element X and element Y are located in the Periodic table of Elements.
 [2 markah / marks]
- (ii) Tulis persamaan kimia bagi tindak balas antara unsur X dan gas oksigen. Hitung jisim hasil tindak balas yang diperoleh jika 1200 cm³ gas oksigen digunakan dalam tindak balas tersebut.
Write the chemical equation for the reaction between element X and oxygen gas. Calculate the mass of the product obtained if 1200 cm³ of oxygen gas is used in the reaction.
 [Jisim atom relatif : O = 16, X = 23; Isipadu molar gas pada keadaan bilik = 24 dm³mol⁻¹]
 [Relative atomic mass : O = 16, X = 23; Molar volume of gas at room condition = 24 dm³mol⁻¹]
 [5 markah / marks]
- (iii) Unsur X dan unsur Y menunjukkan sifat kimia yang sama tetapi dengan kereaktifan yang berbeza. Bandingkan kereaktifan unsur X dan unsur Y. Terangkan jawapan anda.
Element X and element Y shows the same chemical properties but with different reactivity. Compare the reactivity of element X and element Y. Explain your answer.

[3 markah / marks]

- (b) Rajah 10.2 menunjukkan susunan elektron bagi sebatian A dan sebatian B.
Diagram 10.2 shows the electron arrangement of compound A and compound B.



Rajah 10.2 / Diagram 10.2

Berdasarkan Rajah 10.2, / Based on Diagram 10.2,

- (i) Apakah maksud bagi kation?
What is the meaning of cation?

[1 markah / mark]

- (ii) Unsur R bertindak balas dengan unsur P membentuk sebatian A manakala membentuk sebatian B apabila ia bertindak balas dengan unsur Q. Tentukan jenis ikatan yang terbentuk dalam sebatian A dan sebatian B. Terangkan pembentukan bagi salah satu sebatian sama ada sebatian A atau sebatian B
Element R reacts with element P to form compound A while compound B is formed when it reacts with element Q. Determine the type of bond formed in compound A and compound B. Explain the formation of one of the compounds either compound A or compound B.

[7 markah / marks]

- (iii) Takat lebur sebatian B adalah lebih tinggi daripada sebatian A. Terangkan mengapa.
The melting point of compound B is higher than compound A. Explain why.

[2 markah / marks]

Bahagian C
Section C
[20 markah/marks]

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

- 11 (a) Rajah 11.1 menunjukkan ubat gigi yang digunakan untuk menjaga kesihatan gigi.
Diagram 11.1 shows the toothpaste used to take care of dental health.



Rajah 11.1 / Diagram 11.1

- (i) Apakah maksud peneutralan?
What is the meaning of neutralisation?

[1 markah / mark]

- (ii) Bagaimana ubat gigi dalam Rajah 11.1 dapat membantu untuk menjaga kesihatan gigi?
How can the toothpaste in Diagram 11.1 help to take care of dental health?

[2 markah / marks]

- (b) Rajah 11.2 menunjukkan pepejal natrium hidroksida.
Diagram 11.2 shows sodium hydroxide pellet.



Rajah 11.2 / Diagram 11.2

Suatu sampel pepejal natrium hidroksida, NaOH dilarutkan dalam air suling untuk menyediakan 100 cm³ larutan berkepekatan 0.5 mol dm⁻³ dengan nilai pH 13.7. Hitungkan jisim natrium hidroksida yang perlu digunakan.

Kemudian, larutan tersebut dicairkan bagi menghasilkan larutan baharu berkepekatan 0.1 mol dm⁻³ dengan nilai pH 13. Hitung isipadu air suling yang perlu ditambah ke dalam larutan tersebut.

[Jisim atom relatif: H = 1, O = 16, Na = 23]

A sample of solid sodium hydroxide, NaOH is dissolved in distilled water to prepare 100 cm³ of 0.5 mol dm⁻³ solution with pH value of 13.7. Calculate the mass of sodium hydroxide dissolved.

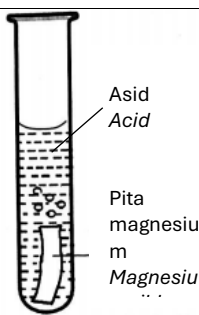
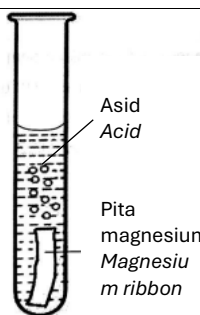
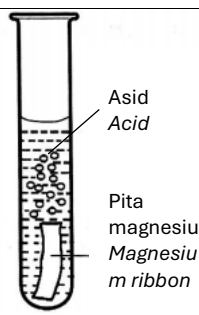
Then, the solution is diluted to produce a new solution with a concentration of 0.1 mol dm^{-3} with a pH value of 13. Calculate the volume of distilled water that needs to be added to the solution.

[Relative atomic mass: $H = 1$, $O = 16$, $Na = 23$]

[4 markah / marks]

- (c) Tiga keping pita magnesium yang berukuran 3 cm telah dimasukkan ke dalam tiga jenis asid berlainan yang berkepekatan 1.0 mol dm^{-3} . Jadual 4 menunjukkan keputusan eksperimen.

Three pieces of 3 cm magnesium ribbon were inserted into three different types of acid with a concentration of 1.0 mol dm^{-3} . Table 4 shows the experimental results.

Asid Acid	P	Q	R
Pemerhatian Observation			
Masa untuk tindak balas selesai (min) Time taken for the reaction to complete (min)	11.0	3.0	1.5

Jadual 4 / Table 4

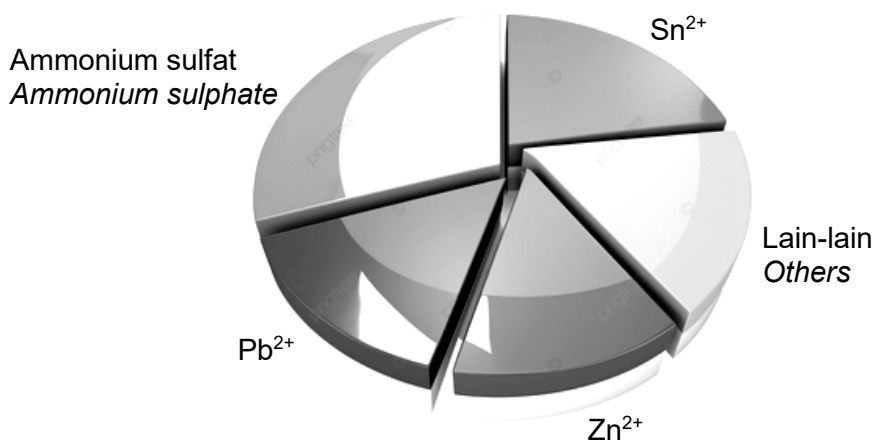
Pada pendapat anda, mengapa terdapat perbezaan pemerhatian bagi tindak balas di atas? Berikan contoh yang sesuai bagi asid P dan R.

In your opinion, why there are differences in the above observations for the reactions? Give suitable examples of acids P and R.

[5 markah / marks]

- (d) Rajah 11.3 menunjukkan carta pai jenis mineral dan kandungannya dalam air lombong bijih timah T.

Diagram 11.3 shows a pie chart of type of mineral and its content in the water of tin mines T.



Rajah 11.3 / Diagram 11.3

T adalah lombong bijih timah yang telah berhenti beroperasi. T terletak berhampiran kawasan pertanian. Air daripada lombong ini berbau sengit dan tidak selamat untuk diminum kerana mengandungi logam berat dan baja daripada kawasan pertanian akibat daripada proses larut lesap serta membentuk enapan.

T is a tin mine that has ceased to operate. T is located near an agricultural area. Water from this mine is smells pungent and not safe to drink because it contains heavy metals and fertilizer from agricultural areas as a result of leaching and sediment is formed.

Pada pendapat anda, mengapakah air tersebut berbau sengit dan apakah nama bahan yang terkandung di dalam enapan tersebut? Bagaimanakah anda ingin membuktikan bahawa air tersebut mengandungi ion-ion yang membentuk sebatian seperti yang anda nyatakan di dalam enapan dan dalam bahan yang menyebabkan air berbau busuk?

In your opinion, why is the water smells pungent and what is the name of the substance contained in the sediment? How do you want to prove that the water contains the ions that form the compound you specify in the sediment and in the substance that cause the water to stink?

[8 markah / marks]

SOALAN TAMAT
END OF THE QUESTIONS

The diagram shows a 3D box representing a hydrogen atom. Inside the box, there is a smaller box labeled 'H' with 'Hydrogen' written below it. To the left of the 'H' box is a label '1' with an arrow pointing to it. To the right of the 'H' box is a label '1' with an arrow pointing to it. Below the 'H' box is a label '1' with an arrow pointing to it. The labels are: Nombor proton (Proton number), Nama unsur (Element name), and Jisim atom relatif (Relative atomic mass).

Kala	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1	1 H Hydrogen																	2 He Helium	
2	3 Li Lithium	4 Be Beryllium												5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oksigen	9 F Fluorin	10 Ne Neon
3	11 Na Natrium	12 Mg Magnesium												13 Al Aluminium	14 Si Silikon	15 P Phosphorus	16 S Sulfur	17 Cl Klorin	18 Ar Argon
4	19 K Kalium	20 Ca Kalsium	21 Sc Skandium	22 Ti Titanium	23 V Vanadium	24 Cr Kromium	25 Mn Mangan	26 Fe Besi	27 Co Kobalt	28 Ni Nikel	29 Cu Kuprum	30 Zn Zink		31 Ga Gallium	32 Ge Germanium	33 As Arsenik	34 Se Selenium	35 Br Bromin	36 Kr Krypton
5	37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirkonium	41 Nb Niobium	42 Mo Molibdenum	43 Tc Teknium	44 Ru Rutenium	45 Rh Rodium	46 Pd Paladium	47 Ag Perak	48 Cd Kadmium		49 In Indium	50 Sn Stannum	51 Sb Antimoni	52 Te Telur	53 I Iodin	54 Xe Xenon
6	55 Cs Sesium	56 Ba Barium	57 - 71 Lantanida	72 Hf Hafnium	73 Ta Tantalum	74 W Wolfram	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Emas	80 Hg Raksa		81 Tl Thallium	82 Pb Timah	83 Bi Bismut	84 Po Polonium	85 At Astatin	86 Rn Radon
7	87 Fr Francium	88 Ra Radium	89 - 103 Aktinida	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium	110 Ds Darmstadtium	111 Rg Roentgenium	112 Cn Copernicium		113 Nh Nihonium	114 Fl Flerovium	115 Mc Moscovium	116 Lv Livermorium	117 Ts Tennessine	118 Og Oganesson