

Nama :

Tingkatan :

4541/2
Kimia
Kertas 2
2021
2 ½ jam



MODUL ULANGKAJI KECEMERLANGAN BERFOKUS SPM 2021

KIMIA

Kertas 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. Kertas soalan ini adalah dalam dwibahasa.
2. Soalan dalam bahasa Melayu mendahului soalan yang sepadan dalam Bahasa Inggeris.
3. Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Melayu atau bahasa Inggeris.
4. Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.
5. Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.

<i>Untuk Kegunaan Pemeriksa</i>			
Kod Pemeriksa:			
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 modul ini mengandungi 26 halaman bercetak dan 2 halaman tidak bercetak

Bahagian A
Section A
[60 markah]
[60 marks]

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

- 1 Rajah 1 menunjukkan Jadual Berkala Unsur. Huruf yang digunakan bukan simbol sebenar untuk unsur-unsur tersebut.

Diagram 1 shows a Periodic Table of Elements. The letter used are not the actual atomic symbols for the elements.

	P																			
	S																			T
				U																

Rajah 1
Diagram 1

Berdasarkan Rajah 1,
Based on Diagram 1,

- (a) Apakah maksud kala?

What is the meaning of period?

.....

[1 markah]

[1 mark]

- (b) Apakah prinsip asas yang digunakan dalam penyusunan unsur-unsur dalam Jadual Berkala Unsur?

What is the basic principle used in arranging the elements in the Periodic Table of Elements?

.....

[1 markah]

[1 mark]

- (c) Unsur T ialah argon, namakan kumpulan bagi unsur T.

Element T is argon, name the group of T.

.....

[1 markah]

[1 mark]

- (d) Unsur manakah mempunyai sifat kimia yang sama? Berikan alasan jawapan anda.

Which elements have the same chemical properties? Give a reason for your answer.

.....

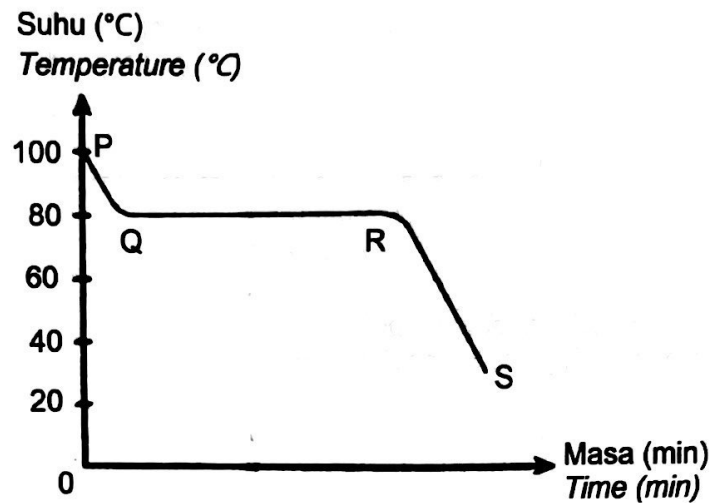
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[2 markah]

[2 marks]

- 2 Rajah 2 menunjukkan graf suhu melawan masa bagi penyejukan asetamida, C_2H_5NO dalam suatu eksperimen.

Diagram 2 shows the graph of temperature against time for cooling of acetamide, C_2H_5NO in an experiment.



Rajah 2
Diagram 2

- (a) Apakah yang dimaksudkan dengan takat beku?
What is the meaning of freezing point?

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

- (b) Nyatakan takat beku bagi asetamida dalam eksperimen ini.
State the freezing point of acetamide in this experiment.

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

- (c) Nyatakan jenis zarah bagi asetamida.
State the type of particle for acetamide.

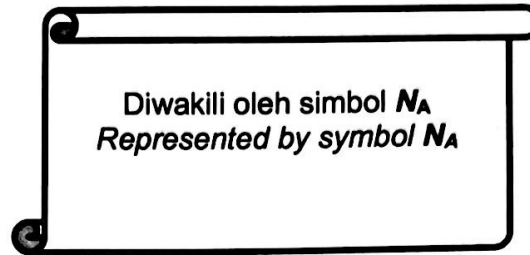
.....
[1 markah]
[1 mark]

- (d) Terangkan mengapa suhu tidak berubah dari titik Q ke titik R.
Explain why there is no change in temperature from point Q to point R.

.....
[2 markah]
[2 mark]

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- 3 Rajah 3 menunjukkan maklumat tentang mol.
Diagram 3 shows information about mole.



Rajah 3
Diagram 3

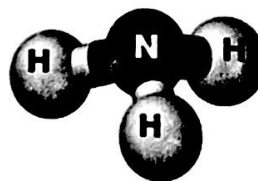
- (a) Apakah yang diwakili dengan simbol di atas.
What is represented by the symbol above.

[1 markah]
[1 mark]

- (b) Nyatakan hubungan antara bilangan mol dengan bilangan zarah.
State the relationship between the number of moles and the number of particles.

[1 markah]
[1 mark]

- (c) Rajah 3.1 menunjukkan formula struktur satu gas pada suhu bilik yang tidak berwarna, mempunyai bau yang menyengat, dan boleh menyebabkan tercekik.
Diagram 3.1 shows a structural formula of a gas at room temperature which is colourless, highly irritating gas with a pungent, and suffocating odour.



Rajah 3.1
Diagram 3.1

- (i) Apakah isi padu untuk 0.01 mol gas tersebut pada suhu bilik dalam cm^3 ?
[Isi padu molar gas pada suhu bilik = $24 \text{ dm}^3 \text{ mol}^{-1}$]
*What is the volume for 0.01 mol of the gas at room temperature in cm^3 ?
[Molar volume = $24 \text{ dm}^3 \text{ mol}^{-1}$ at room temperature]*

[1 markah]
[1 mark]

- (ii) Berapakah bilangan molekul dalam gas di atas?
[Pemalar Avogadro = $6.02 \times 10^{23} \text{ mol}^{-1}$]
How many molecules are there in the gas above?
[Avogadro's constant = $6.02 \times 10^{23} \text{ mol}^{-1}$]

[1 markah]

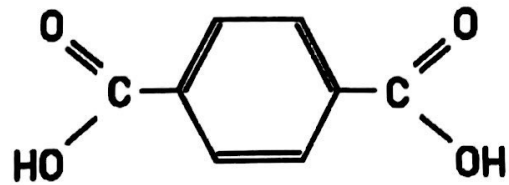
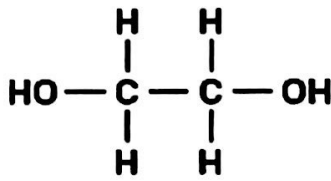
[1 mark]

- (d) Pentana, C_5H_{12} terbakar dengan lengkap dalam oksigen untuk menghasilkan karbon dioksida dan air.
Tuliskan persamaan kimia seimbang bagi tindak balas ini.
Pentane, C_5H_{12} burns completely in oxygen to produce carbon dioxide and water.
Write a balanced chemical equation for this reaction.
-

[2 markah]

[2 marks]

- 4 Rajah 4 menunjukkan monomer-monomer bagi terilena.
Diagram 4 shows the monomers of terylene.



Rajah 4
Diagram 4

- (a) Apakah jenis pempolimeran bagi terilena?
What type of polymerisation for terylene?

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

- (b) (i) Lukiskan formula struktur bagi polimer yang terbentuk dari monomer-monomer tersebut.
Draw the structural formula of the polymer that is formed by these two monomers.

- (ii) Terangkan mengapa polimer yang terbentuk di (b)(i) juga dinamakan polyester.
Explain why polymer formed in (b)(i) also named as polyester.

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

- (c) Terilena digunakan secara meluas dalam industri tekstil. Namun pencemaran sumber air telah berlaku disebabkan pembuangan air sisa.
Terylene is widely used in the textile industry. However, water pollution has occurred due to wastewater disposal.

- (i) Terangkan impak terhadap alam sekitar sekiranya air sisa tidak diuruskan dengan baik.
Explain the impact on the environment if wastewater is not well managed.

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

- (ii) Penggunaan pewarna dalam industri batik telah menyebabkan pencemaran air sungai. Bagaimanakah masalah itu dapat diatasi dengan menggunakan konsep teknologi hijau?

The use of dyes in batik industry in has caused the river pollution. How to solve the problem by using the green technology concept?

.....

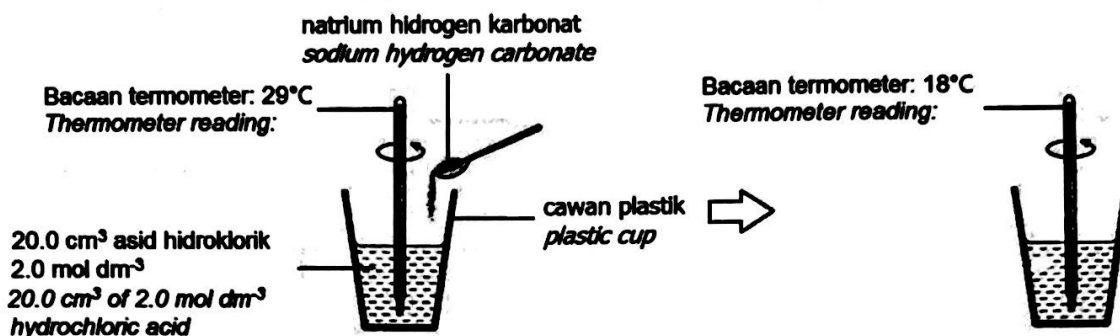
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.....

.....

[2 markah]
[2 marks]

5. Rajah 5 menunjukkan susunan radas yang digunakan untuk menentukan haba tindak balas di antara natrium hidrogen karbonat, NaHCO_3 dengan asid hidroklorik, HCl .
Diagram 5 shows the apparatus set-up used to determine the heat of reaction between sodium hydrogen carbonate, NaHCO_3 and hydrochloric acid, HCl .



Rajah 5
Diagram 5

20.0 cm³ asid hidroklorik 2.0 mol dm⁻³ dituang ke dalam sebuah cawan plastik. Suhu awal larutan asid hidroklorik direkodkan. Kemudian satu spatula serbuk natrium hidrogen karbonat, NaHCO_3 ditambah kepada asid itu. Campuran dikacau dan suhu akhir direkodkan.
20.0 cm³ of 2.0 mol dm⁻³ hydrochloric acid is poured into a plastic cup. The initial temperature of hydrochloric acid is recorded. Then, one spatula of sodium hydrogen carbonate, NaHCO_3 powder is added into the acid. The mixture is stirred and the final temperature is recorded.

Persamaan kimia tindak balas I:
Chemical equation for reaction I:



- (a) Nyatakan satu sebab mengapa cawan plastik digunakan dalam eksperimen ini.
State one reason why plastic cup is used in this experiment.

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

- (b) Nyatakan jenis tindak balas yang berlaku berdasarkan perubahan suhu.
State the type of reaction occurred based on the change in temperature.

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

(c) Berdasarkan maklumat dan keputusan eksperimen:

Based on the informations and results of experiment:

(i) Hitungkan perubahan haba, Q bagi tindak balas ini.

Calculate the heat change, Q for this reaction.

[Muatan haba tentu larutan, $c = 4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$; ketumpatan larutan = 1 g cm^{-3}]

[*Specific heat capacity of solution, $c = 4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$; ketumpatan larutan = 1 g cm^{-3}*]

[1 markah]

[1 mark]

(ii) Hitung haba tindak balas, ΔH bagi tindak balas ini.

Calculate the heat of reaction, ΔH for this reaction.

[3 markah]

[3 marks]

- (d) Eksperimen ini kemudiannya diulangi dengan menggunakan serbuk natrium karbonat, Na_2CO_3 bagi menggantikan serbuk natrium hidrogen karbonat, NaHCO_3 .
The experiment is then repeated using sodium carbonate, Na_2CO_3 powder to replace sodium hydrogen carbonate, NaHCO_3 powder.

Persamaan kimia tindak balas II:

Chemical equation for reaction II:



Haba tindak balas, ΔH yang diperoleh adalah $-36.0 \text{ kJ mol}^{-1}$.

The heat of reaction, ΔH obtained is $-36.0 \text{ kJ mol}^{-1}$.

Bandingkan tindak balas I dan tindak balas II berdasarkan perubahan jumlah kandungan tenaga bahan tindak balas dan jumlah kandungan tenaga hasil tindak balas.

Compare reaction I and reaction II based on the change in the total energy content of reactants and the total energy content of products.

.....

.....

.....

.....

[2 markah]
[2 marks]

- 6 Rajah 6.1 menunjukkan satu pingat dan komposisinya.
Diagram 6.1 shows a medal and its compositions.



90% kuprum, 5% unsur Q
90% copper, 5% element Q

Rajah 6.1
Diagram 6.1

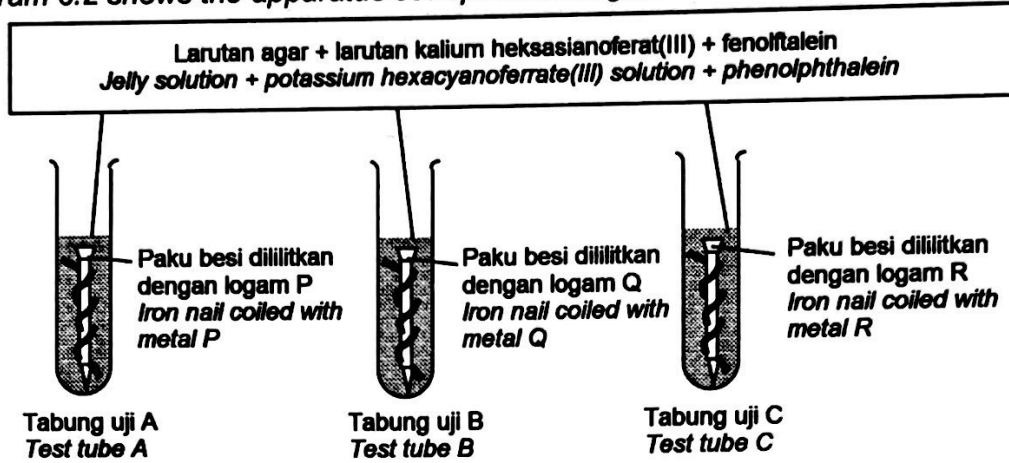
- (a) (i) Apakah maksud aloi?
What is the meaning of alloy?

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

- (ii) Nyatakan unsur Q.
State the element Q.

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

- (b) Rajah 6.2 menunjukkan susunan radas untuk mengkaji pengaratan besi.
 Diagram 6.2 shows the apparatus set-up to investigate the rusting of iron.



Rajah 6.2
 Diagram 6.2

Jadual 6 menunjukkan keputusan eksperimen:
 Table 6 shows the results of experiment:

Tabung uji Test tube	A	B	C
Pemerhatian Observation	Keamatan warna biru rendah Low intensity of blue colour	Merah jambu Pink	Keamatan warna biru tinggi High intensity of blue colour

Jadual 6
 Table 6

- (i) Tuliskan setengah persamaan pengoksidaan dan penurunan tabung uji C jika logam R adalah kuprum.
 Write oxidation and reduction half equation for test tube C if metal R is copper

Setengah persamaan pengoksidaan:

Oxidation half equation:

Setengah persamaan penurunan:

Reduction half equation:

[4 markah]
 [4 marks]

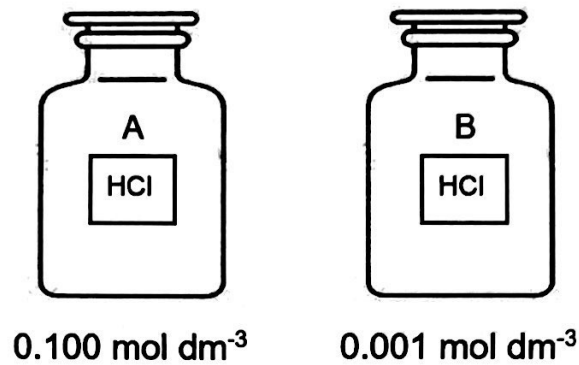
- (ii) Berdasarkan Rajah 6.2, tabung uji manakah yang menunjukkan pengaratan. Terangkan jawapan anda.

Based on the Diagram 6.2, which test tube shows rusting. Explain your answer.

.....

[3 markah]
 [3 marks]

- 7 Rajah 7.1 menunjukkan dua botol reagen.
Diagram 7.1 shows two reagent bottles.



Rajah 7.1
Diagram 7.1

- (a) Nyatakan maksud asid kuat?
State the meaning of strong acid?

.....

[1 markah]
[1 mark]

- (b) (i) Berdasarkan Rajah 7.1, botol reagen yang manakah memberi nilai pH yang rendah?
Based on Diagram 7.1, which reagent bottle gives a lower pH value?

.....

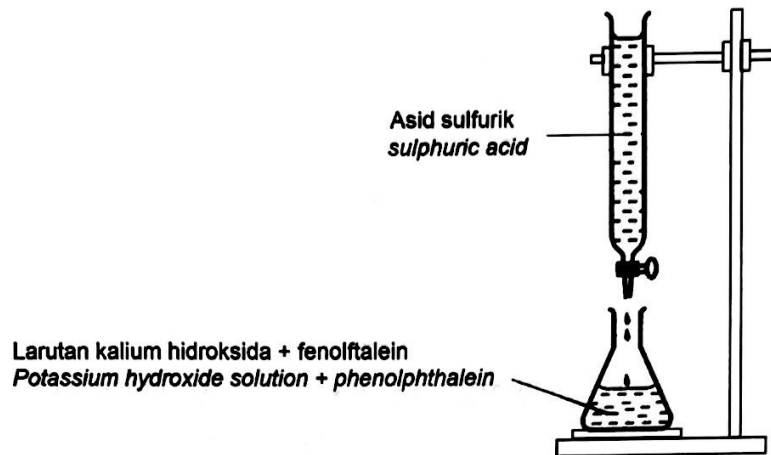
[1 markah]
[1 mark]

- (ii) Nyatakan nilai pH bagi asid HCl pada botol B.
State the pH value of HCl acid in bottle B.

.....

[1 markah]
[1 mark]

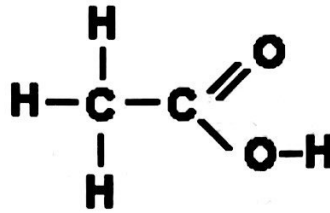
- (c) Rajah 7.2 menunjukkan kaedah pentitratan yang dijalankan oleh seorang murid.
Diagram 7.2 shows titration method carry out by a student.



Rajah 7.2
Diagram 7.2

- (i) Tuliskan persamaan kimia yang seimbang bagi tindak balas di atas.
Write a balanced chemical equation for above reaction.
-
- [2 markah]
[2 marks]
- (ii) Eksperimen diulangi oleh dengan menggunakan asid etanoik. Asid manakah yang akan menggunakan isipadu yang lebih banyak? Terangkan jawapan anda.
The experiment is repeated by using ethanoic acid. Which acid will use more volume? Explain your answer.
-
-
-
- [3 markah]
[3 marks]
- (iii) Semasa menjalankan eksperimen, apakah yang perlu anda lakukan agar isi padu asid yang digunakan semasa pentitratan adalah 2 kali ganda daripada Rajah 7.2? Wajarkan tindakan anda itu.
During the experiment, what should you do so that the volume of acid used while titration is doubled than in Diagram 7.2? Justify your actions.
-
-
- [2 markah]
[2 marks]

- 8 Rajah 8.1 menunjukkan formula struktur bagi satu sebatian karbon X.
Diagram 8.1 shows the structural formula for a carbon compound X.



Rajah 8.1
Diagram 8.1

- (a) (i) Nyatakan maksud sebatian karbon.
State the meaning of carbon compound.

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

- (ii) Nyatakan kumpulan berfungsi sebatian X.
State the functional group of compound X.

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

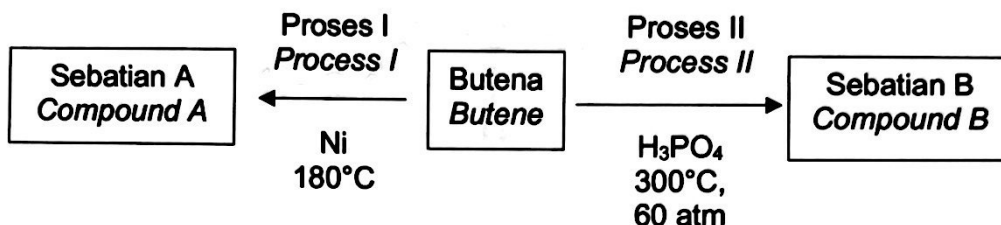
- (b) (i) Sebatian X bertindak balas dengan sebatian Y untuk menghasilkan metil etanoat.
Apakah formula kimia sebatian Y?
Compound X reacts with compound Y to produce methyl ethanoate. What is the chemical formula of compound Y?

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

- (ii) Tuliskan persamaan kimia yang seimbang bagi jawapan b(i).
Write a balanced chemical equation for the answer in b(i).

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

- (c) Rajah 8.2 menunjukkan carta alir bagi satu siri perubahan yang berlaku antara ahli-ahli siri homolog itu.
 Diagram 8.2 shows a flow chart of a series of changes that occur between some members of the homologous series.



Rajah 8.2
 Diagram 8.2

Berdasarkan Rajah 8.2,
 Based on Diagram 8.2,

- (i) Nyatakan formula am sebatian A dan B.
 State the general formula of compound A and B.

Sebatian A:
 Compound A:

Sebatian B:
 Compound B:

[2 markah]
 [2 marks]

- (ii) Huraikan satu ujian kimia untuk membezakan antara sebatian A dan butena.
 Describe a chemical test to differentiate between compound A and butene?

.....

[3 markah]
 [3 marks]

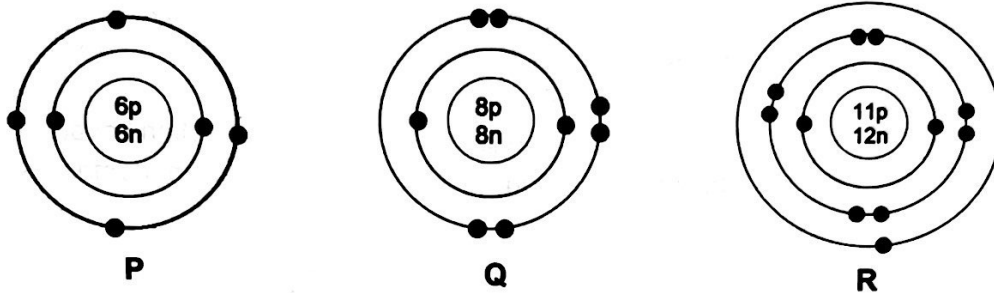
Bahagian B**Section B**

[20 markah]

[20 marks]

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

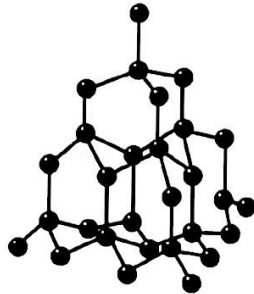
- 9 Rajah 9.1 menunjukkan struktur atom bagi unsur P, Q dan R.
 Diagram 9.1 shows the atomic structure of element P, Q and R.



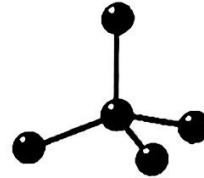
Rajah 9.1
 Diagram 9.1

- (a) Nyatakan maksud nombor nukleon dan nombor proton.
State the meaning of nucleon number and proton number
- [2 markah]
 [2 marks]
- (b) Tuliskan susunan elektron bagi atom P dan Q.
Write the electron arrangement of P atom and Q.
- [2 markah]
 [2 marks]
- (c) Berdasarkan Rajah 9.1,
Based on Diagram 9.1,
- (i) Tuliskan persamaan kimia yang seimbang di antara unsur Q dan R.
Write the balanced chemical equation between element Q and R.
- [2 markah]
 [2 marks]
- (ii) Hitungkan jisim sebatian terbentuk jika 2.3g R bertindak balas dengan Q secara berlebihan.
Calculate the mass of compound formed if 2.3g R react with Q in excess.
- [4 markah]
 [4 marks]

- 9 (d) Rajah 9.2 menunjukkan struktur molekul bagi sebatian kovalen A dan B.
Diagram 9.2 shows the molecular structure for covalent compound A and B.



Sebatian kovalen A
Covalent compound A



Sebatian kovalen B
Covalent compound B

Rajah 9.2
Diagram 9.2

Nyatakan jenis sebatian kovalen A dan B. Cadangkan contoh bagi kedua-duanya. Bandingkan kedua-dua sebatian dari segi struktur, ikatan kimia serta takat lebur dan takat didih.

State what is type of covalent compound A and B. Suggest an example for both compounds.

Compare both compounds based on structure, chemical bond and melting point and boiling point.

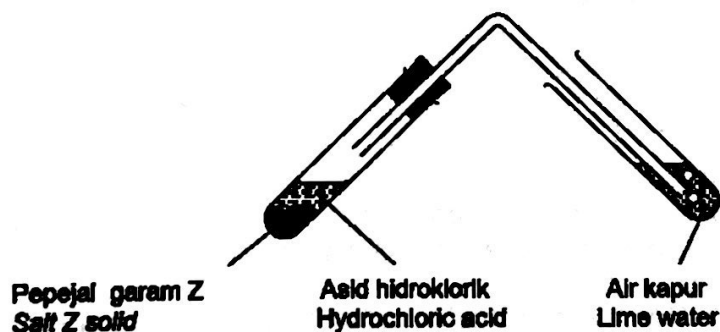
[10 markah]
[10 marks]

- 10 (a) Rajah 10.1 menunjukkan terumbu karang yang terdapat di perairan Pulau Sibul. Terumbu karang ini terbentuk daripada garam Z.
Diagram 10.1 shows coral reefs found in Sibul Island. These coral reefs are formed from salt Z.



Rajah 10.1
 Diagram 10.1

- (i) Nyatakan maksud garam dan namakan satu garam tak terlarutkan.
State the meaning of salt and name insoluble salt. [2 markah]
 [2 marks]
- (ii) Rajah 10.2 menunjukkan susunan radas bagi tindak balas asid hidroklorik dengan pepejal garam Z.
Diagram 10.2 shows apparatus set-up for the reaction of hydrochloric acid with solid salt Z.



Rajah 10.2
 Diagram 10.2

Pepejal garam Z mengandungi unsur kalsium, Apakah garam Z dan gas yang terbebas semasa tindak balas seperti rajah 10.2?
Solid Z salt contain calcium element, what is salt Z and the gas released during the reaction in diagram 10.2?

[2 markah]
 [2 marks]

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- 10 (b) Jadual 10 menunjukkan keputusan satu eksperimen bagi mengkaji faktor yang mempengaruhi kadar tindak balas.
Table 10 shows the result of an experiment to study the factor that affect rate of reaction.

Eksperimen Experiment	I	II	III
Bahan tindak balas Reactants	Serbuk zink berlebihan + 20 cm ³ asid sulfurik 0.1 mol dm ⁻³ <i>Excess zinc powder + 20 cm³ of 0.1 mol dm⁻³ sulphuric acid</i>	Serbuk zink berlebihan + 20 cm ³ asid sulfurik 0.1 mol dm ⁻³ + larutan kuprum(II) sulfat <i>Excess zinc powder + 20 cm³ of 0.1 mol dm⁻³ sulphuric acid + copper(II) sulphate solution</i>	Serbuk zink berlebihan + 20 cm ³ asid sulfurik 0.1 mol dm ⁻³ <i>Excess zinc powder + 20 cm³ of 0.1 mol dm⁻³ sulphuric acid</i>
Suhu (°C) Temperature (°C)	30.0	30.0	40.0
Masa yang diambil untuk mengumpul 30 cm ³ gas yang terbebas (s) Time taken for collecting 30 cm ³ of gas released, (s)	20.0	12.0	10.0

Jadual 10
Table 10

- (i) Tuliskan persamaan kimia bagi tindak balas antara zink dan asid sulfurik. Kira purata kadar tindak balas untuk Eksperimen I dan Eksperimen II dalam unit cm³ s⁻¹.
Write the chemical equation for the reaction between zinc and sulphuric acid. Calculate the average rate of the reaction for Experiment I and Experiment II in cm³ s⁻¹.

[4 markah]
[4 marks]

- (ii) Lakarkan graf isipadu melawan masa bagi kedua-dua eksperimen di dalam paksi yang sama.
Sketch the graf volume against time for both experiment in same axis.

[2 markah]
[2 marks]

10 (iii) Berdasarkan Jadual 10, bandingkan kadar tindak balas antara
Based on Table 10, compare the rate of reaction between

- Eksperimen I dan II
Experiment I and II
- Eksperimen I dan III
Experiment I and III

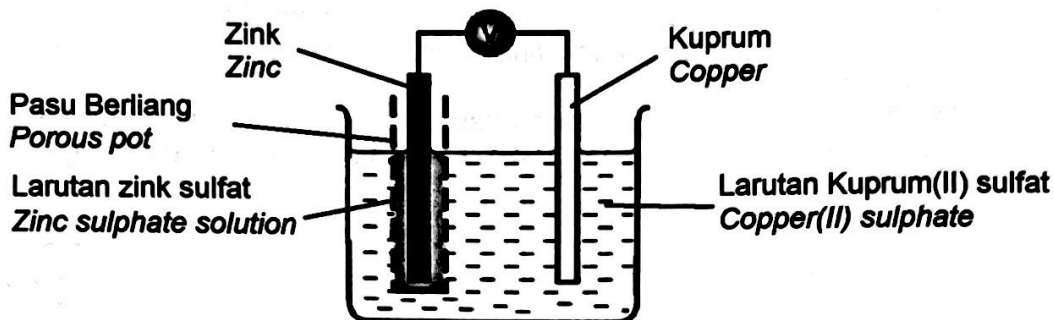
Untuk setiap kes, nyatakan faktor yang mempengaruhi kadar tindak balas dan terangkan perbezaan kadar tindak balas dengan merujuk kepada teori perlanggaran.

In each case, state the factor affect the rate of reaction and explain the difference in the rate of reaction with reference to the collision theory.

[10 markah]
[10 marks]

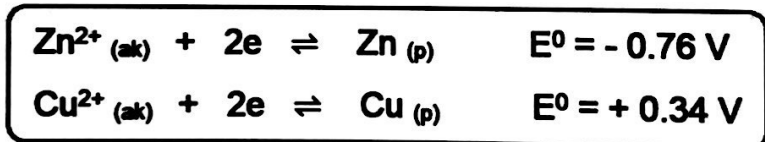
Bahagian C
Section C
 [20 markah]
 [20 marks]

- 11 Rajah 11.1 menunjukkan susunan radas bagi mengkaji tindak balas redoks.
 Diagram 11.1 shows the apparatus set-up to study a redox reaction.



Rajah 11.1
 Diagram 11.1

Siri keupayaan elektrod piawai :
 Standard electrode potential series:



- (a) Apakah maksud tindak balas redoks?
 What is the meaning of redox reaction?
- [1 markah]
 [1 mark]
- (b) Berdasarkan maklumat dalam Rajah 11.1 dan Siri Keupayaan Elektrod Piawai :
 Based on Diagram 11.1 and Standard Electrode Potential Series:
- (i) Kenal pasti terminal negatif dan terminal positif bagi sel tersebut
 Identify the negative terminal and positive of the cell.
- [2 markah]
 [2 marks]
- (ii) Tuliskan persamaan ion keseluruhan.
 Write the overall ionic equation.

[2 markah]
 [2 marks]

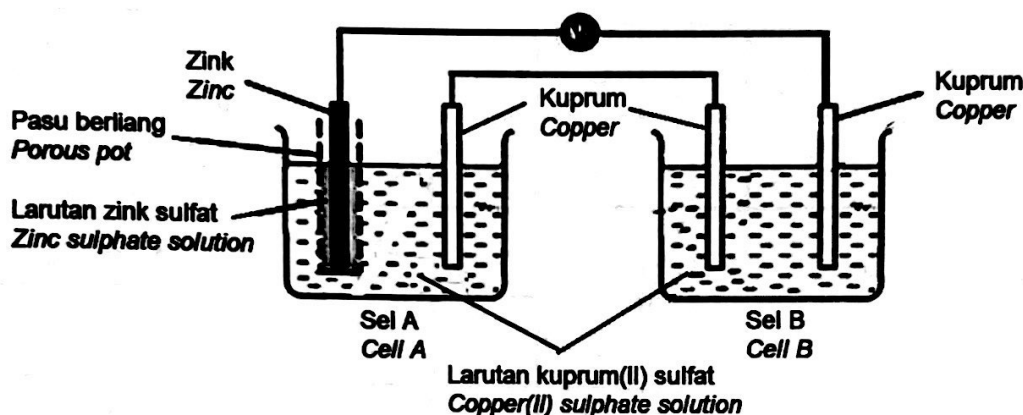
- (iii) Tulis notasi sel bagi sel kimia pada Rajah 11.1
Write cell notation chemical cell in Diagram 11.1

[2 markah]
[2 marks]

- (iv) Hitungkan E° sel
Calculate the E° cell

[1 markah]
[1 mark]

- (c) Rajah 11.2 menunjukkan susunan radas sel A dan sel B.
Diagram 11.2 shows the apparatus setup for cell A and cell B.



Rajah 11.2
Diagram 11.2

- (i) Bandingkan sel A dan sel B dari segi hasil yang terbentuk, pemerhatian dan setengah persamaan di anod.
Compare cell A and cell B in terms of product formed observation and half equation at anode.

[6 markah]
[6 marks]

- (ii) Rumah Faridah terletak di kawasan persisiran pantai. Dia selalu menghadapi masalah apabila tombol pintu keluli rumahnya sering diganti kerana pengaratn berlaku dengan cepat di kawasan tersebut. Sebagai rakan Faridah, cadangkan satu cara bagi menyelesaikan masalah tersebut dengan menggunakan konsep elektrolisis.
Faridah's house is located at seaside. She has a problem when her steel doorknob always need to be replaced due to rusting that occurred faster at that area. As Faridah's friend, suggest a way to solve the problem by using electrolysis concept.

[6 markah]
[6 marks]

KERTAS MODUL TAMAT
END OF MODULE PAPER

[Lihat halaman sebelah
SULIT

JADUAL BERKALA UNSUR

1 H Hidrogen 1	2 He Helium 4	3 Li Litium 7	4 Be Berilium 9	5 B Boron 11	6 C Karbon 12	7 N Nitrogen 14	8 O Oksigen 16	9 F Fluorin 19	10 Ne Neon 20	11 Na Natrium 23	12 Mg Magnesium 24	13 Al Aluminium 27	14 Si Silikon 28	15 P Fosforus 31	16 S Sulfur 32	17 Cl Klorin 35	18 Ar Argon 40	19 K Kalium 39	20 Ca Kalsium 40	21 Sc Skandium 45	22 Ti Titanium 48	23 V Vanadium 51	24 Cr Kromium 52	25 Mn Mangan 55	26 Fe Feran 56	27 Co Kobalt 59	28 Ni Nikel 59	29 Cu Kuprum 64	30 Zn Zink 65	31 Ga Galium 70	32 Ge Germanium 72	33 As Arsenik 75	34 Se Selenium 79	35 Br Bromin 80	36 Kr Kripton 84	37 Rb Rubidium 86	38 Sr Strontium 88	39 Y Itrium 89	40 Zr Zirkonium 91	41 Nb Niobium 93	42 Mo Molibdenum 96	43 Tc Teknium 98	44 Ru Rutenium 101	45 Rh Rodium 103	46 Pd Palladium 106	47 Ag Argentum 108	48 In Indium 115	49 Cd Kadmium 112	50 Sn Stannum 119	51 Sb Antimoni 122	52 Te Telurium 128	53 I Iodin 127	54 Xe Xenon 131	55 Cs Sesium 133	56 Ba Barium 137	57 La Lantanum 139	58 Ce Sesium 140	59 Pr Praseodimium 141	60 Nd Neodimium 144	61 Pm Prometium 147	62 Sm Samarium 150	63 Eu Europium 152	64 Gd Gadolinitium 157	65 Tb Terbitium 159	66 Dy Dysprosium 163	67 Hf Hafnium 165	68 Er Erbium 167	69 Tm Thulium 169	70 Yb Ytterbium 173	71 Lu Lutetium 175	72 Fr Francium 223	73 Ra Radium 226	74 Ac Aktinium 227	75 Th Torium 232	76 Pa Protaktinium 231	77 U Uranium 238	78 Np Neptunium 237	79 Pu Plutonium 244	80 Am Americium 243	81 Cm Kurium 247	82 Bk Berkelium 247	83 Cf Kalifornium 249	84 Es Einsteinium 254	85 Fm Fermium 253	86 Md Mendelevium 256	87 Nb Niobium 254	88 Mo Molibdenum 256	89 Tc Teknium 256	90 Ru Rutenium 256	91 Rh Rodium 256	92 Pd Palladium 256	93 Ag Argentum 256	94 Cd Kadmium 256	95 In Indium 256	96 Sn Stannum 256	97 Sb Antimoni 256	98 Te Telurium 256	99 I Iodin 256	100 Xe Xenon 256
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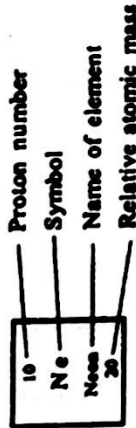


[Lihat halaman sebelah
SULIT

PERIODIC TABLE OF THE ELEMENTS

1	H	Hydrogen	1
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3	Li	Lithium	7
11	Na	Sodium	23
19	K	Potassium	39
37	Rb	Rubidium	85
55	Cs	Cesium	133
87	Fr	Francium	223
4	Be	Beryllium	9
12	Mg	Magnesium	24
20	Ca	Calcium	40
38	Sr	Strontium	88
56	Ba	Barium	137
88	Ra	Radium	226



5	B	Boron	11	6	C	Carbon	12	7	N	Nitrogen	14	8	O	Oxygen	16	9	F	Fluorine	19	10	Ne	Neon	20
13	Al	Aluminum	27	14	Si	Silicon	28	15	P	Phosphorus	31	16	S	Sulfur	32	17	Cl	Chlorine	35	18	Ar	Argon	40
31	Ga	Gallium	70	32	Ge	Germanium	73	33	As	Arsenic	75	34	Se	Selenium	79	35	Br	Bromine	80	36	Kr	Krypton	84
48	In	Indium	115	49	Tl	Thallium	204	50	Hg	Mercury	201	51	Cd	Cadmium	112	52	Sn	Tin	119	53	I	Iodine	127
78	Pt	Platinum	195	79	Au	Gold	197	80	Hg	Mercury	201	81	Tl	Thallium	204	82	Pb	Lead	207	83	Bi	Bismuth	209
108	Pd	Palladium	106	109	Ag	Silver	108	110	Cd	Cadmium	112	111	In	Indium	115	112	Sn	Tin	119	113	Pb	Lead	207
192	Ir	Iridium	192	193	Pt	Platinum	195	194	Au	Gold	197	195	Hg	Mercury	201	196	Tl	Thallium	204	197	Pb	Lead	207
266	Uue	Ununhexium	266	267	Uuo	Ununoccium	267	268	Uuq	Ununquadium	268	269	Uuh	Ununhexium	269	270	Uus	Ununseptium	270	271	Uuq	Ununquadium	271

28	Ce	Cerium	140	58	Pr	Praseodymium	141	89	Ac	Actinium	227	64	Gd	Gadolinium	157	90	Th	Thorium	232	70	Yb	Ytterbium	173
90	Th	Thorium	232	91	Pa	Protactinium	231	92	U	Uranium	238	93	Np	Neptunium	237	94	Pu	Plutonium	244	95	Am	Americium	243
140	Ce	Cerium	140	141	Pr	Praseodymium	141	142	Nd	Neodymium	144	143	Pm	Promethium	147	144	Sm	Samarium	150	145	Eu	Europium	152
157	Gd	Gadolinium	157	158	Tb	Terbium	159	159	Dy	Dysprosium	163	160	Ho	Holmium	165	161	Er	Erbium	167	162	Tm	Thulium	169
243	Am	Americium	243	244	Pu	Plutonium	244	245	Uue	Ununhexium	266	246	Cm	Curium	247	247	Bk	Berkelium	247	248	Cf	Californium	251
257	Lr	Lutetium	257	258	Uub	Ununbium	258	259	Uuo	Ununoccium	267	260	Uuh	Ununhexium	269	261	Uus	Ununseptium	271	262	Uuq	Ununquadium	272

References: Chang, Raymond (1990). Chemistry. McGraw-Hill, Inc.

**MAKLUMAT UNTUK CALON
INFORMATION FOR CANDIDATES**

1. Kertas soalan ini mengandungi tiga bahagian: **Bahagian A, Bahagian B dan Bahagian C.**
*This question paper consists of three sections: **Section A, Section B and Section C.***
2. Jawab **semua** soalan dalam **Bahagian A.** Jawapan anda bagi **Bahagian A** hendaklah ditulis pada ruang yang disediakan dalam kertas soalan ini.
*Answer **all** questions in **Section A.** Write your answers for **Section A** in the spaces provided in this question paper.*
3. Jawab **satu** soalan daripada **Bahagian B** dan satu soalan daripada **Bahagian C.** Jawapan anda bagi **Bahagian B** dan **Bahagian C** hendaklah ditulis dalam kertas kjang.
Anda boleh menggunakan persamaan, rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda.
*Answer **one** question from **Section B** and one question from **Section C.** Write your answers for **Section B** and **Section C** on the foolscap paper. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answers.*
4. Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
The diagrams in the questions are not drawn to scale unless stated.
5. Markah yang diperuntukkan bagi setiap soalan atau ceraihan soalan ditunjukkan dalam kurungan.
Marks allocated for each question or sub-part of a question are shown in brackets.
6. Tunjukkan kerja mengira. Ini membantu anda mendapatkan markah.
Show your working. It may help you to get marks.
7. Jika anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.
If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.
8. Jadual Berkala Unsur disediakan di halaman 24 dan 25.
The Periodic Table of Elements is provided on page 24 and 25.
9. Anda dibenarkan menggunakan kalkulator saintifik.
You may use a scientific calculator.
10. Anda dinasihati supaya mengambil masa 90 minit untuk menjawab soalan dalam **Bahagian A**, 30 minit untuk **Bahagian B** dan 30 minit untuk **Bahagian C.**
*You are advised to spend 90 minutes to answer questions in **Section A**, 30 minutes for **Section B** and 30 minutes for **Section C.***