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SPM SEMINAR 2019

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PART 1

KIMIA

VIDEO PEMBELAJARAN LENGKAP DI

Tingkatan 4

Tingkatan 5

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Jenis zarah
Type of particle:
-Ion / *Ions*
-Molekul
/*Molecules*
-Atom /*Atoms*

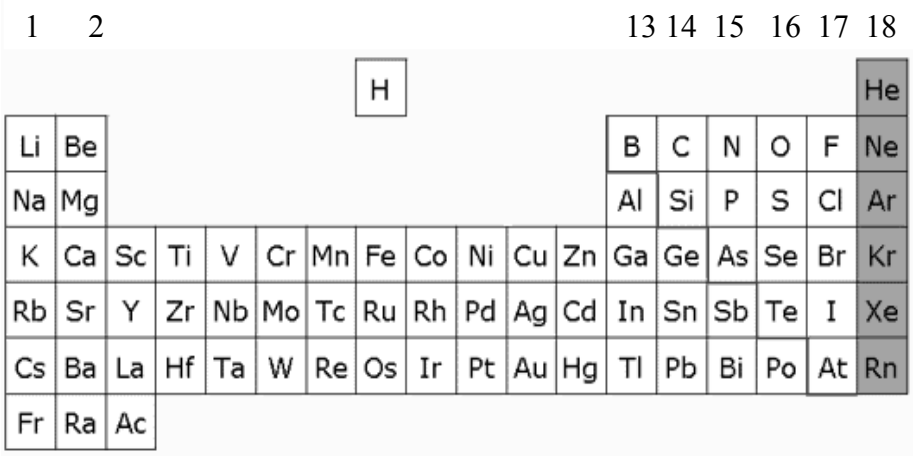
Jadual berkala unsur dan ikatan kimia
Periodic table + chemical bonds

Kumpulan 17 /*Group 17 (Halogen)*
F
Cl
Br
I
At

↑ Kereaktifan bertambah/ *Reactivity increases*
Saiz berkurang / *Size decreases*
Semakin ekeltronegatif / *Electronegativity increases*

Kumpulan 1 (logam alkali) / *Group 1 (alkali metal)*
Li
Na
K
Rb
Cs

↓ Kereaktifan bertambah /*Reactivity increases*
saiz bertambah / *Size increases*
Semakin elektropositif / *Electropositivity increases*



Across a period

Unsur /*Element*	Na	Mg	Al	Si	P	S	Cl	Ar
Logam/bukan logam *Metal/non-metal*	Logam ← *Metal* →			separuh logam ← *Metalloid* →			bukan logam *non-metal* →	
Kelektronegatifan/ *Electronegativity*	→ Bertambah / *increases*							
Sifat oksida/ *Property of oxide*	Bes ← *base* →		amfoterik ← *Amphoteric* →		asid ← *Acid* →			

Logam dan bukan logam menjadi ion yang berbeza
Metal atoms *and* ***non-metal atoms*** *go in opposite directions when they ionise:*

Susunan elektron Dalam atom logam/ ***Electron arrangement of metal atoms***	**Susunan elektron dalam atom bukan logam/** ***Electron arrangement of non-metal atoms***
2.1 **2.2** **2.8.1** **2.8.2** **2.8.3** **2.8.8.1** **2.8.8.2**	**2.6** **2.7** **2.8.6** **2.8.7**

Contoh soalan 1

Diagram 9.1 shows the three element cards, X, Y and Z. X and Y can react with Z to form different type of compounds.
Gambarajah 9.1 *menunjukan tiga kad unsur,* X, Y *dan* Z. X *dan* Y *boleh bertindakbalas dengan* Z *membentuk sebatian yang berbeza.*

X



State at 25 °C: Solid
Colour: Grey/white
Atomic mass: 22.99
Density: 0.968 g/cm^3
Melting pt: 97.72 °C
Boiling pt: 883 °C

- **X** is the 11th element in the Periodic Table
- It is store under oil
- When dropped into water it bursts into flames
- **X** is soft enough to be cut with a knife

Y



State at 25 °C: Solid
Colour: Black
Atomic mass: 12.011
Density: 2.267 g/cm^3
Melting pt: 352 °C
Boiling pt: 4027 °C

- **Y** is the 6th element in the Periodic Table
- Appear in many different forms in nature, e.g. black charcoal, diamonds and graphite
- **Y** forms the bulk of all living matter

Z



State at 25 °C: Gas
Colour: Greenish yellow
Atomic mass: 35.453
Density: 2.898 g/cm^3
Melting pt: -101.5 °C
Boiling pt: -34.04 °C

- **Z** is the 17th element in the Periodic Table
- **Z** is a toxic gas
- It is used in toilet cleaner to kill bacteria
- However, adding small amounts to drinking water kills water-borne disease such as cholera and typhoid

Diagram 9.1
Rajah 9.1

(a) (i) Write the electron arrangement of atoms X, Y and Z.
Tuliskan susunan elektron bagi atom-atom X, Y *dan* Z.

[3 marks]
[3 *markah*]

(ii) Based on Diagram 9.1, suggest any two suitable elements that can react to form a compound.
State the type of bond formed and explain the formation of the compound.

Berdasarkan Rajah 9.1, cadangkan dua unsur yang sesuai bertindak balas membentuk suatu sebatian.
Nyatakan jenis ikatan yang terbentuk dan terangkan pembentukan sebatian tersebut.

[7 marks]

(b) Diagram 9.2 shows the arrangement of particle for two types of compound.
Rajah 9.2 menunjukkan susunan zarah dua jenis sebatian.

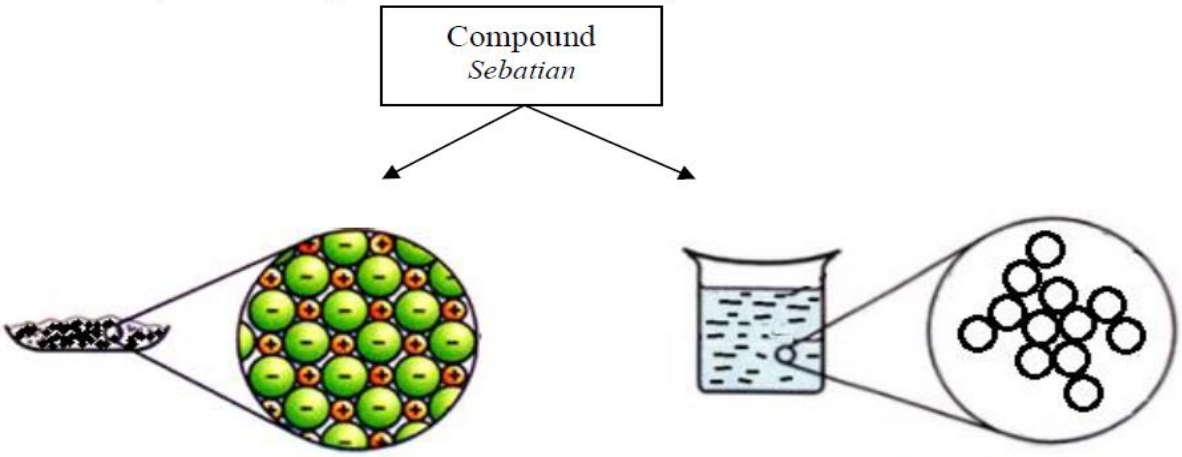


Diagram 9.2

Describe an experiment to differentiate the compounds based on:
Huraikan eksperimen untuk membezakan kedua-dua sebatian tersebut berdasarkan:

- solubility in water
  keterlarutan di dalam air
- melting point or boiling point
  takat lebur atau takat didih.

In your description include:
Huraian anda haruslah mengandungi perkara berikut:

- Example of compound T and compound V
  Contoh sebatian T *dan sebatian* V
- Procedure of experiment
  Kaedah ekperimen
- Observation
  Pemerhatian
- Conclusion
  Kesimpulan

[10 marks]

Contoh soalan 2

Diagram 7.1 shows an article on Health Effects of Mothballs.

Health Effects of Mothballs

Mothballs are nearly 100% active ingredient, and the active ingredient may be either naphthalene or paradichlorobenzene. Each active ingredient can cause different health effects if the exposure is high enough. Mothballs slowly turn from solids to toxic vapour. When you smell mothballs, you are inhaling the insecticide.

Kandungan ubat gegat adalah hampir 100% bahan aktif yang merupakan sama ada naftalena atau paradiklorobenzena. Setiap bahan aktif ini boleh mendatangkan kesan kesihatan yang berlainan jika terdedah kepada kuantiti yang tinggi. Ubat gegat berubah daripada pepejal kepada wap beracun secara perlahan-lahan. Apabila terhidu bahan tersebut, seolah-olah anda menyedut insektisid.



Diagram 7.1

(a) (i) Based on article shown in Diagram 7.1, mothballs are commonly used as the main insecticide to repel cockroaches.
Name the process involved and explain how the mothballs vapour act as insecticide by using Kinetic Theory of Matter.
Berdasarkan artikel dalam Rajah 7.1, ubat gegat kebiasaannya digunakan sebagai insektisid untuk menghalau lipas.
Namakan proses yang terlibat dan terangkan bagaimana wap ubat gegat bertindak sebagai insektisid menggunakan Teori Kinetik Jirim.

[4 marks]

(ii) Solid mothballs melt into liquid when heated in water bath.
Diagram 7.2 shows the heating curve of the solid mothballs.
Pepejal ubat gegat melebur menjadi cecair apabila dipanaskan dalam kukus air. Rajah 7.2 menunjukkan lengkungan pemanasan pepejal ubat gegat.

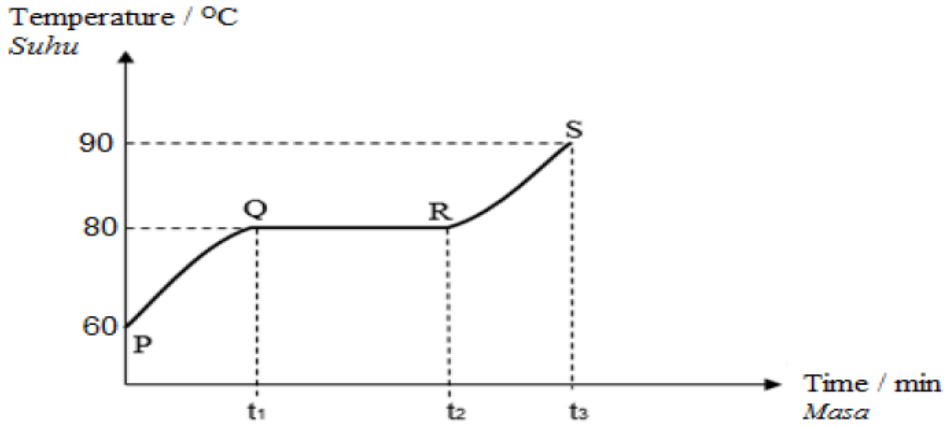


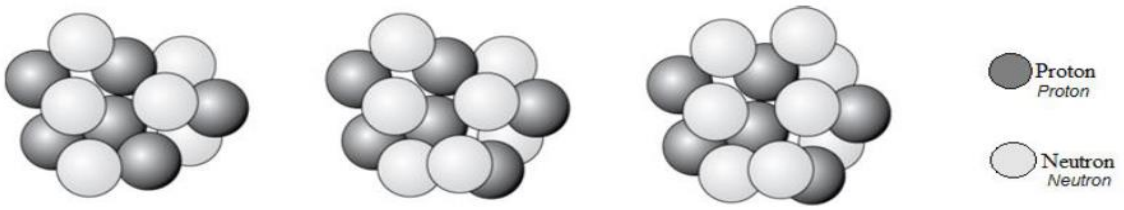
Diagram 7.2

Based on Diagram 7.2, describe the curve from the region of P to Q and the region of R to S. In your description include:
Berdasarkan Rajah 7.2, huraikan lengkung dari bahagian P *ke* Q *dan dari bahagian* R *ke* S. *Dalam huraian anda sertakan:*

- state of matter
  keadaan jirim
- movement of the particles
  pergerakan zarah-zarah
- diagram of particles arrangement
  gambarajah susunan zarah-zarah

[6 marks]

(b) Diagram 7.3 shows subatomic particles in the nucleus of three carbon atoms.
Rajah 7.3 menunjukkan zarah subatom di dalam nukleus bagi tiga atom karbon.



Carbon-12 *Karbon-12* | Carbon-13 *Karbon-13* | Carbon-14 *Karbon-14*

Diagram 7.3
Rajah 7.3

(i) What can be deduced from Diagram 7.3?
Explain your answer.
Apakah kesimpulan berdasarkan Rajah 7.3?
Terangkan jawapan anda.

[2 marks]

(ii) Compare and contrast the three carbon atoms in terms of:
Banding dan bezakan ketiga –tiga atom tersebut dari segi:

- Number of proton
  Bilangan proton
- Number of neutron
  Bilangan neutron
- Number of electron
  Bilangan elektron
- Physical properties
  Sifat fizikal
- Chemical properties
  Sifat kimia

[5m]

(iii) Draw the atomic structure of carbon-14.
Lukiskan struktur atom bagi karbon-14.

[3 marks]

[Total 20]

Contoh soalan 3

Diagram 2.1 shows a part of the Periodic Table of Elements. W, X, Y and Z are not the actual symbols of the elements.
Rajah 2.1 menunjukkan sebahagian daripada Jadual Berkala Unsur. W, X, Y dan Z bukan simbol sebenar unsur tersebut.

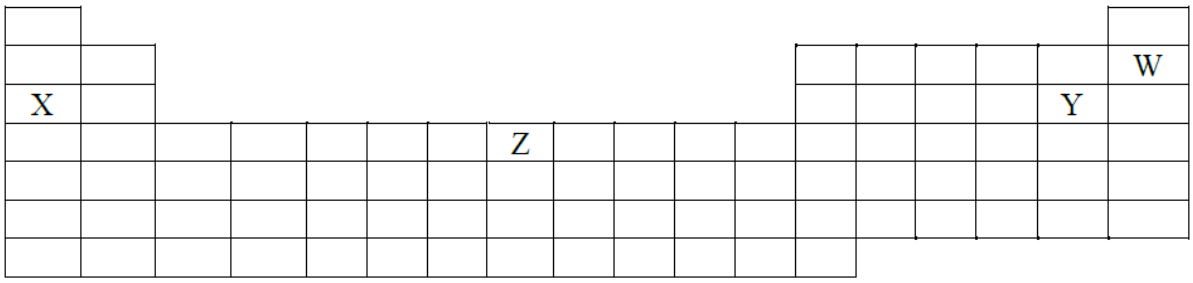


Diagram 2.1
Rajah 2.1

Based on Diagram 2.1,
Berdasarkan Rajah 2.1,

(a) (i) Write an electron arrangement of atom W.
Tuliskan susunan elektron bagi atom W.

.....

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

(ii) Explain why atom W is chemically inert.
Terangkan mengapa atom W lengai secara kimia.

.....

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

(b) Which of the element is a halogen?
Unsur manakah adalah halogen?

.....

[1 *mark*]

(c) Diagram 2.2 shows the special characteristics of an element.
Rajah 2.2 menunjukkan ciri-ciri istimewa bagi suatu unsur.

- Can form complex ion.
  Boleh membentuk ion kompleks.
- Have more than one oxidation number.
  Mempunyai lebih daripada satu nombor pengoksidaan.

Diagram 2.2
Rajah 2.2

Which element shows the above characteristics?
Unsur manakah menunjukkan ciri-ciri di atas?

.....

[1 *mark*]

(d) When a small piece of element X is put in water, alkaline solution is formed and hydrogen gas is released.
Apabila satu ketulan kecil unsur X dimasukkan ke dalam air, larutan beralkali terhasil dan gas hidrogen terbebas.

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

.....

[2 marks]
[2 *markah*]

(ii) If 2.0 mol of X react with water, calculate the volume of gas released at room condition.
[The molar volume of gas is 24 dm^3 mol^{-1} at room condition]
Jika 2.0 mol X bertindak balas dengan air, hitungkan isipadu gas yang terbebas pada keadaan bilik.
[Isipadu molar bagi gas ialah 24 dm^3 mol^{-1} pada keadaan bilik]

[2 marks]
[2 *markah*]

(e) Element R is located below element X in Diagram 2.1.
Unsur R berada di bawah unsur X dalam Rajah 2.1.

Compare the reactivity of element R and element X when react with water.
Bandingkan kereaktifan unsur R dan unsur X apabila bertindak balas dengan air.

.....

[1 mark]

Contoh soalan 4

Diagram 4 shows the electron arrangement of W, Y and Z atoms.
Rajah 4 *menunjukkan susunan elektron bagi atom* W, Y *dan* Z.

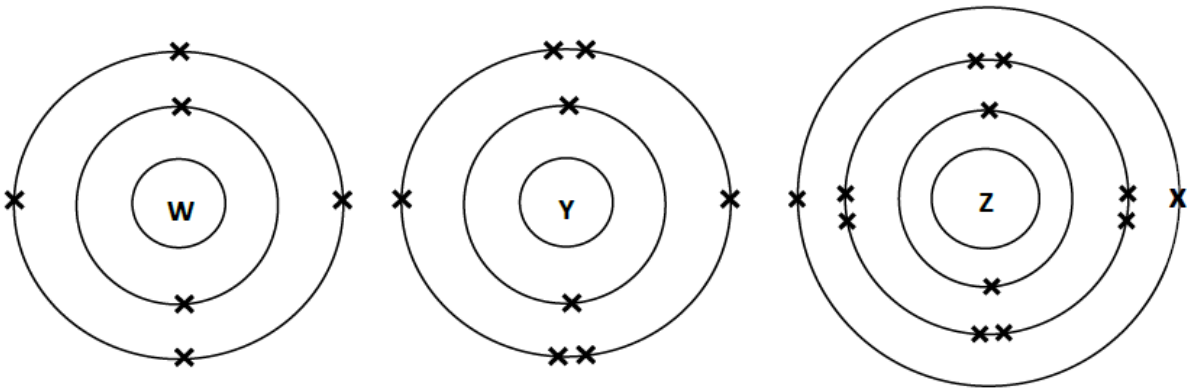


Diagram 4

(a) Based on Diagram 4:
Berdasarkan Rajah 4:

(i) Write the electron arrangement for W atom.
Tulis susunan elektron bagi atom W.

_____

[1 mark]
[1 *markah*]

(ii) Which of the elements is a metal?
Unsur manakah yang merupakan satu logam?

_____

[1 mark]
[1 *markah*]

(b) W combines with Y to form a compound.
W *bergabung dengan* Y *untuk membentuk suatu sebatian*.

(i) What is the type of the compound formed?
Apakah jenis sebatian yang terbentuk?

_____

[1 mark]

(ii) Draw the electron arrangement of this compound.
Lukis susunan elektron bagi sebatian tersebut.

[2m]

(c) 2.4 g of Z reacts completely with Y to form ZY.
2.4 g Z *bertindakbalas dengan lengkap dengan* Y *untuk membentuk* ZY.

(i) Write a balanced chemical equation for the reaction.
Tulis persamaan kimia yang seimbang bagi tindakbalas itu.

_____

[2 marks]

Formula penting / *Important formula*

Bilangan mol = jisim / Jisim molar

Bilangan mol = $\frac{MV}{1000}$

Bilangan mol = isi padu gas / isi padu molar

Amount of moles = Mass / molar mass

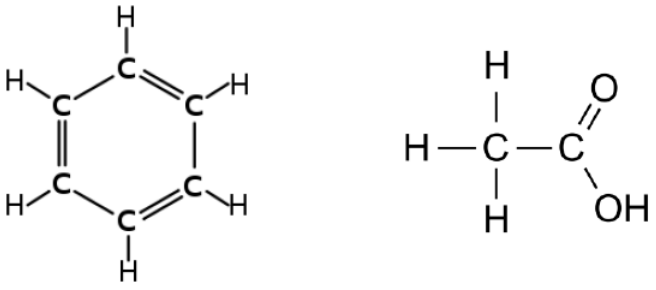
Amount of moles = $\frac{MV}{1000}$

Amount of moles = volume / Molar volume

$M_1V_1 = M_2V_2$

Contoh soalan 5

(*a*) Diagram 3.1 shows the structural formula of substance M and N.
Rajah 3.1 menunjukkan formula struktur bahan M dan N.



M **N**

Diagram 3.1
Rajah 3.1

(i) What is meant by empirical formula?
Apakah yang dimaksudkan dengan formula empirik?

_____ **[1]**

(ii) State the empirical formula of substance M.
Nyatakan formula empirik bahan M.

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

(iii) State the molecular formula of substance N.
Nyatakan formula molekul bahan N.

.....
[1 *mark*]

(b) Diagram 3.2 shows the apparatus set-up to determine the empirical formula for an oxide of copper.
Rajah 3.2 menunjukkan susunan radas untuk menentukan formula empirik bagi satu oksida kuprum.

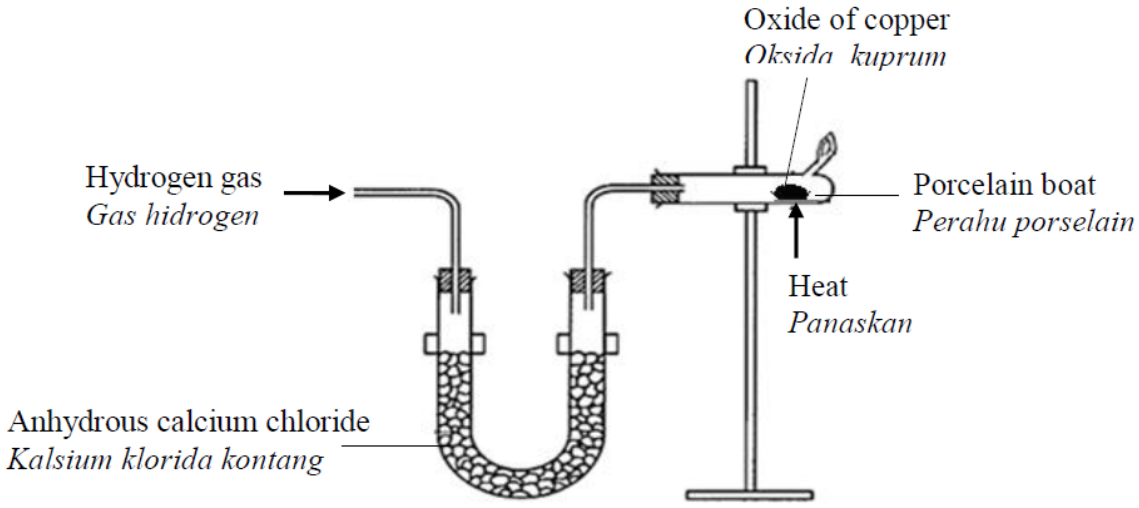


Diagram 3.2
Rajah 3.2

Table 3 shows the data obtained from the experiment.
Jadual 3 menunjukkan data yang diperolehi daripada eksperimen itu.

Description ***Penerangan***	**Mass (g)** ***Jisim (g)***
Combustion tube + porcelain boat *Tiub pembakaran + perahu porselin*	24.60
Combustion tube + porcelain boat + oxide of copper *Tiub pembakaran + perahu porselin + oksida kuprum*	27.00
Combustion tube + porcelain boat + copper *Tiub pembakaran + perahu porselin + kuprum*	26.52

Table 3
Jadual 3

(i) Based on Table 3, calculate the empirical formula for the oxide of copper.
Berdasarkan Jadual 3, hitung formula empirik bagi oksida kuprum
[Relative atomic mass: Cu=64, O=16]

[4m]

(ii) How do you ensure all oxide of copper is reduced to copper?
Bagaimanakah anda memastikan semua oksida kuprum diturunkan kepada kuprum?

.....

.....

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

(iii) Can the empirical formula for magnesium oxide be determined by using this method? Explain your answer.
Bolehkah formula empirik bagi magnesium oksida ditentukan dengan menggunakan kaedah ini? Terangkan jawapan anda.

.....

.....

[2 *marks*]

Contoh soalan 6

Substance Z contains 12 dm^3 of steam. Calculate the mass of steam if it is at room conditions.
[Relative atomic mass: H = 1, O = 16; 1 mol of gas occupies 24 dm^3 at rooms conditions]
Bahan Z mengandungi 12 dm^3 *stim. Hitung jisim stim itu sekiranya ia berada pada keadaan bilik.*
[*Jisim atom relatif*: H=1, O=16; 1 *gas menempati* 24 dm^3 *pada keadaan bilik*]

[2 marks]

[3 marks]

Kadar tindak balas / *Rate of reaction*

Teori perlsnggsrsn / *Collision theory*

<table>
<tr><td>Saiz bahan ↓
Particle size ↓</td><td>Suhu ↓
Temperature ↑</td><td>Kepekatan ↓
Concentration ↑</td><td>Tekanan ↓
Pressure ↑</td><td>Mangkin ✓
Catalyst ✓</td></tr>
<tr><td>Luas permukaan ↑
Total surface area ↑</td><td>Tenaga kinetik ↑
Kinetic energy, E_K ↑</td><td colspan="2">Bilangan zarah per isipadu ↑
Amount of particles per unit volume ↑</td><td>Tenaga pengaktifan ↓
Activation energy ↓</td></tr>
<tr><td colspan="4">Kekerapan perlanggaran ↑
Collision frequency ↑</td><td></td></tr>
<tr><td colspan="5">Kekerapan perlanggaran berkesan ↑
Effective collision frequency ↑</td></tr>
<tr><td colspan="5">Kadar tindak balas ↑
Rate of reaction ↑</td></tr>
</table>

Contoh soalan 7

Three experiments I, II and III are carried out to investigate the factors affecting the rate of reaction. Table 2 shows the reactants and the conditions of the reaction involved.
Tiga eksperimen I, II *dan* III *dijalankan untuk mengkaji faktor-faktor yang mempengaruhi kadar tindak balas. Jadual* 2 *menunjukkan bahan dan keadaan tindak balas yang terlibat.*

Experiment *Eksperimen*	Reactant *Bahan tindak balas*		Volume of gas collected at the end of reaction (cm^3) *Isipadu gas terkumpul di akhir tindak balas* (cm^3)	Time taken to collect the gas (s) *Masa di ambil untuk mengumpul gas* (s)
I	Excess magnesium *Magnesium berlebihan*	50 cm^3 0.5 mol dm^{-3} nitric acid 50 cm^3 *asid nitrik* 0.5 mol dm^{-3}	300	30
II	Excess magnesium *Magnesium berlebihan*	50 cm^3 1.0 mol dm^{-3} nitric acid 50 cm^3 *asid nitrik* 1.0 mol dm^{-3}	600	40
III	Excess Magnesium *Magnesium berlebihan*	50 cm^3 1.0 mol dm^{-3} nitric acid + 2 g copper(II) sulphate 50 cm^3 *asid nitrik* 1.0 mol dm^{-3} + 2 g *kuprum*(II) *sulfat*	600	30

Table 2

(a) What is the colour of copper(II) sulphate?
Apakah warna kuprum(II) *sulfat*?

_____

[1 mark]
[1 *markah*]

(b) Refering to experiments I, II and III, state:
Merujuk kepada eksperimen I, II *dan* III, *nyatakan*:

(i) The meaning of rate of reaction.
Maksud kadar tindak balas.

_____

(ii) Two factors that affect the rate of reaction.
Dua faktor yang mempengaruhi kadar tindak balas.

_____

_____

[3 marks]
[3 *markah*]

(c) Diagram 2 shows the results of Experiment II.
Rajah 2 *menunjukkan keputusan bagi Eksperimen* II.

(i) Sketch the curve obtained for experiment I and III on the same axis in Diagram 2
Lakarkan lengkung yang diperoleh dalam Ekperimen I *dan* III *pada paksi yang sama dalam Rajah* 2.

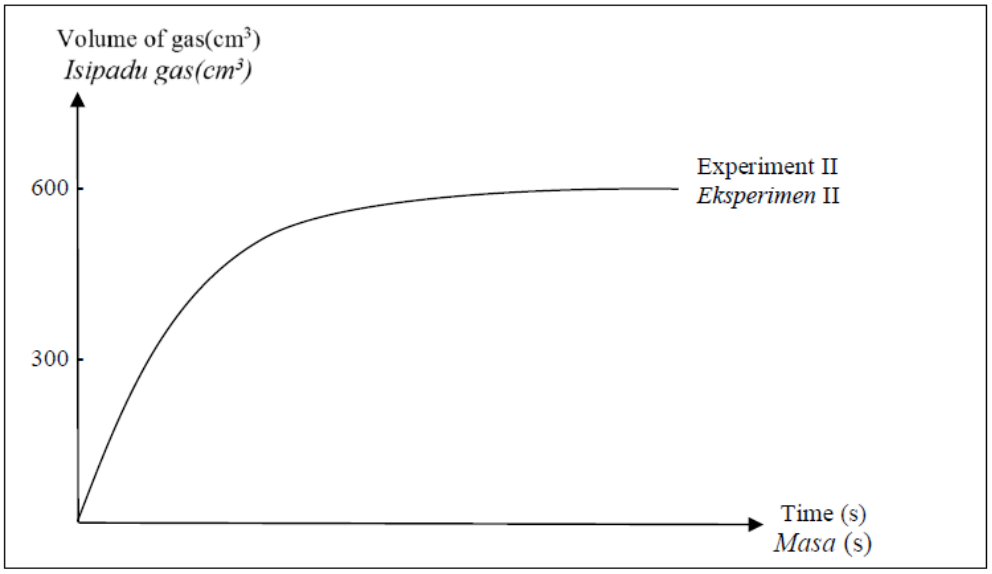


Diagram 2
Rajah 2

[2 marks]

(ii) Calculate the rate of reaction for Experiment II and III.
Hitung kadar tindak balas bagi Experimen II *dan* III.

Experiment II *Eksperimen* II	Experiment III *Eksperimen* III

[2 marks]

(d) In our daily life, human cannot live without clean water supply. Every country spends millions in water treatment to cater the needs of the people. At the treatment plant, there is a stage where small suspended particles need to coagulate to form large lumps, thus the lumps will deposit at the bottom of the coagulation tank. You, as a new chemical engineer reporting to the water treatment plant, suggest a way to accelerate the process of coagulation using the concept of rate of reactions that you have learned.

Dalam kehidupan harian kita, manusia tidak dapat hidup tanpa bekalan air bersih. Setiap negara membelanjakan jutaan ringgit dalam rawatan pembersihan air untuk menampung keperluan rakyat. Di loji rawatan air, terdapat satu peringkat di mana zarah-zarah kecil yang terampai perlu digumpal untuk membentuk butiran besar, maka butiran tersebut akan terenap ke bawah tangki penggumpalan. Anda sebagai jurutera kimia yang baru melaporkan diri di loji rawatan air tersebut, cadangkan satu cara untuk mempercepatkan proses penggumpalan dengan menggunakan konsep kadar tindak balas yang pernah anda pelajari.

[1 mark]

Elektrolisis dan sel kimia ***/ Electrolysis and chemical cell***
Logam / ***Metals*** **Kation /** ***Cation*** **Anion /** ***Anion***

Leburan / ***molten***

Kepekatan larutan / ***concentration of solution***

Jenis elektrod / ***type of electrode***

Contoh soalan 8

Diagram 3.1 shows the reaction occurred in a chemical cell using magnesium ribbon and copper plate as electrodes.

Rajah 3.1 menunjukkan tindak balas yang berlaku dalam suatu sel kimia menggunakan pita magnesium dan kepingan kuprum sebagai elektrod.

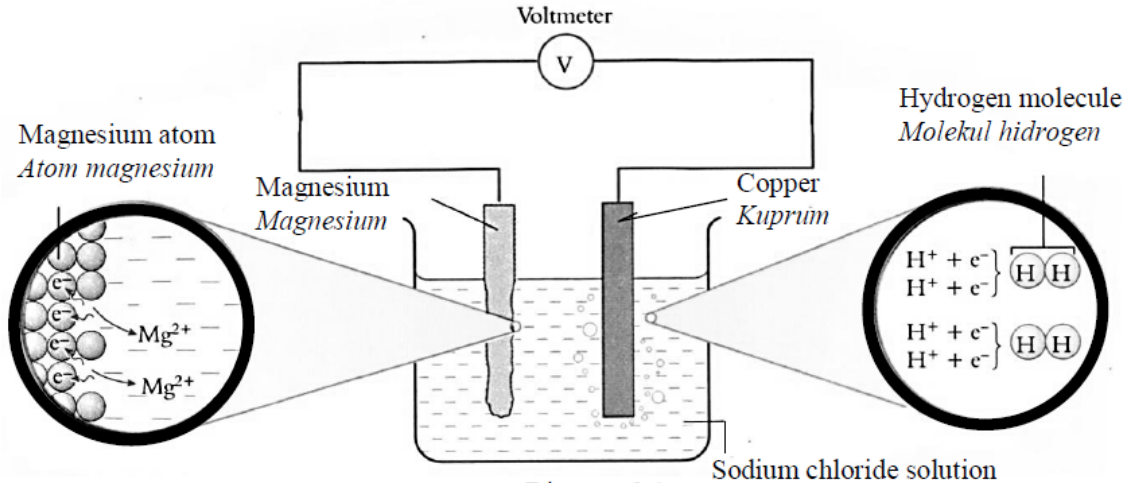


Diagram 3.1
Rajah 3.1

(a) State all the ions present in the sodium chloride solution.
Nyatakan semua ion yang hadir dalam larutan natrium klorida.

[1 mark]
[1 *markah*]

(b) Magnesium electrode acts as negative terminal.
Elektrod magnesium bertindak sebagai terminal negatif?

(i) What is the meaning of negative terminal?
Apakah yang dimaksudkan dengan terminal negatif?

[1 mark]
[1 *markah*]

(ii) State the observation at negative terminal.
Nyatakan pemerhatian pada terminal negatif.

[1 mark]

(iii) Write the half equation at negative terminal.
Tulis setengah persamaan pada terminal negatif.

[2 marks]

(c) In Diagram 3.1, magnesium rod is replaced with lead rod and the voltmeter reading is recorded. State the changes in voltage produced. Give a reason.
Dalam Rajah 3.1, rod magnesium digantikan dengan rod plumbum dan bacaan voltmeter direkodkan. Nyatakan perubahan beza upaya yang dihasilkan. Berikan alasan.

_____

_____

[2 marks]

(d) Diagram 3.2 shows a representation of an industrial process to extract aluminium metal from its ore.
Rajah 3.2 menunjukkan perwakilan bagi suatu proses industri yang digunakan untuk mengekstrak logam aluminium daripada bijihnya.

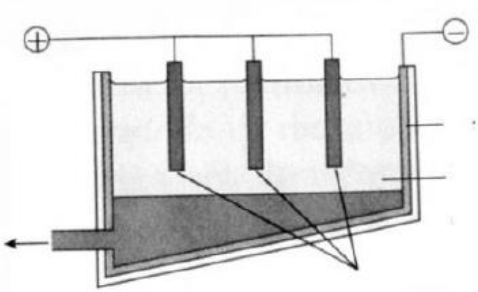


Diagram 3.2

(i) Write the chemical formula for aluminium oxide.
Tulis formula kimia bagi aluminium oksida.

_____

[1 mark]
[1 *markah*]

(ii) Name the product formed at the cathode.
Namakan hasil yang terbentuk di katod.

_____

[1 mark]
[1 *markah*]

(iii) What is the function of the cryolite?
Apakah fungsi kriolit?

_____

[1 mark]

Contoh soalan 9

(a) Diagram 4.1 shows the apparatus set-up to investigate the electrolysis of 1.0 mol dm^{-3} potassium chloride solution.
Rajah 4.1 menunjukkan susunan radas untuk mengkaji elektrolisis larutan kalium klorida 1.0 mol dm^{-3}.

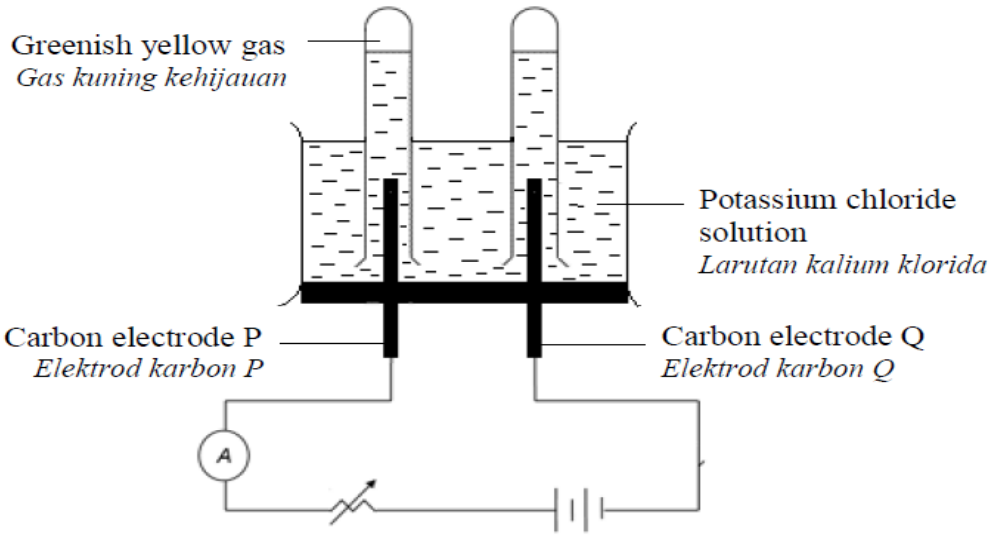


Diagram 4.1
Rajah 4.1

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

.....

[1 mark]
[1 *markah*]

(ii) State all anions that are present in potassium chloride solution.
Nyatakan semua anion yang hadir dalam larutan kalium klorida.

.....

[1 mark]

(iii) The gas collected at electrode P decolourises a moist blue litmus paper. Name the gas. Explain why the gas is released.
Gas yang terkumpul pada elektrod P melunturkan kertas litmus biru lembap. Namakan gas tersebut. Terangkan mengapa gas tersebut terhasil.

.....

.....

[2 marks]

(iv) Write the half equation to show the formation of gas in (a)(iii).
Tuliskan persamaan setengah untuk menunjukkan penghasilan gas di (a)(iii).

.....

[1 mark]

(v) What is the product formed at electrode Q?
Apakah produk yang akan terhasil di elektrod Q?

.....

[1 mark]

(vi) Describe briefly a chemical test to verify the product formed in (a)(v).
Huraikan secara ringkas ujian kimia untuk mengesahkan hasil yang terbentuk di (a)(v)

.....

.....

.....

[2 marks]

(b) A group of students were given apparatus and chemicals listed in Table 4 to produce electrical energy from chemical energy.
Sekumpulan pelajar telah diberikan alat radas dan bahan kimia seperti yang tersenarai di dalam Jadual 4 untuk menghasilkan tenaga electrik daripada tenaga kimia.

Apparatus *Alat radas*	Beaker, connecting wires, voltmeter. *Bikar, wayar penyambung, voltmeter.*
Material *Bahan kimia*	Sodium nitrate solution, a zinc strip, a copper strip, a magnesium strip *Larutan natrium nitrat, satu kepingan zink, satu kepingan kuprum, satu kepingan magnesium.*

Table 4

Based on Table 4,
Berdasarkan Jadual 4,

Draw a labeled diagram to show the formation of electrical energy from chemical energy that will produce highest potential difference.
Lukis gambar rajah berlabel untuk menunjukkan penghasilan tenaga elektrik daripada tenaga kimia yang akan menghasilkan beza keupayaan tertinggi.

[2m]

Proses Haber / *Haber process*

Proses Sentuh/ *Contact process*

1:

2:

3:

4:

Contoh soalan 10

(a) Diagram 1.1 shows the arrangement of atoms in substance J and K.
Rajah 1.1 menunjukkan susunan atom-atom untuk bahan J dan K.



Substance J
Bahan J

Substance K
Bahan K

Diagram 1.1
Rajah 1.1

(i) Identify which of the substance in Diagram 1.1 is a pure metal or alloy.
Tentukan bahan yang manakah dalam Rajah 1.1 *adalah logam tulen atau aloi.*

Pure metal / *Logam Tulen*: .....

Alloy / *Aloi*: .....
[1 mark]
[1 *markah*]

(ii) Diagram 1.2 shows a Kacip Pinang which is used as areca nut scissor to be taken with betel leaves in a traditional Malay culture. The Kacip Pinang is made from brass which is harder than pure copper.
Rajah 1.2 menunjukkan Kacip Pinang yang digunakan untuk memotong buah pinang untuk dimakan bersama daun sirih dalam adat tradisi Melayu. Kacip Pinang ini diperbuat daripada loyang yang lebih keras daripada kuprum tulen.

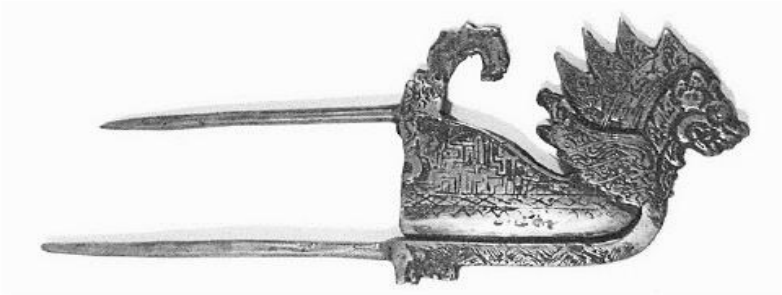


Diagram 1.2

Explain why brass is used instead of pure copper.
Terangkan mengapa loyang digunakan berbanding kuprum tulen.

.....

.....

[2 marks]

(b) Diagram 1.3 shows some examples of modern medicine.
Rajah 1.3 *menunjukkan beberapa contoh ubat moden.*

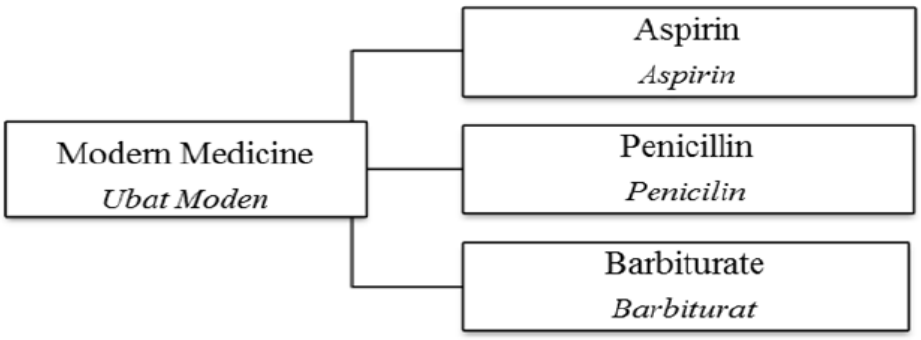


Diagram 1.3
Rajah 1.3

(i) Which substance is produced by fungi?
Bahan yang manakah dihasilkan daripada kulat?

.....

[1 mark]

(ii) What is the type of medicine for barbiturate?
Apakah jenis ubat untuk barbiturat?

.....

[1 mark]
[1 *markah*]

(iii) Aspirin is not prescribed to a patient who has gastric problems. Suggest a medicine that can be used to replace aspirin.
Aspirin tidak diberikan kepada pesakit yang mempunyai masalah gastrik. Cadangkan satu ubat yang boleh digunakan untuk menggantikan aspirin.

.....

[1 mark]

(iv) The following article shows the information about barbiturate.
Artikel berikut menunjukkan maklumat berkaitan barbiturat.

> Barbiturates are synthetic drugs used in medicine to depress the central nervous system. The effects range from mild sedation to coma and they may be used as sedatives, hypnotics or as part of anaesthesia. Some barbiturates are used to relieve tension or anxiety prior to surgery.
>
> *Barbiturat adalah ubat sintetik yang digunakan dalam perubatan untuk menekan sistem saraf pusat. Kesannya berkisar dari penenang ringan hingga koma dan mereka boleh digunakan sebagai sedatif, hipnotis atau sebagai sebahagian daripada anestesia. Sesetengah barbiturat digunakan untuk melegakan ketegangan atau kebimbangan sebelum pembedahan.*
>
> Resource/*Sumber*: https://www.news-medical.net

As a chemistry student, justify the usage of barbiturate for human health.
Sebagai pelajar kimia, pertimbangkan penggunaan barbiturat untuk kesihatan manusia.

.....

.....

.....

[3 marks]

Kertas 3
Contoh soalan 11

Diagram 2 show the products that can be made from rubber. Tyre and rubber band are widely used in our life. However tyre is more elastic than rubber band.
Rajah 2 menunjukkan produk yang dapat dihasilkan dari getah. Tayar dan gelang getah digunakan dengan meluas dalam kehidupan kita. Walaubagaimanapun tayar adalah lebih elastic daripada gelang getah.



Diagram 2
Rajah 2

Referring to the diagram, plan a laboratory experiment to investigate the elasticity of vulcanise and unvulcanised rubber.
Merujuk kepada rajah di atas, rancang satu eksperimen makmal untuk mengkaji kekenyalan bagi getah tervulkan dan getah tidak tervulkan.

Your planning should include the following aspects:
Perancangan anda hendaklah mengandungi aspek-aspek berikut:

(a) Statement of problem
Pernyataan masalah

(b) All the variables
Semua pembolehubah

(c) Statement of the hypothesis
Pernyataan hipotesis

(d) List of materials and apparatus
Senarai bahan dan radas

(e) Procedure of the experiment
Prosedur eksperimen

(f) Tabulation of data
Penjadualan data

[17 marks]

Contoh soalan 12

Table 1.1 shows an experiment to investigate the reactivity and the chemical property of Group 1 elements with oxygen. Observations are made on the combustion and the reaction of the product formed with water.
Jadual 1.1 menunjukkan satu eksperimen untuk mengkaji kereaktifan dan sifat kimia unsur-unsur Kumpulan 1 dengan oksigen. Pemerhatian dibuat terhadap pembakaran dan tindak balas antara hasil yang terbentuk dengan air.

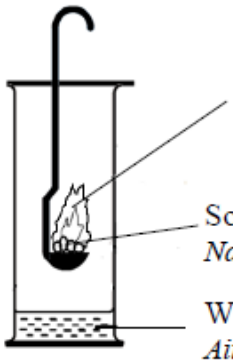
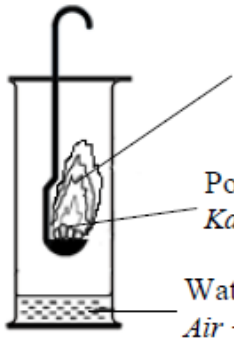
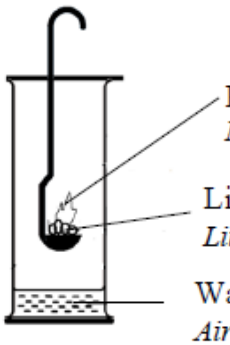
Set ***Set***	**Observation during reaction** ***Pemerhatian semasa tindak balas***	**Observation on phenolphthalein solution** ***Pemerhatian terhadap larutan fenolftalein***
I	 Yellow flame *Nyalaan kuning* Sodium *Natrium* Water + phenolphthalein solution *Air + larutan fenolftalein*	Colourless solution become pink *Larutan tidak berwarna menjadi merah jambu*
II	 Lilac flame *Nyalaan ungu* Potassium *Kalium* Water + phenolphthalein solution *Air + larutan fenolftalein*	Colourless solution become pink *Larutan tidak berwarna menjadi merah jambu*
III	 Red flame *Nyalaan merah* Lithium *Litium* Water + phenolphthalein solution *Air + larutan fenolftalein*	Colourless solution become pink *Larutan tidak berwarna menjadi merah jambu*

Table 1.1

(a) Based on Table 1.1, state the observations which can differentiate the reactivity between the three metals in Table 1.2.
Berdasarkan Jadual 1.1, *nyatakan pemerhatian yang dapat membezakan kereaktifan ketiga-tiga logam tersebut di dalam Jadual* 1.2.

Set ***Set***	**Observation** ***Pemerhatian***
I	
II	
III	

Table 1.2
Jadual 1.2

[3 *marks*]

(b) State **three** inferences from Set II.
Nyatakan ***tiga*** *inferens bagi Set* II.

1.....

2.....

3.....

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

(c) Arrange the **three** elements in ascending order of reactivity.
Susun ***ketiga-tiga*** *unsur itu mengikut tertib kereaktifan menaik.*

.....

[3 *marks*]

(d) State **one** hypothesis for this experiment based on the answer in *(c)*.
Nyatakan ***satu*** *hipotesis bagi eksperimen ini berdasarkan jawapan di (c).*

.....

.....

.....

[3 *marks*]

(e) Rubidium is placed below potassium in Group 1 of The Periodic Table of Elements.
Predict **three** observations from the reaction of rubidium.
Rubidium terletak di bawah kalium dalam Kumpulan 1 *Jadual Berkala Unsur.*
Ramalkan tiga pemerhatian daripada tindak balas antara rubidium.

1.....

2.....

3.....

[3 *marks*]

Kertas 1

1.

The following statement shows the characteristics of a metal.
Pernyataan berikut menunjukkan ciri-ciri suatu logam.

- Able to form complex ion
  Berupaya membentuk ion kompleks
- Can be used as a catalyst
  Boleh digunakan sebagai mangkin

Which of the following metals has the above characteristics?
Antara logam berikut, yang manakah mempunyai ciri-ciri di atas?

A Sodium
Natrium

B Barium
Barium

C Calcium
Kalsium

D Iron
Ferum

2.

What is the meaning of rate of reaction?
Apakah yang dimaksudkan dengan kadar tindak balas?

A Decrease in amount of reactant
Pengurangan kuantiti bahan tindak balas

B Decrease in amount of product against time
Pengurangan kuantiti hasil tindak balas dengan masa

C Increase in amount of product against time
Peningkatan kuantiti hasil tindak balas dengan masa

D Increase in amount of reactant against time
Peningkatan kuantiti bahan tindak balas dengan masa

3.

Diagram 9 shows the apparatus set-up of a chemical cell using magnesium and copper as the electrodes.
Rajah 9 menunjukkan susunan radas bagi sel kimia menggunakan magnesium dan kuprum sebagai elektrod.

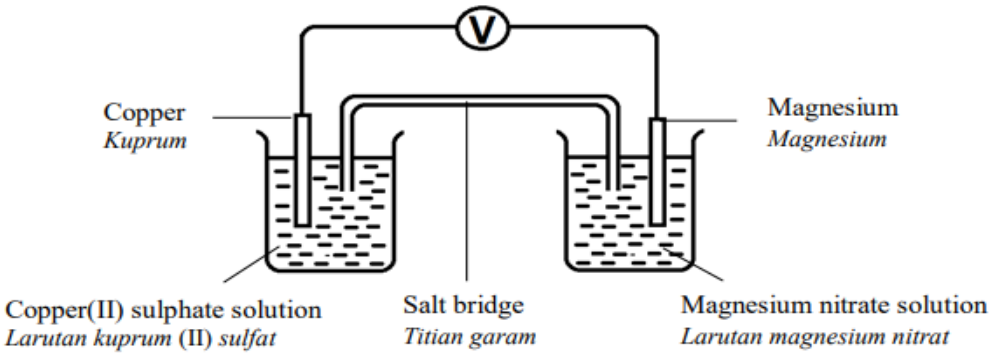


Diagram 9
Rajah 9

Which of the following are the correct products at positive and negative terminal?
Antara berikut, yang manakah hasil-hasil yang betul di terminal positif dan negatif?

	Product at positive terminal ***Hasil di terminal positif***	**Product at negative terminal** ***Hasil di terminal negatif***
A	Magnesium *Magnesium*	Copper(II) ion *Ion kuprum*(II)
B	Copper(II) ion *Ion kuprum*(II)	Hydrogen gas *Gas hidrogen*
C	Hydrogen gas *Gas hidrogen*	Copper *Kuprum*
D	Copper *Kuprum*	Magnesium ion *Ion magnesium*

4.

Table 4 shows the proton number of elements P, Q and R.
Jadual 4 menunjukkan nombor proton bagi unsur P, Q dan R.

Element ***Unsur***	**P**	**Q**	**R**
Proton number ***Nombor proton***	5	7	12

Table 4
Jadual 4

Which is the correct arrangement in descending order of atomic size of the element?
Susunan menurun saiz atom unsur yang manakah betul?

A R , Q , P
B R , P , Q
C P , Q , R
D Q , R , P

5.

Diagram 11 shows curve S which is obtained when excess granulated zinc is reacted with 50 cm^3 of 1.0 mol dm^{-3} nitric acid.
Rajah 11 menunjukkan lengkung S yang diperolehi apabila ketulan zink berlebihan bertindak balas dengan 50 cm^3 asid nitrik 1.0 mol dm^{-3}.

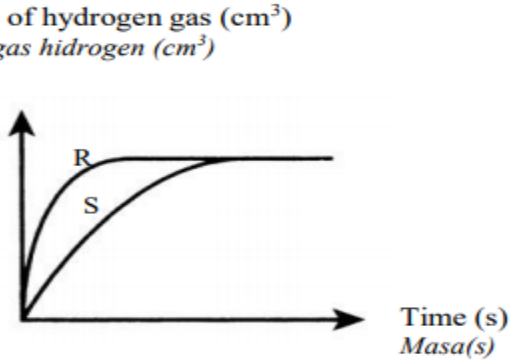


Diagram 11

Which of the following reactions produces curve R?
Antara tindak balas berikut yang manakah menghasilkan lengkung R?

A Excess zinc powder + 50 cm^3 of 2.0 mol dm^{-3} nitric acid
Serbuk zink berlebihan + 50 cm^3 asid nitrik 2.0 mol dm^{-3}

B Excess zinc powder + 50 cm^3 of 1.0 mol dm^{-3} of nitric acid
Serbuk zink berlebihan + 50 cm^3 asid nitrik 1.0 mol dm^{-3}

C Excess granulated zinc + 100 cm^3 of 1.0 mol dm^{-3} of nitric acid
Ketulan zink berlebihan + 100 cm^3 asid nitrik 1.0 mol dm^{-3}

D Excess granulated zinc + 50 cm^3 of 2.0 mol dm^{-3} of nitric acid
Ketulan zink berlebihan + 50 cm^3 asid nitrik 2.0 mol dm^{-3}

6.

The following chemical equation represents the reaction between magnesium oxide and nitric acid.
Persamaan kimia berikut mewakili tindak balas antara magnesium oksida dan asid nitrik.

$$MgO + 2HNO_3 \rightarrow Mg(NO_3)_2 + H_2O$$

Excess magnesium oxide is reacted with 50 cm^3 of 2.0 mol dm^{-3} nitric acid.
What is the maximum mass of magnesium nitrate formed?
[Relative atomic mass : C = 12, N = 14, Mg = 24]
Magnesium oksida berlebihan ditindak balaskan dengan 50 cm^3 asid nitrik 2.0 mol dm^{-3}. Berapakah jisim maksimum magnesium nitrat yang terbentuk?
[*Jisim atom relatif :* C = 12, N = 14, Mg = 24]

A 3.70 g
B 4.30 g
C 7.40 g
D 14.8 g

7.

Diagram 12 shows the composition of element in a seashell.
Rajah 12 menunjukkan komposisi unsur di dalam cengkerang siput.

	Element ***Unsur***	**Mass (g)** ***Jisim* (g)**
 Seashell *Cengkerang siput*	M	25.0
	G	7.5
	J	30.0

Diagram 12
Rajah 12

What is the empirical formula of the compound in the seashell?
[Relative atomic mass: M = 40 ; G = 12 ; J = 16]
Apakah formula empirik bagi sebatian dalam cengkerang siput tersebut?
[*Jisim atom relatif* : M = 40 ; G = 12 ; J = 16]

A MGJ

B MG_2J

C MGJ_2

D MGJ_3

8.

The following equation represents the decomposition of solid copper(II) nitrate.
Persamaan berikut mewakili tindak balas penguraian pepejal kuprum(II) *nitrat*

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

What is the volume of oxygen gas produces at room condition when 1.88 g of solid copper(II) nitrate is decomposed?
Apakah isipadu gas oksigen yang terhasil pada keadaan bilik apabila 1.88 g pepejal kuprum(II) *nitrat terurai?*

[Relative atomic mass : Cu=64; N=14; O=16 ; Molar volume of gas = 24 $dm^3\ mol^{-1}$ at room conditions]
[Jisim atom relatif : Cu=64; N=14; O=16; Isi padu molar bagi gas = 24 $dm^3\ mol^{-1}$ pada keadaan bilik]

A 12 cm^3

B 24 cm^3

C 120 cm^3

D 240 cm^3

Borang Maklum Balas Sesi Seminar SPM BACfreeschool

Sila lengkapkan borang penilaian bagi Seminar SPM yang telah anda hadiri. Penilaian anda dapat membantu kami memahami tahap keberkesanan program ini dan seterusnya membolehkan kami meningkatkan kualiti perkhidmatan kami di masa hadapan.

Terima kasih!

Please fill up this form for the session that you are attending. Your evaluation will help us improve our service and help us understand the effectiveness of this program.

Thank you!

1. Nombor Telefon
Phone Number

2. Apakah subjek bagi seminar yang sedang anda sertai sekarang?
What is the seminar's subject that you're attending now?

- ◯ Bahasa Malaysia
- ◯ English
- ◯ Sejarah
- ◯ Sains
- ◯ Science
- ◯ Matematik
- ◯ Mathematics
- ◯ Biologi
- ◯ Biology
- ◯ Kimia
- ◯ Chemistry
- ◯ Fizik
- ◯ Physics
- ◯ Matematik Tambahan
- ◯ Additional Maths
- ◯ Perniagaan
- ◯ Prinsip Perakaunan
- ◯ Ekonomi

3. Pernahkah anda menonton mana-mana video BACfreeschool (sebelum ini dikenali sebagai EduNation)?
Have you ever watched any BACFreeschool's (previously known as EduNation) videos?

- ◯ Ya
  Yes
- ◯ Tidak
  No

4. Nilai kefahaman guru terhadap isi kandungan yang diajar bagi subjek ini.
Rate the teacher's understanding of this particular subject.

Sangat Rendah *Very Low*	Rendah *Low*	Sederhana *Intermediate*	Tinggi *High*	Sangat Tinggi *Very High*
◯	◯	◯	◯	◯

5. Nilai cara penyampaian guru bagi subjek ini.
Rate the teacher's delivery of the subject.

Sangat Tidak Menarik *Very Uninteresting*	Tidak Menarik *Not Interesting*	Sederhana *Intermediate*	Menarik *Interesting*	Sangat Menarik *Very Interesting*
◯	◯	◯	◯	◯

6. Nilai tahap kepuasan terhadap nota tambahan yang telah diberikan.
Rate your satisfaction level with the notes given.

Sangat Tidak Berpuashati *Very Unsatisfied*	Tidak Berpuashati *Not Satisfied*	Sederhana *Intermediate*	Berpuashati *Satisfied*	Sangat Berpuashati *Very Satisfied*
◯	◯	◯	◯	◯

7. Nilai tahap kebergunaan isi kandungan seminar.
Rate the usefulness of the seminar's content to your SPM preparation.

Sangat Tidak Berguna *Not Very Useful*	Tidak Berguna *Not Useful*	Sederhana *Intermediate*	Useful *Berguna*	Sangat Useful *Very Useful*
◯	◯	◯	◯	◯

8. Bagi pendapat anda, 3 jam untuk satu sesi seminar adalah...
In your opinion, 3 hours per session is...

- ◯ terlalu pendek.
  too short.
- ◯ bersesuaian.
  just right.
- ◯ terlalu panjang.
  too long.

9. Adakah anda mempunyai sebarang maklum balas/komen bagi meningkatkan prestasi kami?
Do you have any additional comments, questions, or concerns you would like to share?