KEMENTERIAN PENDIDIKAN MALAYSIA

BAHAGIAN PENGURUSAN SEKOLAH BERASRAMA PENUH DAN SEKOLAH KECEMERLANGAN

2014

MODUL PERFECT SCORE KIMIA

MODUL PECUTAN KIMIA

MODUL X - APLUS KIMIA

Muka depan ini dihasilkan oleh saya sendiri

1. GARIS PANDUAN PELAKSANAAN MODUL PERFECT SCORE, PECUTAN DAN X A- PLUS KIMIA 2014

http://cikguadura.wordpress.com/

Bil	Modul	Kandungan	Masa	Catatan
1	Perfect Score Kimia SPM 2014	a) 3 Set Kertas 1 b) 3 Set Kertas 3	10 Jam	▪ Modul ini dilaksanakan di peringkat sekolah untuk semua tahap murid. ▪ Skor markah dalam kertas 1 menunjukkan penguasaan konsep kimia secara menyeluruh seperti berikut : Markah — Tahap penguasaan 0 - 19 Sangat lemah 20 – 25 Lemah 26 – 30 Sederhana 31 – 39 Baik 40 – 45 Sangat baik 46 – 50 Cemerlang ▪ Cadangan kepada guru: (i)Sediakan analisis item untuk mengenal pasti kelemahan murid dan mengajar semula konsep yang dikenal pasti. Selepas perbincangan Set 1 selesai, murid menjawab Set 2 dan seterusnya Set 3 (ii) Bagi kumpulam murid cemerlang yang disasarkan A pencapaian minimum kertas 1 adalah 40 markah manakala minimum 45 markah untuk mendapat A+ (iii) Bagi kumpulan murid berpotensi, sasaran markah kertas 1 adalah 30. Dengan pencapaian ini, kumpulan murid ini sudah bersedia untuk menjawab kertas 2 dan 3
2	Pecutan Kimia SPM 2014	Mengandungi soalan struktur , Esei Bahagian B dan C Kertas 2 untuk tajuk-tajuk berikut: 1. Chemical Formula and equation 2. Atomic Structure 3. Periodic table 4. Chemical Bond 5. Acid and base(struktur sahaja) 6. Manufacture Substance in Industry 7. Chemical for Consumers	Min 4 Jam	▪ Modul ini mengandungi **tajuk asas dan tajuk yang mudah dikuasai** oleh murid berpotensi (markah kurang 50 dalam percubaan) ▪ Guru perlu membimbing kumpulan murid ini menjawab sepenuh set ini untuk memantapkan konsep dan teknik menjawab. ▪ Sekiranya mereka selesai modul ini, mereka boleh dibimbing untuk menjawab modul X- A-Plus
3	X- A-Plus Kimia SPM 2014	Mengandungi soalan struktur , Esei Bahagian B dan C Kertas 2 untuk tajuk-tajuk berikut: 1. Acid and base(esei sahaja) 2. Salt 3. Rate of reaction 4. Thermochemistry 5. Redox 6. Carbon Compound	Min 4 Jam	▪ Modul ini mengandungi tajuk sukar yang akan dijawab oleh murid cemerlang yang disasarkan untuk mendapat A/A+ dalam SPM. ▪ Guru perlu membimbing kumpulan murid ini menjawab sepenuh set ini untuk memantapkan konsep dan teknik menjawab.

2. SASARAN :

TOV (Percubaan SPM 2014)	Target	
Cemerlang (A-/A/A+)	Semua A+	Perfect Score dan X A-Plus
Sederhana (C- B+)	Minimum A-	Perfect Score , Pecutan dan X A-Plus
Lemah (D/E)	Minimum B	Perfect Score dan Pecutan
Gagal (G)		

3. KONSTRUK KERTAS 2 SPM YANG PERLU DIFAHAMI :

PERKARA	NO	PENGETAHUAN	KEFAHAMAN	APLIKASI	ANALISIS	SINTISIS	JUMLAH
BAHAGIAN A (Struktur)	1	5	4				9
	2	3	3	3			9
	3	2	4	4			10
	4	2	3	5			10
	5	1	2	4	2	2	11
	6	1	1	3	3	3	11
BAHAGIAN B	7		4	6	10		20
	8		4	6	10		20
BAHAGIAN C	9			4	6	10	20
	10			4	6	10	20

Konstruk Kimia

1. **Pengetahuan**

Kebolehan kognitif untuk mengingat semula atau mengenalpasti elemen spesifik yang terdapat dalam suatu kandungan mata pelajaran

Sample question [SPM 2009 : Question 1(a)]

State the meaning of alloy.

2. **Kefahaman**

Kebolehan kognitif untuk mengetahui apa yang telah dikomunikasikan dan boleh menggunakan bahan atau idea yang telah dikomunikasikan tanpa menghubungkannya dengan bahan lain atau melihat semua implikasinya

Sample question [SPM 2005 : Question 8(a)]

The following information is about hydrochloric acid and ethanoic acid.

- The pH of 1 mol dm^{-3} hydrochloric acid solution is 1
- The pH of 1 mol dm^{-3} ethanoic acid solution is 4

Explain why these two solutions have different pH values.

[4 *marks*]

3. **Aplikasi**

Kebolehan menggunakan pengetahuan untuk memberikan penjelasan bagi suatu situasi baru atau menyelesaikan masalah .

Sample question [SPM 2009. Question 10]

(a) In an experiment, 50 cm^3 of 0.1 mol dm^{-3} of ethanoic acid, CH_3COOH reacts completely with *x* g of sodium hydroxide, NaOH and is dissolved in 100 cm^3 of solution.
Calculate the value of *x*.
[Given the molar mass of sodium hydroxide, NaOH is 40]

[4 *marks*]

4. **Analisis**

Kebolehan mencerakinkan elemen-elemen atau bahagian-bahagian yang terdapat dalam suatu set komunikasi sehingga suatu bentuk pertalian antara elemen-elemen atau bahagian-bahagian yang membina set kumunikasi itu dapat ditunjukkan dengan jelas

Sample Question **: [SPM 2007; Question Number 10]**

Table 10.1 shows the data from Experiment I and Experiment II that were carried out to study the rate of reaction of zinc with two acids, **P** and **Q**.

Experiment	Reactants	Products	Observation
I	2.6 g of zinc and 50 cm^3 of acid **P** 2.0 mol dm^{-3}	Zinc chloride and hydrogen gas	The temperature of the mixture increases
II	2.6 g of zinc and 50 cm^3 of acid **Q** 2.0 mol dm^{-3}	Zinc sulphate and hydrogen gas	The temperature of the mixture increases

Table 10.1

The graph in Diagram 10.2 shows the results of Experiment I and Experiment II.

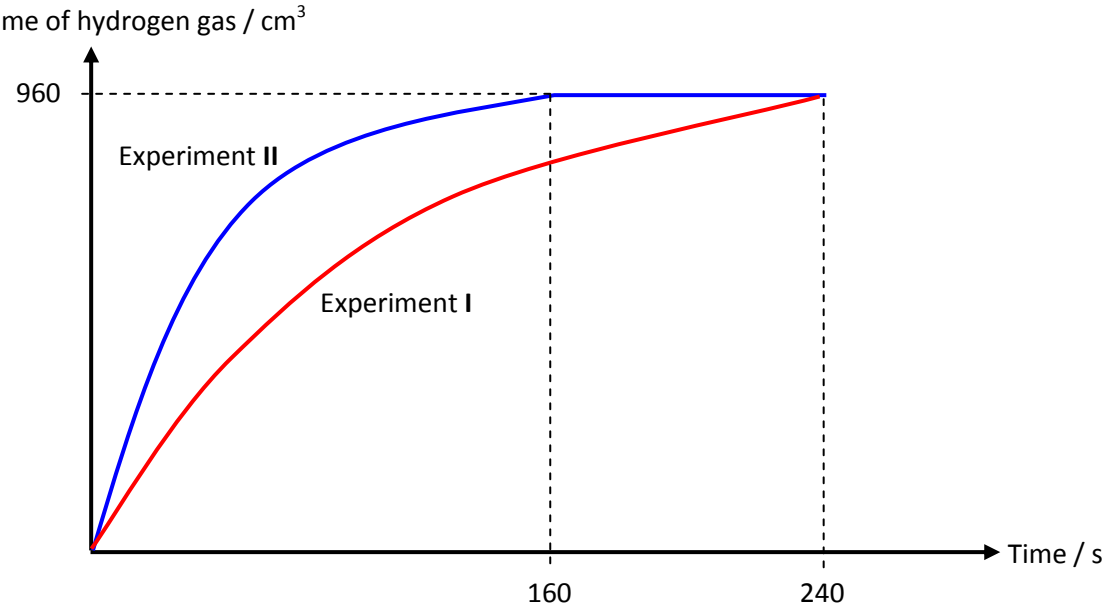

Diagram 10.2

Explain the different in the rate of reaction between Experiment I and Experiment II before 160 s. Use the collision theory in your explanation.

[6 marks]

5. **Sintesis**

Kebolehan menghubungkaitkan atau menggabungkan elemen-elemen supaya membentuk satu keseluruhan komunikasi

Sample question **[SPM 2008 .Question 10 (b)]**

Lead(II) sulphate is insoluble in water.
Describe the preparation of lead (II)sulphate in the laboratory.
In your description , include the chemical equation involved.

[10 marks]

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KERTAS 1

Nama : ..... Kelas :.....

Set	Mukasurat	Skor/50	Catatan
Set 1	2-19		
Set 2	20-39		
Set 3	40-56		

Panduan:

- Skor markah dalam kertas 1 menunjukkan penguasaan konsep kimia secara menyeluruh seperti berikut :

Markah	Tahap penguasaan
0 - 19	Sangat lemah
20 – 25	Lemah
26 – 30	Sederhana
31 – 39	Baik
40 – 45	Sangat baik
46 – 50	Cemerlang

- Untuk memastikan penguasaan konsep kimia meningkat, murid perlu mengulangkaji semula konsep kimia berkaitan nombor soalan yang salah bersama guru /fasilitator/guru muda sebelum menjawab set yang berikutnya

KERTAS 1 SET I

1 Diagram 1 shows the structure of an atom. http://cikguadura.wordpress.com/
Rajah 1 *menunjukkan struktur suatu atom*.

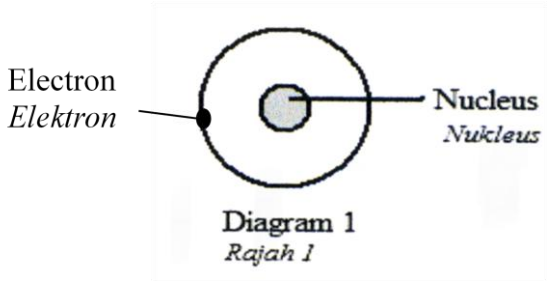


Diagram 1
Rajah 1

What are the subatomic particles in the nucleus?
Apakah zarah-zarah sub atom di dalam nukleus?

A Neutron only
Neutron sahaja
B Proton and neutron
Proton dan neutron
C Electron and proton
Elektron dan proton
D Electron and neutron
Elektron dan neutron

2 Which of the following pairs are matched correctly ?
Antara berikut, yang manakah pasangan yang betul ?

	Atom *Atom*	Ion *Ion*	Molecule *Molekul*
A	Ammonia *Ammonia*	Sodium chloride *Natrium klorida*	Carbon *Karbon*
B	Magnesium *Magnesium*	Mercury *Raksa*	Carbon dioxide *Karbon dioksida*
C	Sodium *Natrium*	Lithium oxide *Litium oksida*	Bromine *Bromin*
D	Copper (II) sulphate *Kuprum (II) sulfat*	Sulphur dioxide *Sulfur dioksida*	Hydrogen *Hidrogen*

3 Carbon-14 is an isotope of carbon. What is the use of carbon-14?
Karbon-14 *adalah isotop bagi karbon. Apakah kegunaan karbon*-14?

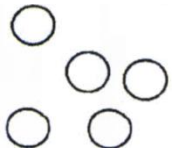
A Estimate the age of fossils and artefacts
Menganggar umur fosil dan artifak
B Radiotherapy for the treatment of cancer
Radioterapi untuk merawat kanser
C Regulate the heartbeats of patients with heart problems
Memulihkan degupan jantung pesakit jantung
D Destroy bacteria in food without changing the quality of food
Memusnahkan bakteria dalam makanan tanpa mengubah kualiti niakanan

4 Which diagram shows the strongest attraction force between the particles?
Rajah manakah menunjukkan daya tarikan antara zarah yang paling kuat?

A

C

B



D

5 What is the meaning of one mole of substance?
Apakah maksud satu mol bagi suatu bahan?

A The number of particle of any substance.
Bilangan zarah bagi suatu bahan.

B One mole of substance contains 6.02×10^{20} particles.
Satu mol bahan mengandungi 6.02×10^{20} *zarah*.

C The mass of one mole of any substance is call relative atomic mass.
Jisim satu mol suatu bahan dipanggil jisim atom relatif.

D The amount of substance that contains as many particles as the number of atoms in exactly 12 g of carbon-12.
Jumlah suatu bahan yang mengandungi bilangan zarah sama dengan bilangan atom dalam 12 g *karbon*-12.

6 Elements in the Periodic Table are arranged according to the increasing
Unsur-unsur di dalam Jadual Berkala disusun berdasarkan pertambahan

A number of electrons
bilangan elektron

B number of neutrons
bilangan neutron

C proton number
nombor proton

D nucleon number
nombor nukleon

7 Which of the following processes absorbs heat from the surroundings?
Antara proses yang berikut, yang manakh menyerap haba dari persekitaran?

A Reaction between zinc and hydrochloric acid
Tindak balas antara zink dan asid hidroklorik

B Diluting concentrated sulphuric acid with water
Mencairkan asid sulfurik pekat dengan air

C Decomposition of calcium carbonate
Penguraian kalsium karbonat

D Neutralisation between acid and alkali
Peneutralan antara asid dan alkali

8 Chloroform is an organic compound with formula $CHCl_3$. Chloroform is used as solvent in the laboratory. Which of the following statement is true about chloroform?
Kloroform adalah satu sebatian organik dengan formula $CHCl_3$. *Kloroform digunakan sebagai pelarut di makmal. Antara pernyataan berikut, yang manakah benar tentang chloroform*?

I Chloroform has covalent bonds
Kloroform mempunyai ikatan kovalen
II Chloroform has low melting and boiling points
Kloroform mempunyai takat lebur dan takat didih yang rendah
III Chloroform is very soluble in water
Kloroform sangat larut di dalam air
IV Chloroform can conduct electricity in the liquid statate
Kloroform boleh mengalirkan arus elektrik dalam keadaan cecair

A I and II
B I and IV
C II and IV
D III and IV

9 Which of the following is not an application of electrolysis in industry?
Antara berikut yang manakah bukan kegunaan elektrolisis dalam industri?

A Purification of metals/*Penulenan logam*
B Melting of metals/*Peleburan logam*
C Electroplating of metals/*Penyaduran logam*
D Extraction of metals/*Pengekstrakan logam*

10 Which of the following solutions has the highest pH value?
Larutan manakah yang mempunyai nilai pH yang paling tinggi?

A 0.5 mol dm^{-3} ethanoic acid
Asid etanoik, 0.5 mol dm^{-3}
B 0.5 mol dm^{-3} sulphuric acid
Asid sulfurik, 0.5 mol dm^{-3}
C 0.5 mol dm^{-3} aqueous ammonia
Akueus ammonia, 0.5 mol dm^{-3}
D 0.5 mol dm^{-3} sodium chloride
Natrium klorida, 0.5 mol dm^{-3}

11 A few drops of phenolphthalein is added to nitric acid and potassium hydroxide solution respectively.
What is the colour of the solutions after phenolphthalein is added?
Beberapa titik fenolftalein ditambah kepada asid nitrik dan larutan kalium hidroksida secara berasingan.
Apakah warna larutan-larutan selepas ditambah fenolftalein?

	Nitric acid/ *Asid nitrik*	Potassium hydroxide solution *Larutan kalium hidroksida*
A	Pink *Merah jambu*	Colourless *Tidak berwarna*
B	Colourless *Tidak berwarna*	Colourless *Tidak berwarna*
C	Red *Merah*	Yellow *Kuning*
D	Colourless *Tidak berwarna*	Pink *Merah jambu*

12 Table 1 shows the proton number of elements W, X, Y and Z.
Jadual 1 *menunjukkan nombor proton bagi unsur* W, X, Y *dan* Z.

Element *Unsur*	W	X	Y	Z
Proton number *Nombor proton*	6	10	11	17

Table 1
Jadual 1

Which of the following pairs of elements can form covalent compound?
Antara pasangan berikut unsur yang manakah boleh membentuk sebatian kovalen?

A W and Z
W *dan* Z
B W and Y
W *dan* Y
C Y and Z
Y *dan* Z
D X and Y
X *dan* Y

13 Diagram 2 shows the molecular formulae of two hydrocarbon compound.
Rajah 2 *menunjukkan formula molekul bagi dua sebatian hidrokarbon*.

Diagram 2

Which of the following is true about compounds P and Q?
Antara berikut, yang manakah benar tentang sebatian P dan *Q*?

A Compound P produces more soot when burnt in air
Sebatian P *menghasilkan lebih jelaga apabila terbakar dalam udara*
B Compound Q decolourises brown bromine water, compound P does not
Sebatian Q *menyahwarnakan warna perang air bromine, sebatian* P *tidak.*
C Compound P is a saturated hydrocarbon, compound Q is an unsaturated hydrocarbon.
Sebatian P *adalah hidrokarbon tepu, sebatian* Q *adalah hidrokarbon tak tepu*.
D Compound P undergoes substitution reaction, compound Q undergoes addition reaction.
Sebatian P *mengalami tindak balas penukargantian, sebatian* Q *mengalami tindak balas penambahan.*

14 Which of the following soluble in water?
Antara berikut yang manakah larut di dalam air?
A Silver chloride
Argentum klorida
B Barium sulphate
Barium sulfat
C Calcium nitrate
Kaslium nitrat
D Copper(II) carbonate
Kuprum(ll) *karbonat*

15 ‘Claypot Mee’ is one of the famous cuisines in Malaysia. Diagram 3 shows the picture of ‘Claypot Mee’.
‘Claypot Mee’ adalah salah satu sajian yang terkenal di Malaysia. Rajah 3 *menunjukkan gambar ‘Claypot Mee’.*

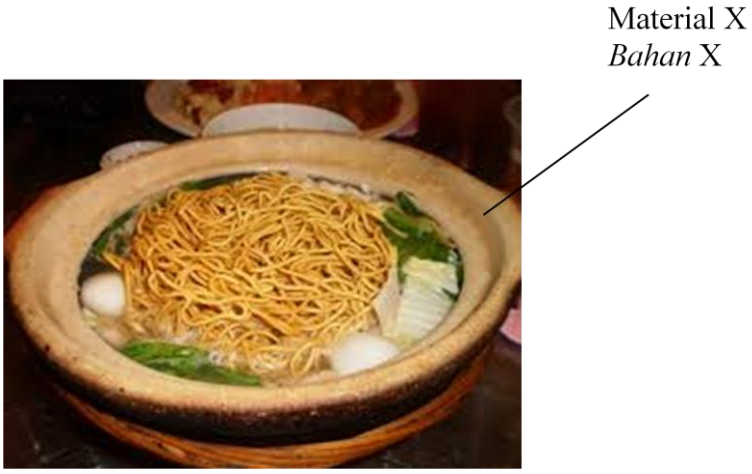


Diagram 3

Material X is used as a pot to cook the ‘Claypot Mee’.
Which of the following are the properties of Material X?
Bahan X *digunakan sebagai periuk untuk memasak ‘Claypot Mee’.*
Antara yang berikut, yang manakah ciri-ciri bahan X?

I Hard but brittle
Keras tapi rapuh
II High melting point
Takat lebur yang tinggi
III Good heat conductor
Konduktor haba yang baik
IV High resistance to the chemical reactions
Sangat tahan terhadap tindak balas kimia

A I, II and III
I, II *dan* III

B I, II and IV
I, II *dan* IV

C I, III and IV
I, III *dan* IV

D II, III and IV
II, III *dan* IV

16 Which characteristic of ammonia enables to show alkaline properties in water?
Ciri ammonia yang manakah membolehkannya menunjukkan sifa kealkaliannya di dalam air?

A Dissolves in water
Larut di dalam air
B Exists as molecule in water
Wujud sebagai molekul dalam air
C Contains hydrogen in its molecules
Mengandungi hidrogen dalam molekulnya
D Ionises in water to form hydroxide ions
Mengion dalam air untuk membentuk ion-ion hidroksida

17 Which pair of monomer and polymer is correct?
Pasangan monomer dan polimer yang manakah betul?

	Monomer *Monomer*	Polymer *Polimer*
A	Methyl methacrylate *Metil metakrilat*	Ethene *Etena*
B	Chloroethene *Kloroetena*	Polyvinyl chloride *Polivinil klorida*
C	Isoprene *Isoprena*	Polystrene *Polistirena*
D	Propene *Propena*	*Perspex* *Perspeks*

18 Zinc granule reacts with dilute hydrochloric acid, HCl to give off hydrogen gas.
Which of the following statement explain why the rate of reaction decreases with time?
Ketulan zink, Zn *bertindak balas dengan asid hidroklorik cair,* HCl*, membebaskan gas hidrogen.*
Antara pernyataan berikut, yang manakah menerangkan mengapa kadar tindak balas berkurang dengan masa?

A The temperature of the reaction mixture increases
Suhu campuran bahan tindak balas bertambah
B The total surface area of the zinc, Zn granules increases
Jumlah luas permukaan bagi ketulan zink, Zn bertambah
C The concentration of dilute hydrochloric acid, HCl decreases
Kepekatan asid hidroklorik cair semakin berkurang
D The frequency of collision between the reactants increases
Bilangan perlanggaran berkesan di antara bahan tindak balas bertambah

9 Diagram 4 shows the set up of the apparatus for a reaction
Rajah 4 menunjukkan susunan radas bagi satu tindak balas.

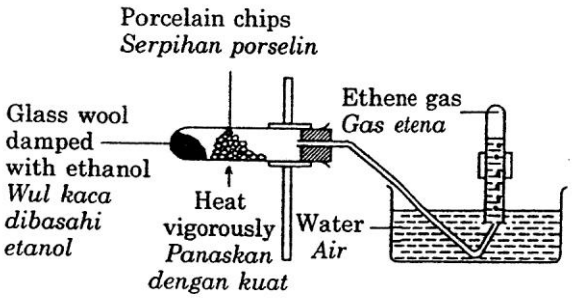


Diagram 4
Rajah 4

What is the reaction?
Apakah tindak balas itu?
A Esterification
Pengesteran
B Cracking
Peretakan
C Dehydration
Pendehidratan
D Oxidation
Pengoksidaan

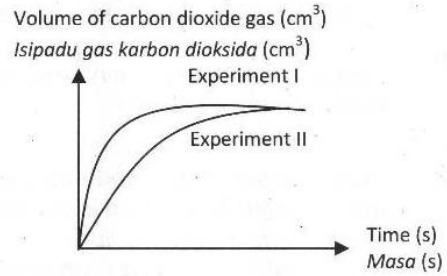
20 Table 2 shows the information of two experiments.
Jadual 2 *menunjukkan maklumat bagi dua eksperimen.*

Experiment I *Eksperiment* I	20 cm^3 of 0.2 mol dm^{-3} hydrochloric acid and excess smaller calcium carbonate chips 20 cm^3 of 0.2 mol dm^{-3} *asid hidroklorik dan ketulan kecil kalsium karbonat yang berlebihan*
Experiment II *Eksperiment* II	20 cm^3 of 0.2 mol dm^{-3} hydrochloric acid and excess bigger calcium carbonate chips 20 cm^3 of 0.2 mol dm^{-3} *asid hidroklorik dan ketulan besar kalsium karbonat yang berlebihan*

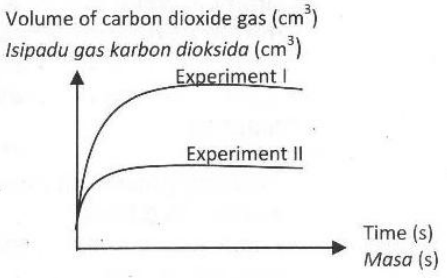
Table 2
Jadual 2

Which of the following graphs shows the volume of carbon dioxide gas collected against time in both experiments?
Antara graf berikut, yang manakah menunjukkan isipadu gas karbon dioksida yang dikumpul melawan masa bagi kedua-dua eksperimen tersebut?

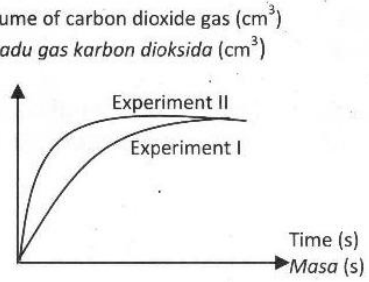
A



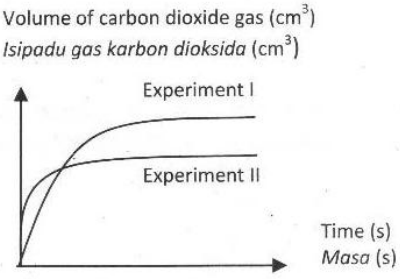
C



B



D



21 The following equation represents a reaction for industrial preparation of propanol.
Persamaan berikut mewakili tindak balas penyediaan propanol secara industri.

$$P + H_2O \xrightarrow[\text{Catalyst X, 300 } ^oC/\text{ 60 atm}]{\text{Mangkin X, 300 } ^oC/\text{ 60 atm}} CH_3CH_2CH_2OH$$

What is P and catalyst X?
Apakah P *dan mangkin* X?

	P	Catalyst X
A	C_2H_4	Nickel/*Nikel*
B	C_3H_6	Platinum/*Platinum*
C	C_2H_4	Sulphuric acid/*Asid sulfurik*
D	C_3H_6	Phosphoric acid/*Asid fosforik*

22 Table 3 shows the boiling points of three elements in Group 17.
Jadual 3 *menunjukkan takat didih bagi tiga unsur dalam kumpulan* 17.

Halogen *Halogen*	Boiling point (^{o}C) *Takat didih* (^{o}C)
Fluorine Fluorin	-188
Chlorine Klorin	-35
Bromine Bromin	-59

Table 3/*Jadual* 3

Which of the following best explain why the boiling point increases down the group?
Pernyataan manakah yang menerangkan mengapa takat didih bertambah apabila menuruni kumpulan?

A Increase in proton number
Pertambahan nombor proton

B Increase in the strength of intermolecular forces
Pertambahan kekuatan daya tarikan antara molekul

C Increase in number of occupied shells of the atom
Pertambahan bilangan petala berisi elektron dalam atom

D Increase in the strength of covalent bond between the atoms
Pertambahan kekuatan ikatan kovalen antara atom-atom

23 Which of the following will happen when iron rusts?
Antara berikut, yang manakah akan berlaku apabila besi berkarat?

A Iron is reduced
Besi diturunkan

B Iron as cathode
Besi sebagai katod

C Atom of iron gains electron
Atom besi menerima elektron

D Oxidation number of iron increase
Nombor pengoksidaan besi bertambah

24 Iron (III) ions can be reduced to iron (II) ions by substance X.
Which of the following is substance X?
Ion ferum (III) *boleh diturunkan kepada ion ferum* (II) *oleh bahan* X.
Antara beriukt, yang manakah bahan X?

A Zinc
Zink

B Chlorine water
Air klorin

C Acidified potassium manganate (VII) solution
Larutan kalium manganat (VII) *berasid*

D Acidified potasiium dichromate (VI) solution
Larutan kalium dikromat (VI) *berasid*

25 Diagram 5 is an energy level diagram
Rajah 5 *adalah gambar rajah aras tenaga*

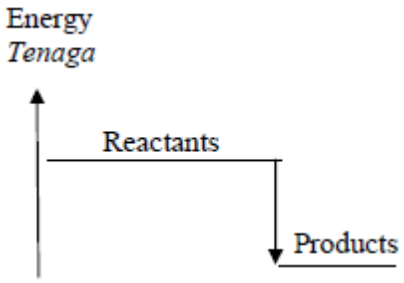


Diagram 5

Which statement is true about this energy level diagram?
Pernyataan manakah yang benar mengenai gambar rajah aras tenaga ini?

A Heat is absorbed
Haba diserap

B Heat is needed to start the reaction
Haba diperlukan untuk memulakan tindak balas

C The surrounding temperature increase
Suhu persekitaran meningkat

D The products contain more energy than the reactants
Hasil tindak balas mengandungi lebih tenaga daripada bahan tindak balas

26 The information below shows the reaction between carboxylic acid and alcohol.
Maklumat berikut menunjukkan tindak balas antara asid karboksilik dan alkohol.

Carboxylic acid + alcohol → substance X + water

Asid karboksilik + alkohol → bahan X + *air*

What is the function of substance X in food processing?
Apakah fungsi bahan X *dalam pemprosesan makanan*?

A Colouring/*Pewarna*
B Flavouring/*Perisa*
C Antioxidant/*Antioksidan*
D Preservative/*Pengawet*

27 Which of the following statement is true about natural rubber?
Antara berikut, pernyataan yang manakah benar tentang getah asli?

A Natural rubber is elastic
Getah asli adalah kenyal

B Natural rubber is acidic
Getah asli adalah berasid

C Natural rubber dissolves in water
Getah asli larut dalam air

D Natural rubber becomes hard when heated
Getah asli menjadi keras apabila dipanaskan

28 Which of the following is correct about the detergent additives and their functions?
Manakah antara berikut benar tentang bahan tambahan detergen dan fungsinya?

	Detergent additive *Bahan tambahan detergen*	Function *Fungsi*
A	Sodium perborate *Natrium perborat*	To soften the water *Untuk melembutkan air*
B	Sodium tripolyphosphate *Natrium tripolifosfat*	To whiten the fabric *Memutihkan kain*
C	Sodium sulphate *Natrium sulfat*	To remove protein stain *Menyingkirkan kotoran protein*
D	Diethanolamide *dietanolamida*	To control foaming *Mengawal buih*

29 What is the number of atoms in 2 mol of carbon monoxide gas, CO?
Berapakah bilangan atom yang terdapat dalam 2 mol gas karbon dioksida, CO?
[Avogadro constant: 6.02 X 10^{23}]
[*Pemalar Avogadro*: 6.02 X 10^{23}]

A 1.204 X 10^{23}
B 6.02 X 10^{23}
C 1.204 X 10^{24}
D 2.408 X 10^{24}

30 Metal M react with 0.48 g of oxygen to form 1.52 g of M oxide.
Determine the empirical formula of M oxide.
Logam M *bertindak balas dengan 0.48 g oksigen untuk membentuk 1.52 g oksida* M.
Tentukan formula empirik oksida M.
[Relative atomic mass: O=16, M=52]
[*Jisim atom relatif*: O=16, M=52]

A MO
B MO_2
C M_2O_3
D M_3O_2

31 Both hydrochloric acid, HCl and ethanoic acid, CH_3COOH have the same concentration, 1.0 mol dm^{-3}.Which of the following statement is true?
Kedua-dua asid hidroklorik, HCl *dan asid etanoik, mempunyai kepekatan yang sama,* 1.0 *mol* dm^{-3}*.Antara pernyataan berikut, yang manakah benar*?

A Have same pH value
Mempunyai nilai pH *yang sama*
B Different concentration of hydrogen ions
Berbeza kepekatan ion hidrogen
C Have the same concentration of hydroxide ions
Mempunyai kepekatan ion hidroksida yang sama
D Degree of ionisation of ethanoic acid in water is higher than hydrochloric acid
Darjah pengionan asid etanoik dalam air lebih tinggi daripada asid hidroklorik

32 Which of the following substances are suitable to prepare pure copper (II) chloride?
Antara bahan berikut, yang manakah sesuai untuk menyediakan kuprum (II) klorida tulen?

A Hydrochloric acid and copper
Asid hidroklorik dan kuprum
B Sodium chloride and copper (II) nitrate
Natrium klorida dan kuprum (II) *nitrat*
C Hydrochloric acid and copper (II) oxide
Asid hidroklorik dan kuprum (II) *oksida*
D Copper (II) carbonate and potassium chloride
Kuprum (II) *karbonat dan kalium klorida*

33 The ionic equation below represents a redox reaction.
Persamaan ionik di bawah mewakili satu tindak balas redoks.

$$2Fe^{2+} + Br_2 \longrightarrow 2Fe^{3+} + 2Br^-$$

Which statements is true?
Pernyataan manakah benar?

A Iron (II) ion, Fe^{2+} is oxidized
Ion ferum (II), Fe^{2+} *dioksidakan*
B Iron (III) ion, Fe^{3+} is reduced
Ion ferum (III), Fe^{3+} *diturunkan*
C Bromine is the reducing agent
Bromin adalah agen pengoksidaan
D Oxidation number of bromine decrease from 0 to -2
Nombor pengoksidaan bromin berkurang daripada 0 *kepada* -2

34 Table 3 shows the total volume of gas collected at regular interval in reaction.
Jadual 3 *menunjukkan isipadu gas terkumpul pada sela masa tertentu*.

Time/second *Masa/s*	0	30	60	90	120	150	180	210
Volume of gas/ cm^3 *Isipadu gas/* cm^3	0	2.0	3.7	5.2	6.4	7.3	8.6	8.6

Table 3
Jadual 3

What is the average rate of reaction?
Berapakah kadar tindak balas purata?

A 0.041 cm^3s^{-1}
B 0.048 cm^3s^{-1}
C 0.053 cm^3s^{-1}
D 0.067 cm^3s^{-1}

35 Diagram 6 shows a woman that wearing glasses at two different places.
Rajah 6 *menunjukkan seorang wanita memakai cermin mata pada dua tempat yang berbeza*.

Inside the building
Dalam bangunan

Outside the building
Di luar bangunan

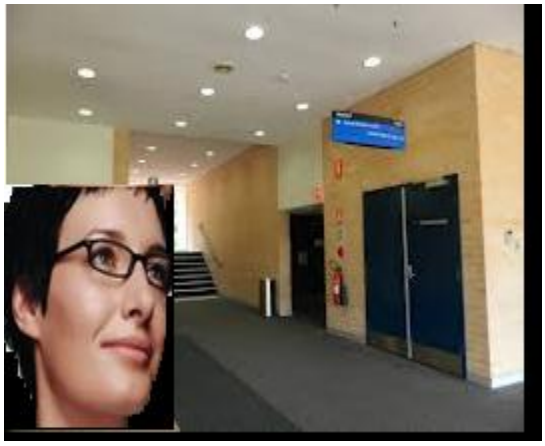


Diagram 6
Rajah 6

Which of the following substance is added to molten glass to produce these glasses?
Antara bahan berikut, yang manakah ditambahkan kepada kaca lebur untuk menghasilkan cermin mata ini?

A Lead (II) nitrate
Plumbum (II) *nitrat*
B Copper (II) sulphate
Kuprum (II) *sulfat*
C Boron oxide
Boron oksida
D Silver chloride
Argentum klorida

36 The chemical formula of butene is C_4H_8. Determine the relative molecular mass for the alcohol that same number of carbon atom with butene.
[Relative atomic mass of H=1, C=12, O=16]
Formula kimia bagi butena ialah C_4H_8. *Tentukan jisim molekul relatif bagi alkohol yang mempunyai bilangan atom karbon yang sama dengan butena.*
[*Jisim atom relatif* H=1, C=12, O=16]

A 30
B 48
C 56
D 74

37 Diagram 7 shows part of the structure of a polypropene.
Rajah 7 menunjukkan sebahagian struktur polipropene.

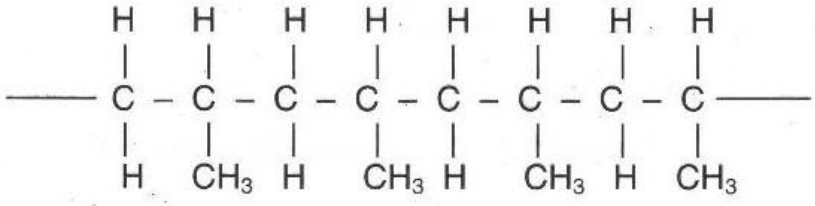
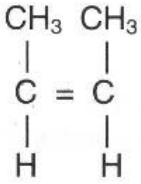


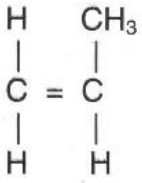
Diagram 7
Rajah 7

What is the monomer for the polymer?
Apakah monomer untuk polimer ini?

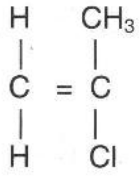
A



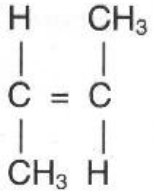
C



B



D



38 The following chemical reaction represents the reaction between lead (II) nitrate and sodium chloride solutions.
Persamaan kimia berikut menunjukkan tindak balas antara larutan plumbum (II) *nitrat dan larutan natrium klorida*.

$$Pb(NO_3)_2 + 2NaCl \longrightarrow PbCl_2 + 2NaNO_3$$

The product of the reaction are filtered using a filter paper. If 11.12 g of salt are collected on the filter paper, what is the volume of 0.4 mol dm^{-3} of sodium chloride solution used?
[Relative atomic mass: Pb=207; N=14; O=16; Na=23; Cl=35.5]

Hasil tindak balas dituras dengan menggunakan kertas turas. Sekiranya 11.12 g *garam terkumpul di atas kertas turas, berapakah isipadu larutan natrium klorida,* 0.4 mol dm^{-3} *yang digunakan*?
[*Jisim atom relatif*: Pb=207; N=14; O=16; Na=23; Cl=35.5]

A 20 cm^3
B 40 cm^3
C 200 cm^3
D 400 cm^3

39 Diagram 8 shows a simple voltaic cell.
Rajah 8 *menunjukkan satu sel kimia ringkas*.

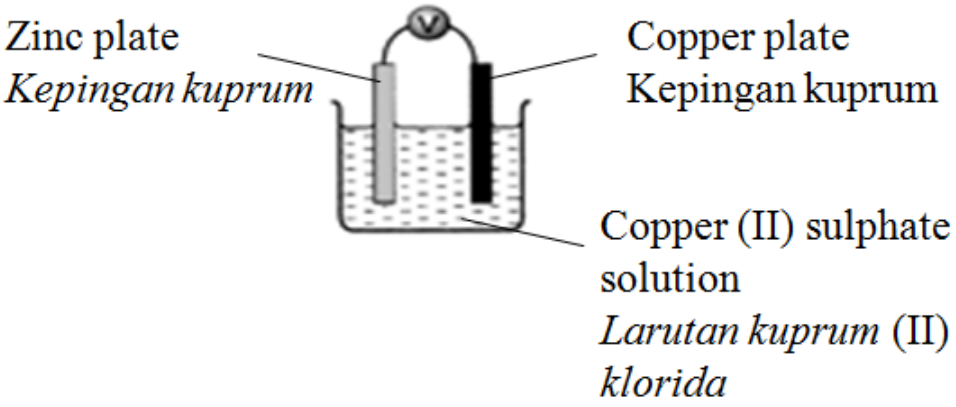


Diagram 8/*Rajah* 8

Which substance undergoes oxidation in the chemical cell?
Bahan manakah mengalami pengoksidaan dalam sel kimia?

A Zinc
Zink
B Copper
Kuprum
C Copper (II) ions
Ion kuprum (II)
D Hydrogen ions
Ion hidrogen

40 Table 5 shows an atom E with its proton number and nucleon number.
Jadual 5 *menunjukkan nombor proton dan nombor nukleon bagi atom* E.

Proton number *Nombor proton*	14
Nucleon number *Nombor nukleon*	28

Table 5
Jadual 5

Which group and period is E located in the Periodic Table?
Kumpulan dan kala manakah E *terletak dalam Jadual Berkala*?

	Group *Kumpulan*	Period *Kala*
A	4	3
B	13	4
C	4	3
D	14	3

41 Diagram 9 shows a spoon of coffee beans that contains 30 pieces of coffee beans.
Rajah 9 *menunjukkan satu sudu biji kopi yang mengandungi 30 butir biji kopi.*

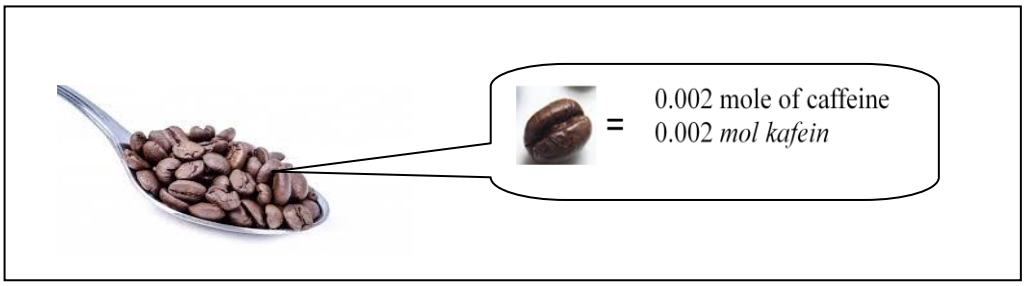


Diagram 9

Caffeine is found in the coffee beans. Its molecular formula is $C_4H_5N_2O$. If one coffee bean contains 0.002 mole of caffeine, determine mass of the caffeine that contains in the spoon above.[Relative atomic mass: H=1; C=12; N=14; O=16]
Kafein dijumpai di dalam biji kopi. Formula molekulnya ialah $C_4H_5N_2O$. *Jika sebutir biji kopi mengandungi* 0.02 *mol kafein. tentukan jisim kafein yang terdapat di dalam sudu berkenaan.* [*Jisim atom relatif*: H=1; C=12; N=14; O=16]

A 0.194 g
B 2.913 g
C 5.820 g
D 9.103 g

42 Diagram 10 shows the set of apparatus of an experiment to investigate the redox reaction in terms of the electron transfer at a distance.
Rajah 10 *menunjukkan susunan radas satu eksperimen untuk mengkaji tindak balas redoks berdasarkan pemindahan elektron pada satu jarak*.

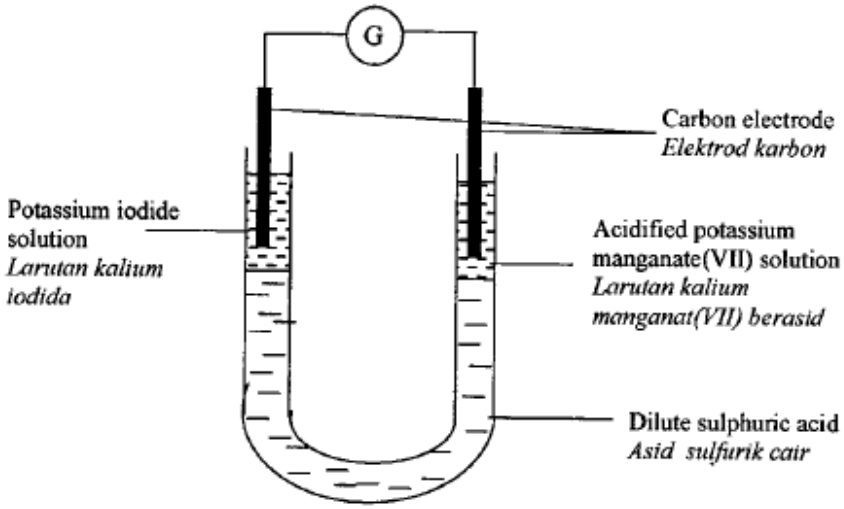


Diagram 10

Which statement is true about the experiment?
Antara pernyataan berikut, yang manakah benar tentang eksperimen itu?

A Iodide ion is the oxidising agent/*Ion iodida adalah agen pengoksidaan*
B Oxidation number of iodine decreases from 0 to -1
Nombor pengoksidaan iodin menurun dari 0 *ke* -1
C Oxidation number of manganese decreases from +7 to +2
Nombor pengoksidaan mangan menurun dari +7 *ke* +2
D Electron flow from potassium iodide solution to acidified potassium mnganate (VII) through sulphuric acid
Elektron mengalir dari larutan kalium iodida ke larutan kalium manganat (VII) *berasid melalui asid sulfurik*

43 5.6 g of potassium hydroxide is dissolved in distilled water to form 250 cm^3 solution. What is the concentration of the sodium hydroxide solution?
5.6 g *kalium hidroksida dilarutkan ke dalam* 250 cm^3 *air suling*. A*pakah kepekatan larutan kalium hidroksida itu*?
[Relative atomic mass: H=1; K=39; O=16]
[*Jisim atom relatif*: H=1; K=39; O=16]

A 0.02 mol dm^{-3}
B 0.25mol dm^{-3}
C 0.40 mol dm^{-3}
D 1.12 mol dm^{-3}

44 Table 6 shows the electron arrangements for atom of element T and atom of element U.
Jadual 6 *menunjukkan susunan elektron bagi atom unsur* T *dan atom unsur* U.

Element *Unsur*	Electron arrangement *Susunan elektron*
T	2.4
U	2.8.6

Table 6
Jadual 6

Which pair of formula and type of bond is correct when element T reacts with element U?
Antara pasangan formula dan jenis ikatan berikut, yang manakah benar apabila unsur T *bertindak balas dengan unsur* U?

	Formula/*Formula*	Type of bond/*Jenis ikatan*
A	T_2U	Ionic/*Ionik*
B	TU_2	Ionic/*Ionik*
C	T_2U	Covalent/*Kovalen*
D	TU_2	Covalent/*Kovalen*

45 Table 7 shows information about three voltaic cells.
Jadual 7 *menunjukkan maklumat berkenaan tiga sel voltan*.

Pairs of metal *Pasangan logam*	Potential difference (V) *Beza keupayaan* (V)	Negative terminal *Terminal negatif*
R and copper R *dan kuprum*	0.44	R
S and copper S *dan kuprum*	1.70	S
T and copper T *dan kuprum*	0.53	Cu

Table 7
Jadual 7

What is the potential difference for the pair of metal S and T?
Apakah beza keupayaan bagi pasangan logam S *dan* T?

A 0.97 V
B 2.14 V
C 2.23 V
D 2.67 V

46 Table 8 shows the result obtained from the reaction between hydrochoric acid and calcium carbonate.
Jadual 8 *menunjukkan keputusan yang diperolehi daripada tindak balas antara asid hidroklorik dan kalsium karbonat*.

Time/minute *Masa/minit*	0	0.5	1.0	1.5	2.0	2.5	3.0
Volume of CO_2 gas / cm^3 *Isipadu gas* CO_2 / cm^3	0	170	260	305	340	350	350

Table 8

Calculate the average rate of reaction in the second minute.
Kira kadar tindak balas purata dalam minit kedua.
A 40.0 cm^3 min^{-1}
B 80.0 cm^3 min
C 140.0 cm^3 min
D 340.0 cm^3 min

47 Diagram 11 shows the apparatus set-up for the titrataion of potassium hydroxide solution with sulphuric acid./*Rajah* 11 *menunjukkan sususan radas bagi proses pentitratan larutan kalim hidroksida dengan asid sulfurik*.

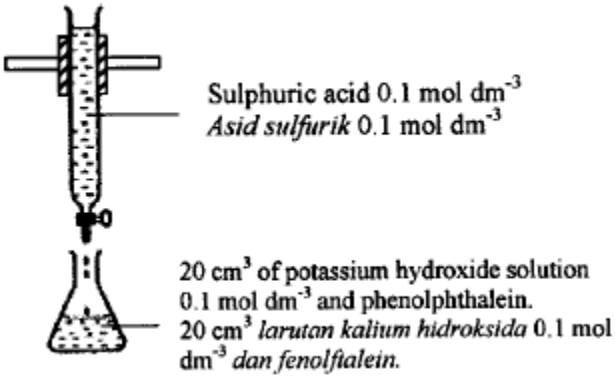


Diagram 11

What is the **total volume** of the mixture in the conical flask at the end point of the titration in Diagram 11?
Berapakah ***jumlah isi padu*** *campuran di dalam kelalang kon pada takat akhir pentitratan dalam Rajah* 11?
A 10 cm^3
B 20 cm^3
C 30 cm^3
D 40 cm^3

48 In an experiment, 2.4 g of magnesium powder is added to 100 cm^3 of 2.0 $moldm^{-1}$ Copper(II) sulphate solution.The temperature of the mixture increases by 1.0 ^oC.
What is the heat of reaction in the experiment ?
[specific heat capacity of a solution = 4.2 $Jg^{-1o}C^{-1}$; Relative atomic mass of Mg =24]
Dalam satu eksperimen, 2.4 g serbuk magnesium ditambahkan kepada 100 cm^3 larutan kuprum(II) sulfat 2.0 $moldm^{-1}$suhu campuran meningkat sebanyak 1.0 ^oC
[muatan haba tentu larutan =4.2 $Jg^{-1o}C^{-1}$; Jisim atom relative Mg = 24]
A -0.42 kJ mol^{-1}
B -0.48 kJ mol^{-1}
C -4.80 kJ mol^{-1}
D -0.21 kJ mol^{-1}

49 Diagram 12 shows the general structure of soap ion.
Rajah 12 *menunjukkan struktur ion sabun.*

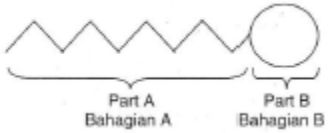


Diagram 12
Rajah 12

Which statement is not true about part A?
Pernyataan manakah tidak benar tentang bahagian A?

A Consist of hydrocarbon chain
Mengandungi rantai hidrokarbon
B Hydrophobic region
Bahagian hidrofobik
C Dissolves in grease
Larut dalam minyak
D Ionic region
Bahagian ion

50 Diagram 13 shows an energy level diagram.
Rajah 13 *menunjukkan gambar rajah aras tenaga*.

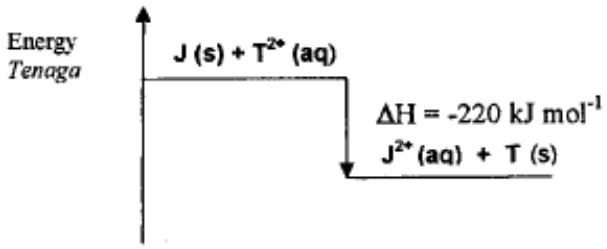


Diagram 13
Rajah 13

Based on Diagram 13, what is the increase in temperature of the solution if excess J powder is added to 50 cm^3 of T salt solution 0.2 mol dm^{-3}?
Berdasarkan Rajah 13, *berapakah kenaikan suhu larutan jika serbuk* J *berlebihan ditambah kepada* 50 cm^3 *larutan garam* T 0.2 mol dm^{-3}?
[specific heat capacity of a solution = 4.2 $Jg^{-1o}C^{-1}$]
[*muatan haba tentu larutan =4.2* $Jg^{-1o}C^{-1}$]

A 4.4 °C

B 5.5 °C

C 8.8 °C

D 10.48 °C

KERTAS SOALAN TAMAT

KERTAS 1 SET II

http://cikguadura.wordpress.com/

1 Diagram 1 shows the heating curve of solid P
Rajah 1 *menunjukkan lengkung pemanasan bagi pepejal* P.

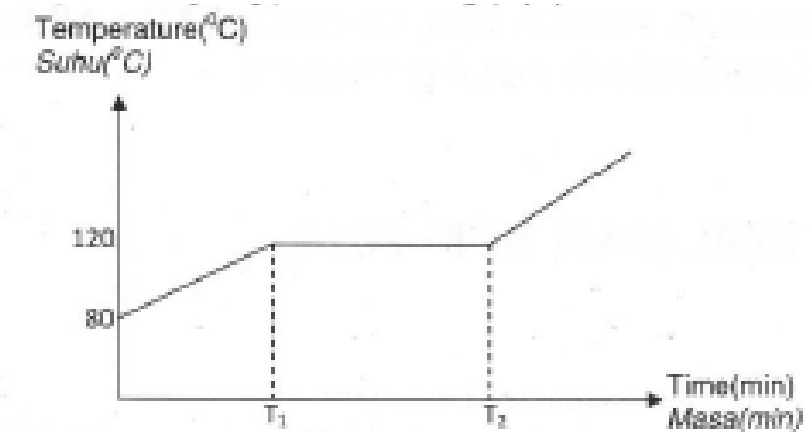


Diagram 1/*Rajah* 1

What is the physical state of solid P at T_1 to T_2?
Apakah keadaan fizikal pepejal P *pada* T_1*hingga* T_2?

A Solid
Pepejal
B Liquid
Cecair
C Solid and liquid
Pepejal dan cecair
D Solid and gas
Pepejal dan gas

2 Diagram 2 shows the symbol of atom X.
Rajah 2 *menunjukkan simbol bagi atom* X.

$$^{24}_{12}X$$

Diagram 2
Rajah 2

Which of the following is true based on Diagram 2?
Pernyataan yang manakah adalah benar berdasarkan Rajah 2?

	Proton number *Nombor proton*	Number of neutron *Bilangan neutron*
A	24	12
B	12	24
C	12	12
D	24	36

3 Which of the following is true about solid?
Antara berikut, yang manakah benar tentang suatu pepejal?

A Particles move randomly
Zarah bergerak secara rawak

B Energy content is high
Kandungan tenaga sangat tinggi

C Particles are arranged in order
Zarah disusun dengan teratur

D Force of attraction between particles is very weak
Daya tarikan antara zarah sangat lemah

4 Diagram 3 shows the structural formula of propene
Rajah 3 *menunjukkan formula struktur propena*

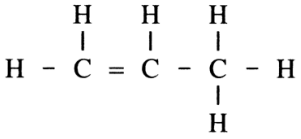


Diagram 3

What is the empirical formula of propene?
Apakah formula empirik bagi propena?

A CH
B CH_2
C C_3H_6
D C_nH_{2n}

5 Diagram 4 shows the electron arrangement of an oxygen atom
Rajah 4 *menunjukkan susunan elektron bagi satu atom oksigen*

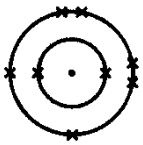


Diagram 4

Which of the following is true about this atom?
Antara berikut, yang manakah benar tentang atom ini?

A The number of valence electrons is 6
Bilangan elektron valens ialah 6

B The total number of electrons is 6
Jumlah bilangan elektron ialah 6

C The proton number is 16
Nombor proton ialah 16

D The nucleon number is 8
Nombor nukleon ialah 8

6 Which of the following is the correct formula for sodium phosphate?
Antara berikut, yang manakah formula yang betul bagi natrium fosfat?

A $NaPO_4$
B Na_3PO_4
C $Na(PO_4)_3$
D Na_3PO

7 The mass of atom X is four times heavier than one iron atom.
What is the relative atomic mass of X?
[Relative atomic mass: Fe=56]
Jisim satu atom X *empat kali lebih berat daripada satu atom besi.*
Berapakah jisim atom relatif X?
[*Jisim atom relatif*: Fe=56]

A 8
B 14
C 28
D 224

8 What are the changes that occurs as we go across period 3from left to right in the Periodic Table?
Apakah perubahan yang berlaku apabila merentasi Kala 3 dari kiri ke kanan di dalam Jadual Berkala Unsur?

I The proton number increases
Nombor proton bertambah
II The atomic radius increases
Jejari atom bertambah
III The electronegativity increases
Keelektronegatifan bertambah
IV The metallic properties of the elements decreases
Sifat kelogaman unsur berkurang

A I and II, III
I , II *dan* III
B I, II and IV
I, II *dan* IV
C I, III and IV
I, III *dan* IV
D II, III and IV
II , III *dan* IV

9 Diagram 5 shows the electron arrangement of T ion.
Rajah 5 *menunjukkan susunan elektron bagi ion* T.

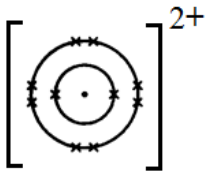


Diagram 5

What is the group of element T in the Periodic Table of Element?
Apakah kumpulan bagi unsur T *dalam Jadual Berkala Unsur*?

A 2
B 8
C 16
D 18

10 Diagram 6 shows the set up of the apparatus for electrolysis.
Rajah 6 *menunjukkan susunan radas bagi proses elektrolisis*.

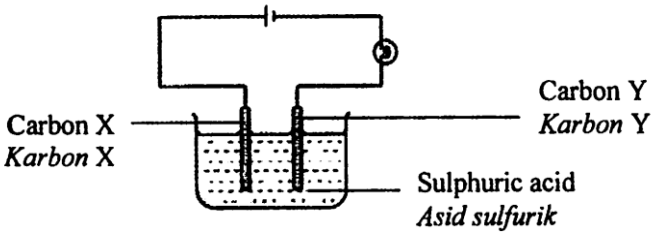


Diagram 6
Rajah 6

Which of the following ion is attracted to carbon X electrode?
Antara ion-ion berikut, yang manakah tertarik ke elektrod karbon X?

A Hydrogen ion
Ion hidrogen
B Sulphate ion
Ion sulfat
C Hydroxide ion
Ion hidroksida
D Hydroxide ion and sulphate ion
Ion hidroksida dan ion sulfat

11 Which of the following substance is a hydrocarbon?
Antara bahan berikut, yang manakah adalah hidrokarbon?

A Pentanol
Pentanol
B 2-methylbutane
2-*metilbutana*
C Methanoic acid
Asid metanoik
D Ethyl ethanoate
Etil etanoat

12 Which of the following are true about ionic compound?
Antara berikut, yang manakah benar tentang sebatian ion?

I Dissolve in water
Larut dalam air
II Produced from the reaction between metal and non metal elements
Terbentuk daripada tindak balas antara unsur logam dengan unsur bukan logam
III Formed through transfer of electrons between the atom
Terbentuk melalui perpindahan elektron antara atom
IV Conduct an electricity in a solid state
Mengalirkan arus elektrik dalam keadaan pepejal

A I and II only
I *dan* II *sahaja*
B III and IV only
III *dan* IV*sahaja*
C I, II and III only
I, II *and* III *sahaja*
D I, II, III and IV
I, II, III *dan* IV

13 Equation below shows the reaction between iron and chlorine gas to form iron (III) chloride.
Persamaan di bawah menunjukkan tindak balas antara ferum dan gas klorin bagi menghasilkan ferum (III) *klorida*.

$$2Fe + 3Cl_2 \longrightarrow 2FeCl_3$$

What is the mass of iron(III) chloride formed when 28 g of iron reacts with excess chlorine gas?
Berapakah jisim ferum (III) *klorida terbentuk apabila 28 g ferum bertindak balas dengan gas klorin berlebihan*?

[Relative atomic mass: Fe=56; Cl=35.5]
[*Jisim atom relatif*: Fe=56; Cl=35.5]

A 8.125 g
B 81.25 g
C 156.8 g
D 162.5 g

14 What is the oxidation number of oxygen in oxygen gas, O_2?
Apakah nombor pengoksidaan oksigen dalam gas oksigen, O_2*?*

A -2
B -1
C 0
D +1

15 Diagram 7 shows the structural formula of a hydrocarbon compound.
Rajah 7 menunjukkan formula struktur bagi satu sebatian hidrokarbon.

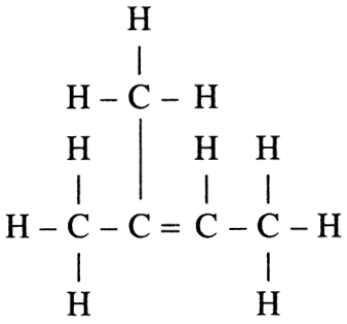


Diagram 7
Rajah 7

What is the name of the compound based on IUPAC nomenclature?
Apakah nama sebatian ini berdasarkan penamaan IUPAC?

A 2-methylbut-2-ene
2-*metilbut*-2-*ena*
B 2-methylbut-3-ene
2-*metilbut*-3-*ena*
C 3-methylbut-2-ene
3-*metilbut*-2-*ena*
D 3-methylbut-3-ene
3-*metilbut*-3-*ena*

16 Diagram 8 shows apparatus set-up to determine the heat of reaction.
Rajah 8 *menunjukkan susunan radas untuk menentukan haba tinda balas*.

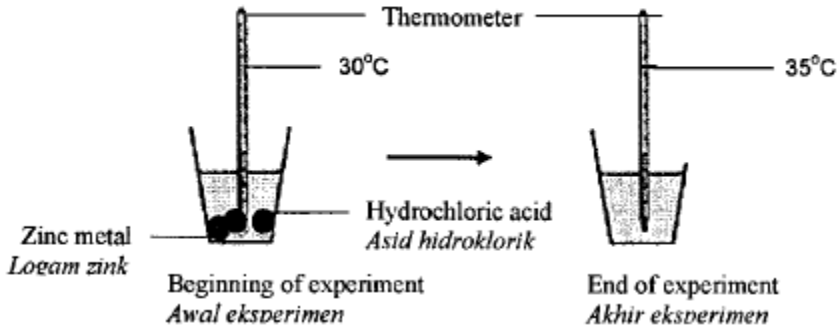


Diagram 8

Based on Diagram 8, which of the following statement is true?
Berdasarkan Rajah 8, *antara pernyataan berikut yang manakah benar*?

A The reaction is endothermic
Tindak balas adalah endotermik
B The ΔH value in the reaction is positive
*Nilai*ΔH *dalam tindak balas ini adalah positif*
C Chemical energy changes to heat energy during reaction
Tenaga kimia bertukar kepada tenaga haba semasa tindak balas
D The energy content of the products of reaction is higher than that
Kandungan tenaga hasil tindak balas lebih tinggi daripada kandungan bahan tindak balas

17 Table 1 shows element X, Y and Z placed in Period 3 of the Periodic Table.
Jadual 1 *menunjukkan unsur* X. Y *dan* Z *dalam kala* 3 *Jadual Berkala*.

Elements/*Unsur*	Properties of oxide/*Sifat oksida*
X	Amphoteic/*Amfoterik*
Y	Base/*Bes*
Z	Acidic/*Berasid*

Table 1

Choose the correct sequence based on the increase in the atomic size.
Pilih susunan yang betul berdasarkan pertambahan saiz atom.

A X, Y, Z
B Y, X, Z
C Z, X, Y
D Y, Z, X

18 Which of the following statement is true about all bases?
Manakah antara pernyataan berikut benar tentang semua bes?

A React with acid
Bertindak balas dengan asid
B Contain hydroxide ions
Mengandungi ion hidroksida
C Dissolves in water
Larut dalam air
D Have alkaline properties
Mempunyai sifat alkali

19 Which of the following statements is true about streptomycin?
Pernyataan manakah benar mengenai streptomisin?

A Can kill viruses/*Boleh membunuh virus*
B Obtained from animal cells/*Diperolehi dari sel haiwan*
C A type of analgesic/*Sejenis alnalgesik*
D Treats patients with disease caused by bacteria
Merawat pesakit yang berpenyakit disebabkan oleh bakteria

20 Ionic equation below shows a reaction between iron (III) ion and chlorine.
Persamaan ion berikut menunjukkan tindak balas antara ion ferum (III) *dan klorin*.

$$2Fe^{2+} + Cl_2 \rightarrow Fe^{3+} + 2Cl^-$$

In this reaction, the green colour solution turns to brown more faster when the reactant mixture was heated. This was due to the:
Dalam tindak balas ini, larutan berwarna hijau bertukar kepada perang dengan lebih cepat apabila campuran bahan tindak balas dipanaskan. *Ini adalah disebabkan*:

I decrease in the activation energy/*tenaga pengaktifan menurun*
II increase in the frequency of effective collision/*frekuensi perlanggaran berkesan meningkat*
III chlorine is a strong oxidizing agent/*klorin adalah agen pengoksidaan yang kuat*
IV increase in kinetic energy of iron (II) ions and chlorine molecule
pertambahan tenaga kinetic bagi ion ferum (II) dan klorin molekul

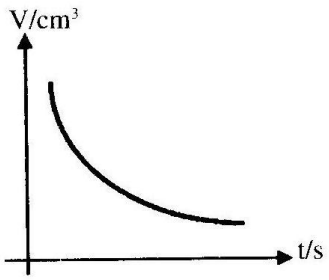
A I and II only
B II and IVonly
C II,III and IV only
D I, II, III and IV

21 Magnesium reacts with hydrochloric acid according to the equation below:
Magnesium bertindak balas dengan asid hidroklorik berdasarkan persamaan di bawah:

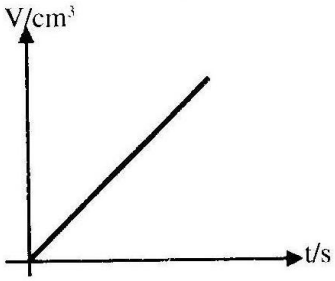
$$Mg + 2HCl \longrightarrow MgCl_2 + H_2$$

Which of the following graphs of volume of hydrogen gas against time is correct?
Manakah antara graf isipadu gas hidrogen melawan masa berikut adalah betul?

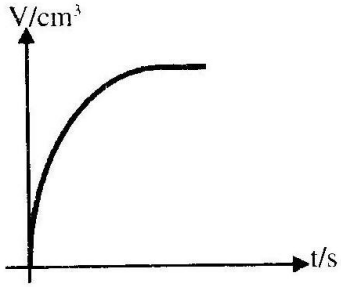
A



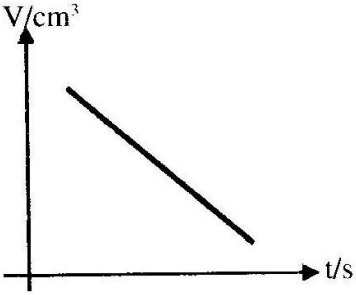
B



C



D



22 Which of the following salt is insoluble?
Antara berikut yang manakah garam tak terlarut?

A Silver sulphate
Argentum sulfat
B Ammonium carbonate
Ammonium karbonat
C Potassium carbonate
Kalium karbonat
D Barium sulphate
Barium sulfat

23 Diagram 9 shows the reaction between calcium carbonate and glacial ethanoic acid.
Rajah 9 *menunjukkan tindak balas kalsium karbonat dengan asid etanoik glasial.*

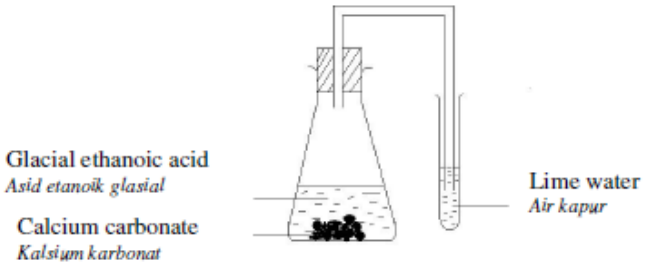


Diagram 9
Rajah 9

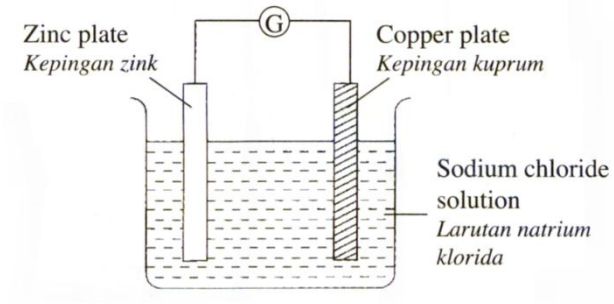
No changes are observed after the reaction.
What should be done in order to make the lime water cloudy?
Tiada perubahan diperhatikan selepas tindak balas berlaku.
Apakah yang patut dlakukan untuk menjadikan air kapur keruh?

A Heat the mixture
Panaskan campuran
B Add water to the mixture
Menambah air kepada campuran
C Substitute calcium carbonate with zinc powder
Menukarkan kalsium karbonat dengan serbuk zink
D Change calcium carbonate chips to calcium carbonate powder.
Menukarkan ketulan kalsium karbonat kepada serbuk kalsium karbonat

24 Which statement best explains why vulcanised rubber is more elastic than unvulcanised rubber?
Pernyataan manakah paling baik menerangkan mengapa getah tervulkan lebih elastik daripada getah tak tervulkan?

A Size of molecule of vulcanised rubber is bigger
Saiz molekul getah tervulkan lebih besar
B The melting point of vulcanised rubber is higher
Takat lebur getah tervulkan lebih tinggi
C Vulcanised rubber has less double bond between carbon atoms
Getah tervulkan mempunyai kurang ikatan ganda dua antara atom-atom karbon
D Presence of sulphur cross-linkage pulls the vulcanised rubber-molecule back to their original position
Kehadiran rantai silang sulfur menarik molekul getah tervulkan kembali kepada kedudukan asal

25 Diagaram 10 shows a chemical cell.
Rajah 10 *menunjukkan suatu sel kimia*.



Diagarm 10
Rajah 10

Which substance undergo oxidation and reduction?
Bahan manakah yang mengalami pengoksidaan dan penurunan?

	Oxidation *Pengoksidaan*	Reduction *Penurunan*
A	Zinc *Zink*	Copper *Kuprum*
B	Zinc *Zink*	Hydrogen ions *Ion hidrogen*
C	Copper (II) ions *Ion kuprum* (II)	Copper *Kuprum*
D	Copper (II) ions *Ion kuprum* (II)	Zinc *Zink*

26 Diagram 11 shows an energy level diagram for the decomposition of calcium carbonate.
Rajah 11 *menunjukkan rajah aras tenaga bagi penguraian kalsium karbonat*.

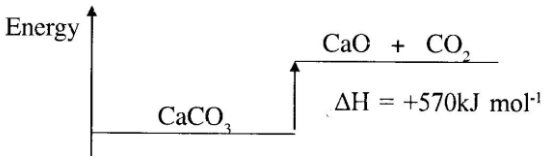


Diagram 11
Rajah 11

Which statemnets can be deduced from Diagram 11?
Pernyataan manakh yang boleh dirumuskan dariapda Rajah 11?

A Heat is absorbed in the reaction
Haba diserap dalam tindak balas tersebut.
B The reaction is exothermic
Tindak balas adalah eksotermik
C Total energy of the reactant and the products is 570 kJ
Jumlah tenaga bagi bahagn tindak balas dan hasil tindak balas adalah 570 kJ
D The reactant has more energy than the products
Bahan tindak balas mempunyai lebih tenaga berbanding hasil tindak balas

27 Diagram 12 shows a picture of fisherman washing his dirty cloth using two different types of cleansing agent, A and B. Table 2 shows the result obtained.
Rajah 12 *menunjukkan gambar seorang nelayang yang sedang membasuh bajunya. Beliau menggunakan dua agen pencuci yang berbeza,* A *dan* B. *Jadual* 2 *menunjukkan keputusan yang diperoleh*.

Diagram 12

Cleansing agent *Agen pencuci*	A	B
Observation *Pemerhatian*	The oily stain disappears *Kesan minyak hilang*	The oily stain remains *Kesan minyak kekal*

Table 2

Which of the following explain the observation?
Manakah antara berikut menerangkan pemerhatian?

A Cleansing agent A are biodegradable wheareas cleansing agent B is non-biodegradable.
Agen pencuci A *boleh terurai manakala agen pencuci* B *tidak terurai.*

B Cleansing agent A reduces the surface tension of water wheareas cleansing agent B does not.
Agen pencuci A *mengurangkan ketegangan permukaan air manakala agen pencuci* B *tidak*.

C Cleansing agent A soluble in oil , whereas cleansing agent B does not.
Agen pencuci A *larut di dalam minyak manakala agen pencuci* B *tidak.*

D Cleansing agent A do not form scum in sea water, whereas cleansing agent B forms scum in sea water.
Agen pencuci A *tidak membentuk kekat dalam air laut tetapi agen pencuci* B *membentuk kekat didalam air laut*.

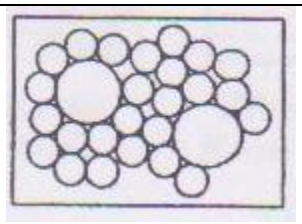
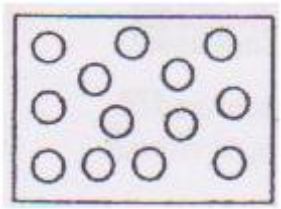
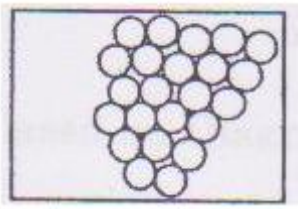
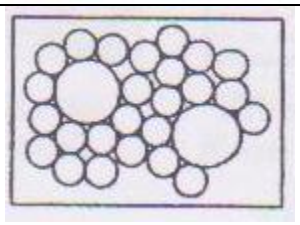
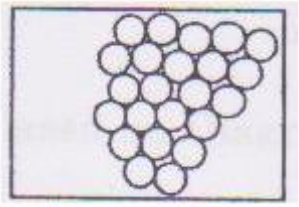
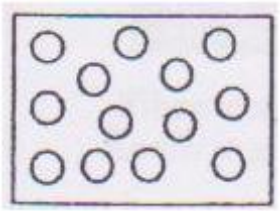
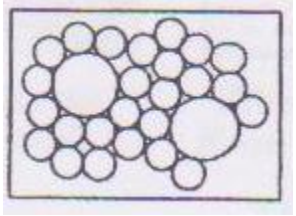
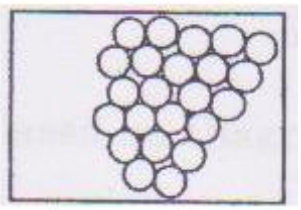
Question 28 and 29 are based on Diagram 13
***Soalan* 28 *dan* 29 *adalah berdasarkan Rajah* 13**

Diagram 13 shows two different materials, X and Y.
Rajah 13 *menunjukkan dua bahan yang berbeza, X dan Y.*

X Y

Diagram 13

28 Material X is the main element consist in material Y.
Which of the following is the arrangement of atoms in X *and* Y?
Bahan X adalah unsure utama dalam bahan Y.
Manakah antara berikut susunan atom yang betul dalam X dan Y?

	X	Y
A		
B		
C		
D		

29 Which of the following explains why material Y is harder than material X?
Pernyataan manakah menerangkan mengapa bahan Y lebih keras berbanding bahan Y?

A The arrangement of atoms in material Y is more compact
Susunan atom dalam bahan Y lebih padat

B There are no empty space between atoms in the material Y
Tiada ruang kosong antara atom dalam bahan Y

C Layers of atoms are not easily slide in material Y
Lapisan atom sukar menggelongsor dalam bahan Y

D Strong bonds are formed between atoms in material Y
Ikatan yang kuat terbentuk antara atom dalam bahan Y

30 Table 3 shows the proton number for element P and Q.
Jadual 3 *menunjukkan nombor proton bagi unsur* P *dan unsur* Q.

Element/*Unsur*	Proton number/*Nombor proton*
P	13
Q	8

Table 3

What is the formula of the compound formed when element P react with element Q?
Apakah formula bagi sebatian yang terbentuk apabila unsur P *bertindak balas dengan unsur* Q?

A P_2Q
B PQ_2
C P_3Q_2
D P_2Q_3

31 Diagram 14 shows the apparatus set-up to determine the empirical formula of P oxide.
Rajah 14 *menunjukkan susunan radas untu menentukan formula empirik bagi oksida P*.

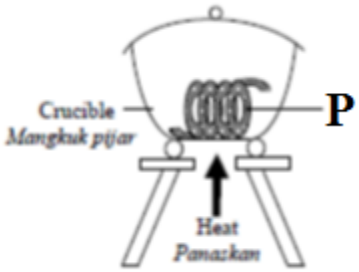


Diagram 14

Which statement is true about this reaction?
Pernyataan manakah benar tentang tindak balas ini?

A P oxide is oxidised to metal P
P *oksida dioksidakan kepada logam* P
B Metal P is the oxidising agent
Logam Padalah agen pengoksidaan
C Metal P is reduced to P oxide
Logam P *diturunkan kepada oksida* P
D The oxidation number of metal P increases
Nombor pengoksidaan logam P *bertambah*

32 The following equation shows the combustion of heptane, C_7H_{16}, in excess oxygen.
Persamaan di bawah menunjukkan pembakaran heptana, C_7H_{16}, *di dalam oksigen berlebihan*.

$$C_7H_{16} + 11O_2 \longrightarrow CO_2 + 8H_2O \quad \Delta H = -5512 \text{ kJ mol}^{-1}$$

Calculate the mass of heptane used to release 1378 kJ of energy.
[Relative atomic mass: H=1; C=12]
Hitung jisimheptana yang digunakan untuk membebaskan haba sebanyak 1387 kJ. [*Jisim atom relatif*: H=1; C=12]

A 25.0 g
B 36.0 g
C 77.0 g
D 88.0 g

33 Diagram 15 shows the manufacture of sulphuric acid.
Rajah 15 *menunjukkan pembuatan asid sulfurik.*

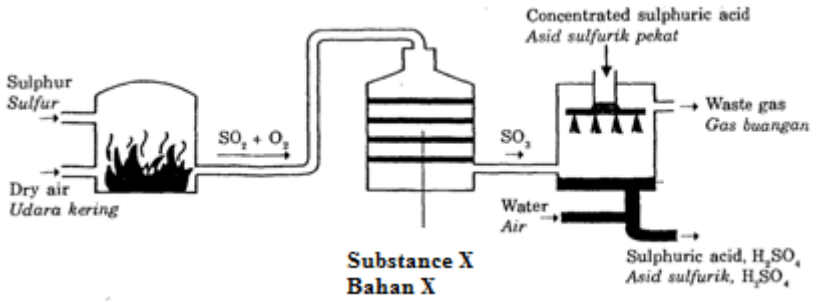


Diagram 15
Rajah 15

Which of the following the role of substance X in this process?
Antara berikut, yang manakah peranan bahan X *dalam proses itu*?

A Increases the kinetic energy of reacting particle
Meningkatkan tenaga kinetik zarah bahan tindak balas
B Lowers the activation energy in the reaction
Merendahkan tenaga pengaktifan di dalam tindak balas
C To increase the amount of sulphuric acid produced
Untuk meningkatkan kuantiti asid sulfurik yang terhasil
D Decreses the frequency of effective collision of reacting particles
Mengurangkan frekuensi perlanggaran berkesan zarah bahan tindak balas

34 Which of the following coagulate the latex the fastest?
Manakah antara berikut menggumpal lateks dengan paling cepat?
A Nitric acid/*Asid nitrik*
B Methanoic acid/*Asid metanoik*
C Ammonia aqueous/*Akueus ammonia*
D Sodium hydroxide solution/*Larutan natrium hidroksida*

35 Table 4 shows the observation in three tests on solution X.
Jadual 4 *menunjukkan pemerhatian bagi tiga ujian ke atas larutan* X.

	Test / *Ujian*	**Observation / *Pemerhatian***
I	Add sodium hydroxide solution until in excess *Tambah larutan natrium hidroksida sehingga berlebihan*	White precipitate which dissolves in excess sodium hydroxide solution *Mendakan putih larut dalam larutan natrium hidroksida berlebihan*
II	Add ammonia solution until in excess *Tambah larutan ammonia sehingga berlebihan*	White precipitate which dissolves in excess ammonia solution *Mendakan putih larut dalam larutan ammonia berlebihan*
III	Add 2 cm^3 of dilute nitric acid and a few drops of silver nitrate solution *Tambah 2 cm^3 asid nitric cair dan beberapa titik larutan argentum nitrat*	White precipitate formed *Mendakan putih terbentuk*

Table 4

A Zinc chloride
Zink klorida
B Aluminium chloride
Aluminium klorida
C Zinc sulphate
Zink sulfat
D Aluminium sulphate
Aluminium sulfat

36 Diagram 16 shows the apparatus set-up involves in the preparation of a soluble salt.
Rajah 16 *menunjukkan radas dalam penyediaan suatu garam larut*.

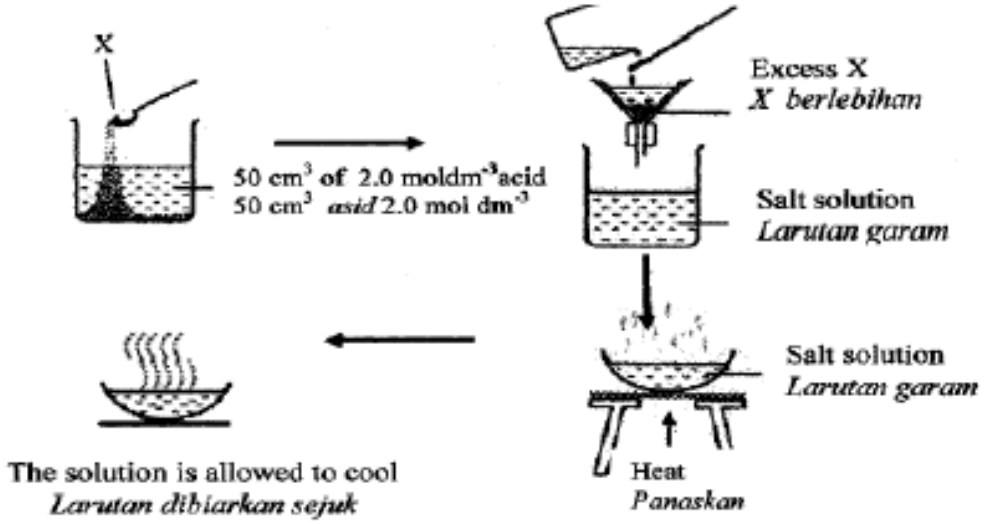


Diagram 16

Which of the following could be X?
Antara berikut yang manakah munkin X?

A Sodium carbonate
Natrium karbonat
B Magnesium carbonate
Magnesium karbonat
C Ammonium carbonate
Ammonium karbonat
D Potassium carbonate
Potassium carbonate

37 Diagram 17 shows the structural formula of two different types of rubber, X and Y.
Rajah 17 *menunjukkan formula struktur bagi dua jenis getah yang berbeza, getah* X *dan getah* Y.

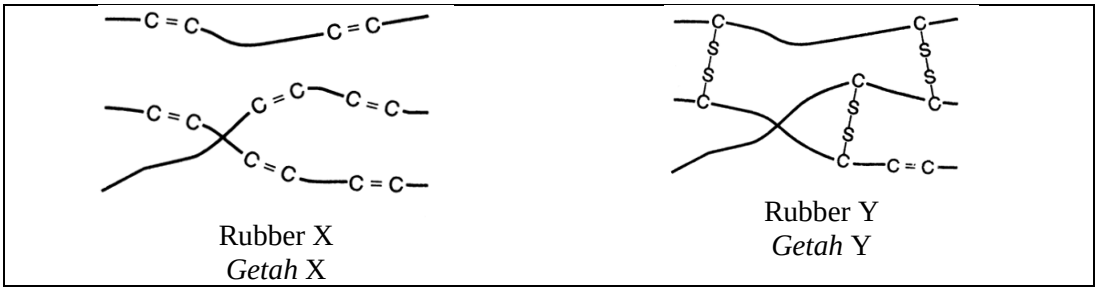


Diagram 17
Rajah 17

Which of the following statement is true?
Pernyataan manakah benar?

A Rubber X is more elastic than rubber Y
Getah X *lebih elastik berbanding getah* Y
B Rubber X is easily oxidised than rubber Y
Getah X *lebih mudah teroksida berbanding getah* Y
C Rubber X is more resistant to heat than rubber Y
Getah X *lebih tahan haba berbanding getah* Y
D Rubber X can be produced from rubber Y through vulcanisation reaction
Getah X *dapat dihasilkan daripada getah Y melalui tindak balas pemvulkanan*

38 Table 5 shows the melting point and boiling point of substances W, X, Y and Z.
Jadual 5 *menunjukkan takat lebur dan takat didih bagi bahan* W, X, Y *dan* Z.

	Substance *Bahan*	Melting point (^oC) *Takat lebur* (^oC)	Boiling point (^oC) *Takat didih* (^oC)
I	W	-180	-120
II	X	-78	70
III	Y	10	85
IV	Z	117	230

Table 5
Jadual 5

Which substance is a liquid at room temperature?
Bahan manakah dalam keadaan cecair pada suhu bilik?

A I and II
I *dan* II
B II and III
II *dan* III
C II and IV
II *dan* IV
D III and IV
III *dan* IV

39 Samad is the famous fishmonger in his village. The most famous product sells by him is salted fish. In the making of salted fish, he adds an appropriate amount of substance X to the fish as shown in Diagram 18.
Samad adalah penjual ikan yang terkenal di kampungnya. Produk yang paling terkenal dijual oleh beliau adalah ikan masin. Dalam pembuatan ikan masin, beliau menambahkan bahan X *secukupnyapada ikan seperti yang ditunjukkan oleh Rajah* 18.

Diagram 18
Rajah 18

Which of the following is the main purpose of adding substance X?
Manakah antara berikut tujuan utama penambahan bahan X?

A To prevent the oxidation of fish
Menghalang ikan daripada dioksidakan
B To remove water from the cell of microorganism
Mengeluarkan air dari sel mikroorganisma
C To make to fish easier to be cooked
Membolehkan ikan lebih mudah dimasak
D To make the fish tastier
Menjadikan ikan lebih sedap

40 Diagram 19 shows farmer applies a type of fertiliser to his paddy field.
Rajah 19 *menunjukkan seorang petani menggunakan sejenis baja pada tanaman padinya*.

Diagram 19
Rajah 19

Which of the following chemicals can be used to manufacture the fertilizer as used by the farmer?
Antara bahan kimia berikut yangmanakah boleh digunakanuntuk menghasilkan baja yang digunakan oleh petani tersebut?

A Ammonia gas and sulphur trioxide
Gas ammonia dan sulfur trioksida
B Ammonia gas, sulphur and oxygen
Gas ammonia, sulfur dan oksigen
C Aqueous of ammonia and sulphuric acid
Akueus ammonia dan asid sulfurik
D Aqueous of ammonia and sulphur dioxide
Akueus ammonia dan sulfur dioksida

41 Diagaram 20 shows a set-up of apparatus of a redox reaction.
Rajah 20 *menunjukkan susunan radas suatu tindak balas redoks*.

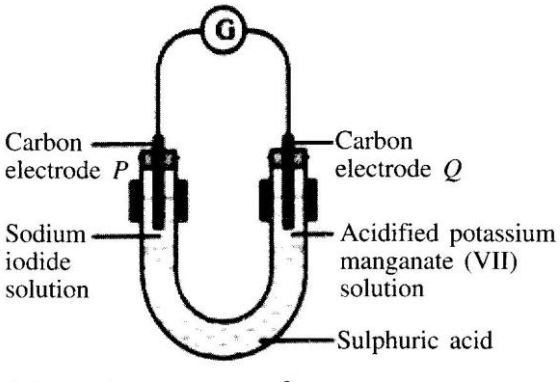


Diagram 20
Which of the following statements are correct?
Pernyataan yang manakah betul?

I Iodide ions act as reducing agents
Ion iodida bertindak sebagai agen penurunan
II The function of sulphuric acid is to allow the flow of electrons
Fungsi asid sulfurik adalah membenarkan pengaliran elektron
III Manganate (VII) ion gain electrons to form manganese (II) ion
Ion manganat (VII) *menerimaelektron bagi membentuk ion manganat* (II)
IV Electron flows from electrode P to electrode Q through sulphuric acid
Elektron mengalir dari elektrod P *ke elektrod* Q *melalui asid sulfurik*

A I and III
B I and III
C II and IIII
D III and IV

42 A student caries out an experimet in a laboratory to investigate the effect of other metals on rusting of iron. For each set, the iron nail is coiled with different metals. All of the coiled iron nails are dipped into separates test tubes that containing hot jelly and potassium hexacyanoferrate (III) solution as shown in Diagram 21.
Seorang pelajar menjalankan eksperimen buntuk mengkaji kesan logam lain ke atas pengaratan paku besi. Bagi setiap set, paku besi dililitkan dengan logam yang berbeza. Kesemua paku besi yang dililit dengan logam-logam itu dimasukkan ke dalam tabung uji yang mengandungi larutan agar-agar panas dan larutan kalium heksasianoferat (III) seperti yang ditunjukkan dalam Rajah 21.

Set *Set*	Experiment *Eksperimen*	Observation *Pemerhatian*
I	 Iron nail *Paku besi* Metal P *Logam* P Hot jelly solution + potassium hexacyanoferrate (III) solution *Larutan agar-agar panas+ Larutan kalium heksasianoferate* (III)	Low intensity of blue spot *Keamatan tompokan biru yang rendah*
II	 Iron nail *Paku besi* Metal Q *Logam* Q Hot jelly solution + potassium hexacyanoferrate (III) solution *Larutan agar-agar panas+ Larutan kalium heksasianoferate* (III)	High intensity of blue spot *Keamatan tompokan biru yang tinggi*
III	 Iron nail *Paku besi* Metal R *Logam* R Hot jelly solution + potassium hexacyanoferrate (III) solution *Larutan agar-agar panas+ Larutan kalium heksasianoferate* (III)	No change *Tiada perubahan*

Diagram 21
Rajah 21

Which of the following is the correct position of the metals, in ascending order, of the tendency of the metals to form ions?
Antara yang berikut yang manakah kedudukan yang betul dalam tertib menaik, bagi logam-logam itu dalam kecenderungannya membentuk ion?

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

43 Diagram 22 shows the apparatus set-up for the reactioncarbon and metal T oxide.
Rajah 22 *menunjukkan susunan radas bagi tindak balas antara karbon dan oksida logam T.*

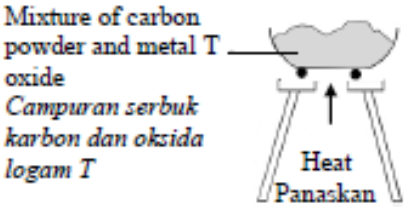


Diagram 22
Rajah 22

When the mixture is heated strongly, a flame spreads to the whole mixture.
What is metal T?
Apabila campuran itu dipanaskan dengan kuat, nyalaan tersebar ke seluruh campuran.
Apakah logam T?

A Aluminium
Aluminium
B Copper
Kuprum
C Magnesium
Magnesium
D Zinc
Zink

44 The chemical formula of potassium hexacuanoferrate (III) is $K_3Fe(CN)_6$.
What is the percentage of carbon by mass in the molecule?
Formula molekul bagi kalium heksasianoferat (III) *ialah* $K_3Fe(CN)_6$.
Berapakah peratusan karbon mengikut jisim di dalam molekulnya?
[Relative atomic mass: C=12; Fe=56; K=39; N=14]
[*Jisim atom relatif*: C=12; Fe=56; K=39; N=14]

A 5.58 %
B 10.94 %
C 16.41 %
D 21.71 %

45 P^{3+} ion has 14 neutrons and 10 electrons.
Which of the following is the proton number and nucleon numbers for atom P?
Ion P^{3+} *mempunyai* 14 *neutron dan* 10 *elektron.*
Yang manakah antara berikut menunjukkan nombor proton dan nombor nukleon bagi atom P?

	Proton number *Nombor proton*	Nucleon number *Nombor nukleon*
A	10	27
B	13	27
C	13	14
D	27	13

46 Which of the following is not true about antibiotic?
Antara berikut yang manakah tidak benar mengenai antibiotik?

A It is used to destroy the growth of bacteria.
Ia digunakan untuk memusnahkan pertumbuhan bakteria.
B It is used to treat bacterial disease.
Ia digunakan untuk merawat penyakit disebabkan bakteria.
C Penicilin and streptomycin are two common antibiotics
Penisilin dan streptomisin adalah dua antibiotik yang umum
D Antibiotics are very effective against fungal and viral infections.
Antibiotik sangat berkesan melawan jangkitan kulat dan jangkitan virus.

47 Which of the following acids can produce the highest concentration of hydrogen ions when dissolve in water?
Yang manakah antara asid berikut boleh menghasilkan kepekatan ion hidrogen yang tinggi apabila larut dalam air?

A 0.1 mol dm^{-3} ethanoic acid
0.1 mol dm^{-3} *asid etanoik*
B 0.1 mol dm^{-3} hydrochloric acid
0.1 mol dm^{-3} *asid hidroklorik*
C 0.1 mol dm^{-3} nitric acid
0.1 mol dm^{-3} *asid nitrik*
D 0.1 mol dm^{-3} sulphuric acid
0.1 mol dm^{-3} *asid sulfurik*

48 Diagram 23 shows the mechanism of rusting.
Rajah 23 *menunjukkan mekanisme pengaratan*.

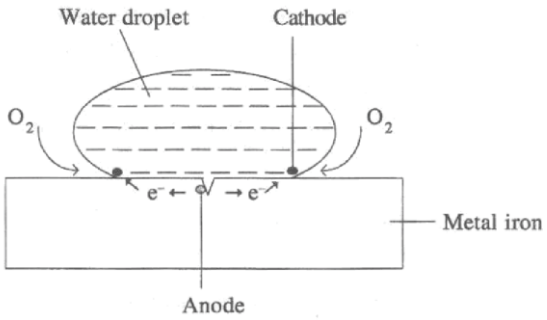


Diagram 23
Rajah 23

Which of the following equation occurs at the anode?
Yang manakah persamaan berikut berlaku di anod?

A $Fe \rightarrow Fe^{2+} + 2e$
B $Fe^{2+} + 2e \rightarrow Fe$
C $O_2 + 2H_2O + 4e \rightarrow 4OH^-$
D $4OH^- \rightarrow O_2 + 2H_2O + 4e$

49 Which of the following reaction is not a redox reaction?
M anakah antara berikut bukan tindak balas redoks?

I	CuO	+	Mg	$\longrightarrow$	MgO	+	Cu
II	H_2SO_4	+	$2NaOH$	$\longrightarrow$	Na_2SO_4	+	$2H_2O$
III	$AgNO_3$	+	$NaCl$	$\longrightarrow$	$AgCl$	+	NaN_{O3}
IV	Zn	+	$2Ag\ NO_3$	$\longrightarrow$	$Zn(NO_3)$	+	$2Ag$

A I and II
I *dan* II
B II and III
II *dan* III
C I, II and IV
I, II *dan* IV
D I,III and IV
I, III *dan* IV

50 25.0 cm^3 of hydrochloric acid and 25.0 cm^3 of sodium hydroxide solution were mixed together in a polystrene cup. The mixture was stirred. The temperature of the mixture increased from 29.0 ^oC to 39.0 ^oC. Determine the heat released during the experiment.
[specific heat capacity of a solution = 4.2 J $g^{-1o}C^{-1}$]
2.0cm^3 *asid hidroklorik dan* 25.0 cm^3*larutan natrium hidroksida telah dicampurkan ke dalam satu cawan polistrena. Campuran ini dikacau. Suhu campuran bertambah dari*29.0 ^oC *kepada* 39.0 ^oC. *Tentukan haba yang dibebaskan semasa eksperimen ini.*
[muatan haba tentu larutan =4.2 Jg$^{-1o}C^{-1}$]

A 1050 J
B 2100 J
C 6090 J
D 8190 J

KERTAS SOALAN TAMAT

KERTAS 1 SET III

1 The following statements refer to the contributions of a scientist in the development of the Periodic Table of Elements
Pernyataan berikut merujuk kepada sumbangan seorang ahli sains dalam membangunkan Jadual Berkala Unsur.

• Plotted the graph of the atomic volume against the atomic mass of the elements *Memplot graf isi padu atom melawan jisim atom bagi unsur-unsur* • Suggested that there is a periodic relationship of elements based on their relative atomic masses *Mencadangkan bahawa terdapat satu perhubungan berkala bagi unsur-unsur berdasarkan jisim atom unsur* http://cikguadura.wordpress.com/

Who was the scientist?
Siapakah ahli sains itu?

A Johann W.Dobereiner
B John Newlands
C Henry Moseley
D Lothar Meyer

2 A covalent compound does not conduct electricity because
Sebatian kovalen tidak mengalirkan arus elektrik kerana

A it does not dissolve in water
ia tidak larut dalam air
B it has strong covalent bonding
ia mempunyai ikatan kovalen yang kuat
C particles consist of molecules
zarah terdiri daripada molekul
D ions in the covalent compound are not mobile
ion-ion dalam sebatian kovalen tidak bergerak bebas

3 1 mol of oxygen gas, O_2 and 1 mol of carbon dioxide gas, CO_2 have
1 mol *gas oksigen*, O_2 *dan* 1 mol *gas karbon dioksida*, CO_2 *mempunyai*

A same mass/*jisim yang sama*
B same number of electrons/*bilangan elektron yang sama*
C same number of atoms /*bilangan atom yang sama*
D same number of molecules /*bilangan molekul yang sama*

4 Which compound in the table below is correctly matched with its relative molecular mass?
Sebatian yang manakah di dalam jadual di bawah dipadankan dengan betul dengan jisim molekul relatif masing-masing?
(RAM : H,1 ; C,12 ; N,14 ; O,16 ; Na, 23 ; P, 31 ; S, 32 ; Ca, 40 ; Fe, 56)

	Compound/*Sebatian*	Relative molecular mass/*Jisim molekul relatif*
I	$Ca_3(PO_4)_2$	310
II	$C_{14}H_{18}N_2O_5$	294
III	$FeSO_4.7H_2O$	278
IV	$C_{15}H_{31}COONa$	266

A I and IIII
B II and IV
C I, II and III
D I, III and IV

5 of the following is true of the oxides of elements in Period 3 of the Periodic Table?
Antara yang berikut yang manakah benar bagi oksida Kala 3 *dalam Jadual Berkala*?

	Na_2O	MgO	Al_2O_3	SiO_2	P_4O_{10}	SO_2	Cl_2O_7
A	Basic *Bes*				Amphoteric *Amfoterik*	Acidic *Asid*	
B	Basic *Bes*		Amphoteric *Amfoterik*	Acidic *Asid*			
C	Basic *Bes*		Acidic *Asid*				Amphoteric *Amfoterik*
D	Amphoteric *Amfoterik*	Basic *Bes*		Acidic *Asid*			

6 What are the major components used in the making of lead crystal glass?
Apakah komponen utama untuk pembuatan kaca Kristal plumbum?

A Copper(II) oxide and lead(II) oxide
Kuprum(II) oksida dan plumbum(II) oksida

B Aluminium silicate and silicon dioxide
Aluminium silikat dan silicon dioksida

C Silicon dioxide and lead(II) oxide
Silikon dioksida dan plumbum(II) oksida

D Iron(III) oxide and boron oxide
Ferum(III) oksida dan boron oksida

7 Which process has the lowest rate of reaction?
Proses manakah yang mempunyai kadar tindak balas yang paling rendah?

A Combustion/ *Pembakaran*

B Fermentation/*Penapaian*

C Neutralisation/*Peneutralan*

D Photosynthesis/*Fotosintesis*

8 Which chemical equation is correctly balanced?
Persamaan kimia manakah yang diseimbangkan dengan betul?

A $Na + O_2 \rightarrow Na_2O$

B $Na + Cl_2 \rightarrow NaCl$

C $Mg + 2HCl \rightarrow MgCl_2 + H_2$

D $Mg + CH_3COOH \longrightarrow (CH_3COOH)_2Mg + H_2$

9 Diagram 1 shows the set-up of the apparatus for electrolysis.
Diagram 1 menunjukkan susunan radas bagi elektrolisis.

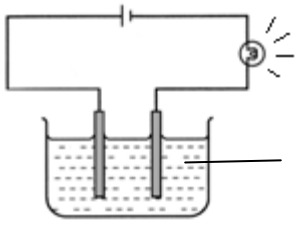


Diagram *1*

Which of the following compounds could be used as substance X?
Antara berikut, yang manakah boleh digunakan sebagai bahan X?

A Ethanol, C_2H_5OH/*Etanol*, C_2H_5OH

B Potassium iodide solution, KI /*Larutan kalium iodida*, KI

C 1,1,1-trichloroethane, CH_3CCl_3 /1,1,1-*trikloroetana*, CH_3Cl

D Ethyl ethanoate, $CH_3COOC_2H_5$/*Etil etanoat*, $CH_3COOC_2H_5$

10 Diagram 2 shows information of element X and element Y.
Rajah 2 menunjukkan maklumat bagi unsur X dan unsur Y.

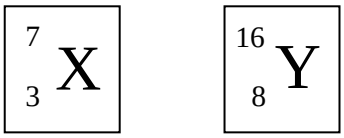
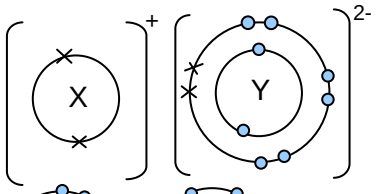


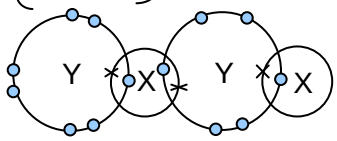
Diagram 4

Which of the following electron arrangement for the substances formed when the element X and element Y react?
Antara berikut, yang manakah susunan elektron bagi sebatian yang terbentuk apabila unsur X dan unsur Y bertindak balas?

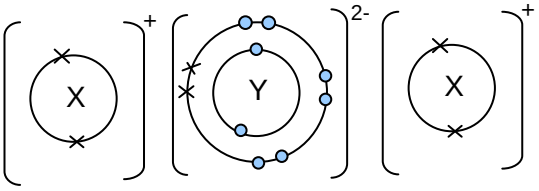
A.



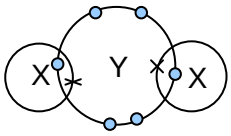
B.



C



D



11 Table 1 shows the proton number of elements E and G.
Jadual 1 *menunjukkan nombor proton unsur* E *dan* G.

Element *Unsur*	Proton number *Nombor proton*
E	13
G	8

Table 1

Which pair of formula and the type of bond is correct?
Yang manakah pasangan formula dan jenis ikatan adalah betul?

	Formula *Formula*	Type of bond *Jenis ikatan*
A	E_2G_3	ionic *ion*
B	E_3G_2	ionic *ion*
C	E_2G_3	covalent *kovalen*
D	E_3G_2	colavent *kovalen*

12 Diagram 3 shows the set up of the apparatus of a simple chemical cell. The reading on the voltmeter is 0.3 V.
Rajah 3 *menunjukkan susunan radas bagi satu sel kimia ringkas. Bacaan voltmeter ialah 0.3 V.*

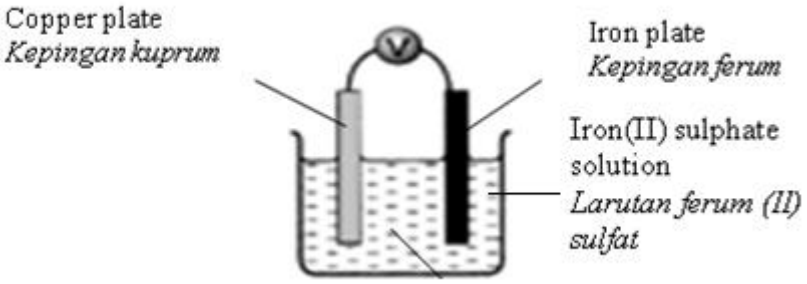


Diagram 3

Which of the following will increase the reading on the voltmeter?
Manakah antara kaedah berikut dapat menambahkan bacaan voltmeter?

I Increase the volume of iron(II) sulphate solution?
Tambahkan isipadu larutan ferum(II) sulfat
II Substitute the copper plate with a silver plate
Gantikan kepingan kuprum dengan kepingan argentum
III Use a more dilute iron(II) sulphate solution
Gunakan larutan ferum(II) sulfat yang lebih cair
IV Subtitute the iron plate with a magnesium plate
Gantikan kepingan besi dengan kepingan magnesium

13 Diagram 4 shows the graph of volume of carbon dioxide gas against time when 5 g of marble chips is added to 50 cm^3 of 0.2 mol dm^{-3} hydrochloric acid.
Rajah 4 *menunjukkan graf isipadu gas karbon dioksida melawan masa apabila* 5g *ketulan marmar dimasukkan ke dalam* 50 cm^3 *asid hidroklorik* 0.2 mol dm^{-3}.

Volume of CO_2 gas /cm^3
Isi padu gas CO_2 / cm^3

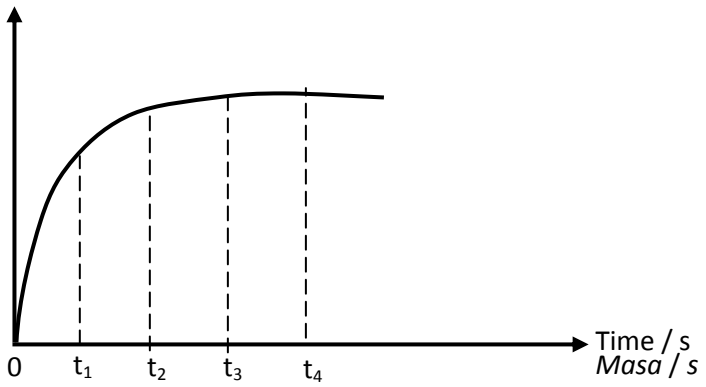


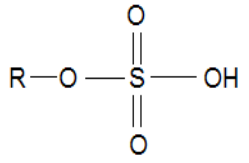
Diagram 4

Which of the following shows the highest rate of reaction?
Manakah antara berikut menunjukkan kadar tindak balas yang paling tinggi?

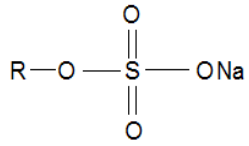
A t_1
B t_2
C t_3
D t_4

14 Which of the following structural formulas is for the soap?
Antara formula struktur berikut yang manakah bagi sabun?

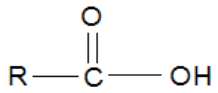
A



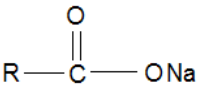
B



C



D



15 Diagram 5 shows the apparatus set-up for the electrolysis of 1 mol dm^{-3} sodium chloride solution using carbon electrodes.
Rajah 5 menunjukkan susunan radas bagi proses elektrolisis 1 mol dm^{-3} *larutan natrium klorida dengan menggunakan elektrod karbon.*

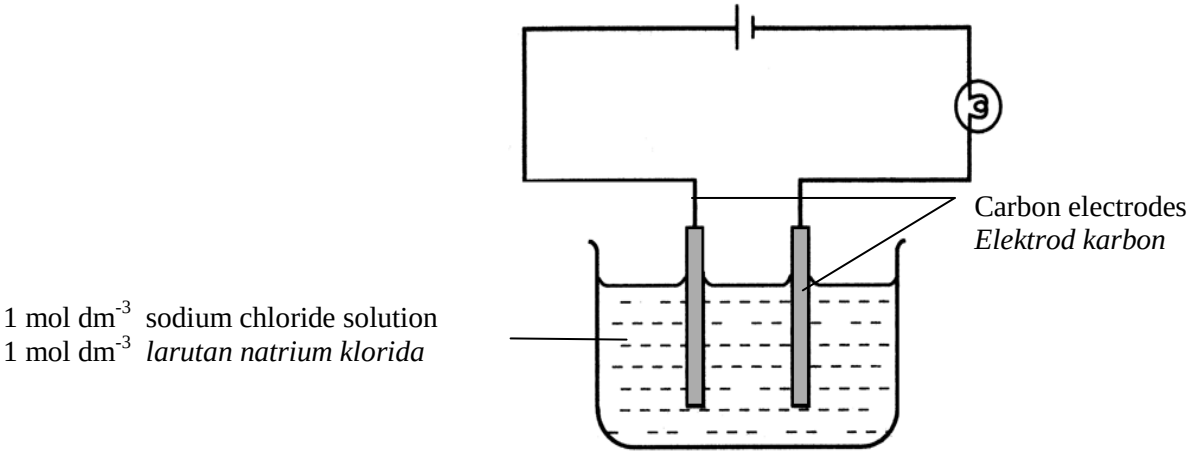


Diagram *5*

What are the products formed at the anode and cathode?
Apakah hasil terbentuk di anod dan katod?

	Anode/*Anod*	Cathode/*Katod*
A	Chlorine//*Klorin*	Hydrogen/*Hidrogen*
B	Chlorine/*Klorin*	Sodium/*Natrium*
C	Oxygen/*Oksigen*	Sodium/*Natrium*
D	Oxygen/*Oksigen*	Hydrogen/*Hidrogen*

16 Diagram 6 shows electron flow from metal X to metal Y in the simple chemical cell.
Rajah 6 *menunjukkan aliran elektron daripada logam X ke logam Y di dalam sel kimia*.

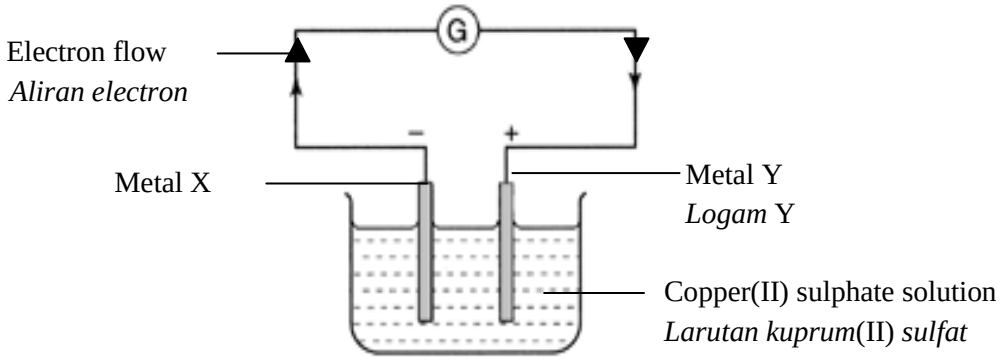


Diagram 6

What are metal X and metal Y?
Apakah logam X *dan logam* Y?

	Metal X/*Logam* X	Metal Y/*Logam* Y
A	Aluminium/*Aluminium*	Copper/*Kuprum*
B	Lead/*Plumbum*	Aluminium/*Aluminium*
C	Aluminium/*Aluminium*	Magnesium/*Magnesium*
D	Lead/*Plumbum*	Zinc/*Zink*

17 Zinc chloride solution and aluminium chloride solution are colourless solutions.
Which of the following can be used to differentiate the solutions?
Larutan zink klorida dan larutan aluminium klorida adalah larutan tidak berwarna.
Antara berikut, yang manakah boleh digunakan untuk membezakan larutan-larutan tersebut?

A Ammonia solution
Larutan ammonia
B Barium nitrate solution
Larutan barium nitrat
C Silver nitrate solution
Larutan argentum nitrat
D Sodium hydroxide solution
Larutan natrium hidroksida

18 Which of the following solutions have the same number of hydrogen ions, H^+, as in 50 cm^3 of 0.1 mol dm^{-3} sulphuric acid, H_2SO_4?
Antara larutan berikut, yang manakah mempunyai bilangan ion hidrogen, H^+*, sama seperti dalam* 50 cm^3 0.1 *mol* dm^{-3} *asid sulfurik,* H_2SO_4?

I 100 cm^3 of 0.1 mol dm^{-3} hydrochloric acid, HCl
100 cm^3 *0.1 mol* dm^{-3} *asid hidroklorik, HCl*
II 50 cm^3 of 0.2 mol dm^{-3} nitric acid, HNO_3
50 cm^3 *0.2 mol* dm^{-3} *asid nitrik,* HNO_3
III 100 cm^3 of 0.1 mol dm^{-3} ethanoic acid, CH_3COOH
100 cm^3 *0.1 mol* dm^{-3} *asid etanoik,* CH_3COOH
IV 50 cm^3 of 0.1 mol dm^{-3} phosphoric acid, H_3PO_4
50 cm^3 *0.1 mol* dm^{-3} *asid fosforic,* H_3PO_4

A I and II only
B I and III only
C III and IV only
D I, II and III only

19 Which is a natural polymer?
Yang manakah adalah suatu polimer semulajadi?

A Polyvinyl chloride
Polivinil klorida
B Polyisoprene
Poliisoprena
C Polythene
Politena
D Perspex
Perspek

20 Which of the following solution will give the shortest time to form a yellow precipitate when same concentration of sodium thiosulphate solution is added?
Antara yang berikut, larutan yang manakah akan memberi masa yang tersingkat untuk membentuk suatu mendakan kuning apabila kepekatan larutan natrium tiosulfat yang sama ditambahkan?

A 5 cm^3 of 1.0 mol dm^{-3} nitric acid/5 cm^3 1.0 mol dm^{-3} *asid nitrik*
B 5 cm^3 of 2.0 mol dm^{-3} ethanoic acid/5 cm^3 2.0 mol dm^{-3} *asid etanoik*
C 5 cm^3 of 1.0 mol dm^{-3} sulphuric acid/5 cm^3 1.0 mol dm^{-3} *asid sulfurik*
D 10 cm^3 of 1.0 mol dm^{-3} hydrochloric acid/10 cm^3 1.0 mol dm^{-3} *asid hidroklorik*

21 The following information shows the properties of organic compound X.
Maklumat berikut menunjukkan sifat-sifat bahan organik X.

Compound X react with calcium carbonate to release gas which turns lime water chalky

Which substance is X?
Bahan manakah adalah X
A Ethene / *Etena*
B Ethanol/*Etanol*
C Ethanoic acid/ *Asid etanoik*
D Ethyl ethanoate/*Etil etanoat*

22 Element X is located in the same group as potassium in the Periodic Table. X is not the actual symbol of the element.
Which of the following statements are chemical properties of element X?
Unsur X berada dalam kumpulan yang sama dengan kslium dalam Jadual Berkala. X bukan simbol sebenar unsur itu.
Antara pernyataan berikut, yang manakah sifat kimia unsur X?

I. Reacts with oxygen to produce a black solid
Bertindak balas dengan oksigen menghasilkan pepejal hitam
II Reacts with water to produce an alkaline solution
Bertindak balas dengan air menghasilkan laaarutan bersifat alkali
III Reacts with chlorine gas to produce a white solid
Bertindak balas dengan gas klorin menghasilkan pepejal putih
IV Reacts with sodium hydroxide to produce salt solutions.
Bertindak balas dengan natrium hidrosida menghasilkan larutan-larutan garam

A I and II/ I *dan* II
B I and IV/I *dan* IV
C II and III/II *dan* III
D II and IV/II *dan* IV

23 Which of the following equations represent a redox reaction?
Antara persamaan berikut, manakah mewakili tindak balas redoks?

I $CuO + H_2SO_4 \rightarrow CuSO_4 + H_2O$
II $2HCl + Zn \rightarrow ZnCl_2 + H_2$
III $Ag^+ + Cl^- \rightarrow AgCl$
IV $Cl_2 + S^{2-} \rightarrow 2Cl^- + S$

A I and II
B II and IV
C I and III
D III and IV

24 Diagram 14 shows the energy level diagram of the displacement reaction between magnesium and iron(II) chloride solution.
Rajah 14 menunjukkan gambar rajah aras tenaga bagi tindak balas penyesaran antara magnesium dan larutan ferum(II) sulfat.

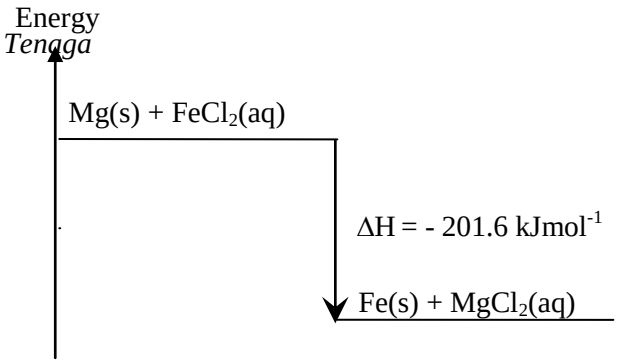


Diagram 7

What is the increase in temperature if 50 cm^3 of 0.25 mol dm^{-3} iron(II) chloride solution is reacted with excess magnesium,?
Berapakah kenaikan suhu, jika 50 cm^3 0.25 mol dm^{-3} larutan ferum(III) klorida ditindak balaskan dengan berlebihan magnesium ?
[Specific heat capacity of the solution = 4.2 J g^{-1} $^oC^{-1}$]/[*Muatan haba tentu larutan* = 4.2 J g^{-1} $^oC^{-1}$]

A 12 ^oC
B 16 ^oC
C 22 ^oC
D 24 ^oC

25 Table 2 shows the melting and boiling points of substances P, Q, R and S.
Jadual 2 menunjukkan takat lebur dan takat didih untuk bahan P, Q, R dan S.

Substance *Bahan*	Melting point / ^0C *Takat lebur / ^0C*	Boiling point / ^0C *Takat didih / ^0C*
P	-59	60
Q	48	130
R	-110	-70
S	10	50

Table 2/*Jadual 2*

of the following is solid at room temperature?
ah antara berikut adalah pepejal pada suhu bilik?

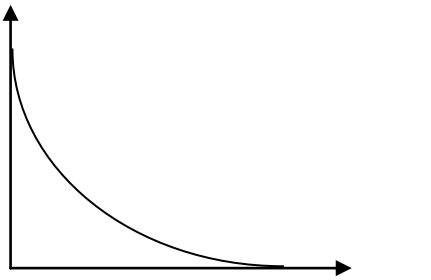
A P
B Q
C R
D S

26 The equation below shows the reaction between excess marble chips with dilute hydrochloric acid.
Persamaan di bawah menunjukkan tindak balas antara ketulan marmar dengan asid hidroklorik cair.

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

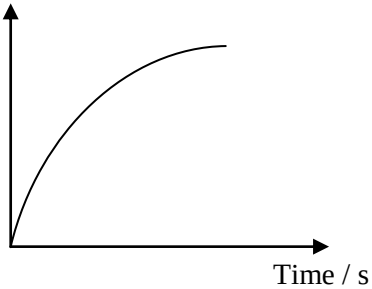
The changes of the quantity of reactants and products are recorded with time until the reaction is completed. Which graph shows the correct changes?
Perubahan-perubahan dalam kuantiti bahan-bahan tindak balas dan hasil-hasil tindak balas mengikut masa dicatatkan sehingga tindak balas lengkap. *Graf yang manakah menunjukkan perubahan yang betul*?

Mass of marble chips / g
Jisim ketulan marmar



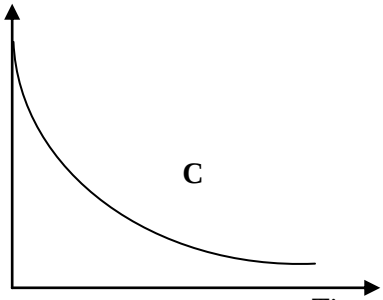
A

Concentration of $CaCl_2$ solution / mol dm^{-3}
Kepekatan larutan $CaCl_2$

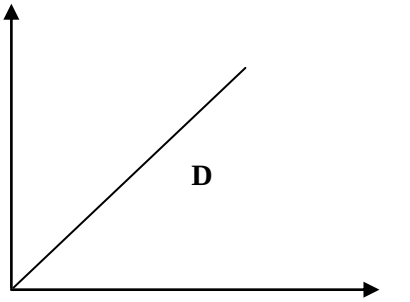


B

Concentration of HCl / mol dm^{-3}
Kepekatan asid hidroklorik



Volume of CO_2 / cm^3
Isipadu CO_2



27 Which statement is true when adding a catalyst in a chemical reaction?
Penyataan yang manakah betul apabila suatu mangkin ditambah dalam satu tindak balas kimia?

A Increase the yield of the reaction
Meningkatkan hasilan tindak balas

B Increase the frequency of collision between the reacting particles
Meningkatkan frekuensi perlanggaran antara zarah-zarah tindak balas

C Provide an alternative pathway which increases the activation energy
Membekalkan suatu laluan alternatif yang meningkatkan tenaga pengaktifan

D Increase the frequency of effective collision between the reacting particles
Meningkatkan frekuensi perlanggaran berkesan antara zarah-zarah bahan tindak balas

28 Which are the following statements in **true**?
Manakah pernyataan berikut yang **benar?**

I Group 17 elements are also known as halogens.
Unsur kumpulan 17 dikenali sebagai halogen.

II Group 17 elements are monoatomic.
Unsur kumpulan 17 adalah monoatom.

III Bromine is a reddish-brown liquid.
Bromin adalah cecair perang.

IV Iodine is in solid state at room conditions.
Iodin adalah pepejal pada keadaan bilik.

A I, II and III only
B I, II and IV only
C I, III and IV only
D I, II, III and IV only

29 Which of the following statements are true?
Antara penyataan berikut, yang manakah benar?

I Codeine is an example of an antibiotics.
Kodeina adalah satu contoh antibiotik.

II A tranquilizer is used for treating anxiety.
Trankuilizer digunakan untuk mengubati keresahan.

III Streptomycin is used to treat psychiatric patients.
Streptomisin digunakan untuk merawat pesakit psikiatrik.

IV A diabetes mellitus patient can be treated by using insulin.
Seorang pesakit kencing manis boleh dirawati dengan menggunakan insulin

A I and II
B I and III
C II and IV
D III and IV

30 Which of the following processes is palm oil converted to margarine?
Manakah antara proses yang berikut, minyak sawit boleh ditukarkan kepada marjerin?

A Hydrolysis/*Hidrolisis*
B Fermentation/*Penapaian*
C Hydrogenation/*Penghidrogenan*
D Polymerisation/
Pempolimeran

31 Compound X reacts with magnesium to produce hydrogen gas.
What is X?
Sebatian X bertindak balas dengan magnesium untuk menghasilkan gas hydrogen.
Apakah X?

A Propane , C_3H_8
Propana, C_3H_8

B Propene, C_3H_6
Propena, C_3H_6

C Propanol,C_3H_5OH
Propanol, C_3H_5OH

D Propanoic acid , C_2H_5COOH
Asid propanoik, C_2H_5COOH

32 Diagram 8 shows the process to produce compound Q.
Rajah 8 menunjukkan proses menghasilkan sebatian Q.

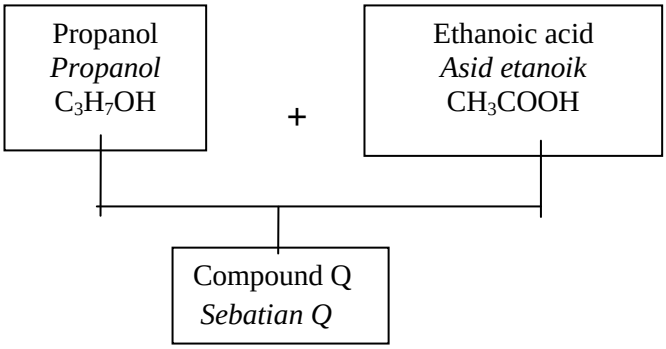
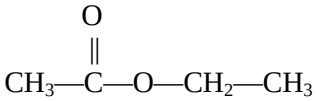
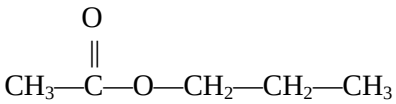
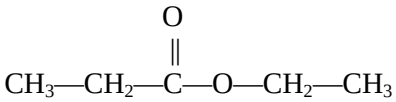


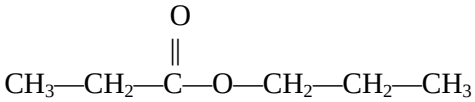
Diagram 8

Which of the following structural formulas is of compound Q?
Antara formula struktur yang manakah bagi sebatian Q?

A 

B 

C 

D 

33 What is the oxidation number of vanadium in NH_4VO_3?
Apakah nombor pengoksidaan vanadium dalam NH_4VO_3?

A +3 **C** +5
B +4 **D** +6

34 What is the volume of 2.0 mol dm^{-3} potassium hydroxide solution is needed to prepare 500 cm^3 of 0.1 mol dm^{-3} potassium hydroxide solution.
Berapakah isipadu larutan kalium hidroksida 2.0 mol dm^{-3} *yang diperlukan untuk menyediakan* 500 cm^3 *larutan kalium hidroksida* 0.1 mol dm^{-3}

A 25 cm^3 **C** 100 cm^3
B 50 cm^3 **D** 500 cm^3

35 The following equation represents the reaction between sodium hydroxide solution and dilute sulphuric acid.
Persamaan berikut mewakili tindak balas antara larutan natrium hidroksida dengan asid sulfurik cair.

$$H_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O$$

What is the volume of 0.5 mol dm^{-3} sulphuric acid needed to neutralise 50 cm^3 of 0.5 mol dm^{-3} sodium hydroxide?
Apakah isipadu 0.5 mol dm^{-3} asid sulfurik yang diperlukan untuk meneutralkan 50 cm^3 0.5 mol dm^{-3} natrium hidroksida?

A 12.5 cm^3
B 50.0 cm^3
C 25.0 cm^3
D 75.0 cm^3

36 What is the percentage of carbon by mass in the molecule of hexane.
[Relative atomic mass : C = 12, H = 1]
Apakah peratus karbon dalam molekul heksana mengikut jisim.
[Jisim atom relative : C = 12, H = 1]
A 70.59 %
B 85.71 %
C 83.72 %
D 92.31 %

37 100 cm^3 of water is heated by the burning of a sample of ethanol. The temperature of the water increases by 25 ^oC.
Calculate the heat release by the complete combustion of the ethanol.
[Specific heat capacity of water = 4.2 $Jg^{-1o}C^{-1}$]
100cm^3air dipanaskan oleh pembakaran suatu sampel etanol.Suhu air meningkat sebanyak25 ^oC. Hitungkan haba yang dibebaskan daripada pembakaran lengkap etanol tersebut.
[Muatan haba tentu air = 4.2 $Jg^{-1o}C^{-1}$]

A 10.5 J
B 16.8 J
C 595.2 J
D 10500 J

38 The chemical equation shows the decomposition of a copper(II) nitrate salt.
Persamaan kimia berikut menunjukkan penguraian garam kuprum(II) nitrat.

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

What is the volume of nitrogen dioxide, NO_2 gas at room condition if 0.2 mol of $Cu(NO_3)_2$ salt is heated.
[Molar volume = 24 dm^3 mol^{-1} at room conditions]

Hitung isipadu gas nitrogen dioksida, NO_2 pada keadaan bilik jika 0.2 mol garam $Cu(NO_3)_2$ dipanaskan?
[Isipadu molar = 24 dm^3 mol^{-1} pada suhu bilik]

A 1.2 dm^3
B 2.4 dm^3
C 4.8 dm^3
D 9.6 dm^3

39 Diagram 9 shows the conversion of ethene, C_2H_4, into ethanoic acid, CH_3COOH.
Rajah 9 *menunjukkan perubahan etena*, C_2H_4, *kepada asid etanoik*, CH_3COOH.

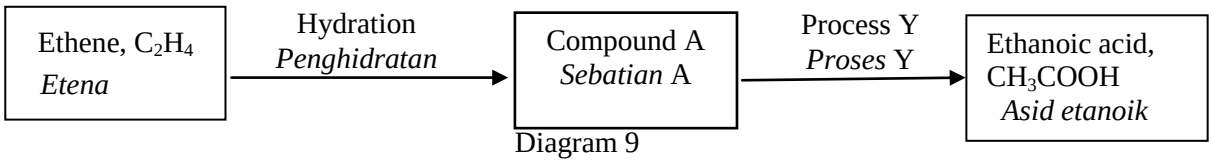


Diagram 9

Which of the following is compound A and process Y?
Yang manakah antara berikut merupakan sebatian A *dan proses* Y?

	Compound A ***Sebatian* A**	**Process Y** ***Proses* Y**
A	Ethane *Etana*	Substitution *Penukargantian*
B	Ethanol *Etanol*	Esterification *Pengesteran*
C	Ethane *Etana*	Addition *Penambahan*
D	Ethanol *Etanol*	Oxidation *Pengoksidaan*

40 The equation below represent displacement reactions.
Persamaan tindak balas di bawah mewakili tindak balas penyesaran.

$$P_{(s)} + Q^{2+}{}_{(aq)} \longrightarrow P^{2+}{}_{(aq)} + Q_{(s)}$$
$$Q_{(s)} + R^{2+}{}_{(aq)} \longrightarrow Q^{2+}{}_{(aq)} + R_{(s)}$$
$$S_{(s)} + P^{2+}{}_{(aq)} \longrightarrow S^{2+}{}_{(aq)} + P_{(s)}$$

Arrange the metals P, Q, R and S in order of increasing reactivity
Susunkan logam-logam P, Q, R dan S mengikut reaktiviti secara menaik.

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

41. What is the meaning of '*heat of displacement'* ?
Apakah yang dimaksudkan dengan 'haba penyesaran'?

A. Heat change when metal is displaced from its solution by a more electropositive metal.
Perubahan haba apabila logam disingkirkan dari larutannya oleh suatu logam yang lebih elektropositif.

B. Heat change when metal is displaced from its solution by a less electropositive metal.
Perubahan haba apabila logam disingkirkan dari larutannya oleh suatu logam yang kurang elektropositif.

C. Heat change when 1 mol of metal is displaced from its solution by a more electropositive metal.
Perubahan haba apabila 1 mol logam disingkirkan dari larutannya oleh suatu logam yang lebih elektropositif.

D. Heat change when 1 mol of metal is displaced from its solution by a less electropositive metal.
Perubahan haba apabila1 mol logam disingkirkan dari larutannya oleh suatu logam yang kurang elektropositif.

42 hat is the type of glass used to make glass containers?
Apakah jenis kaca yang digunakan untuk menghasilkan bekas kaca?

A Borosilicate glass/*Kaca borosilikat*
B Soda lime glass/*Kaca soda kapur*
C Fused glass/*Kaca silica terlakur*
D Lead crystal glass/*Kaca plumbum*

43 Diagram 10 shows a series of tests carried out on solution Y.
Rajah 10 menunjukkan satu siri ujian telah dijalankan ke atas larutan Y.

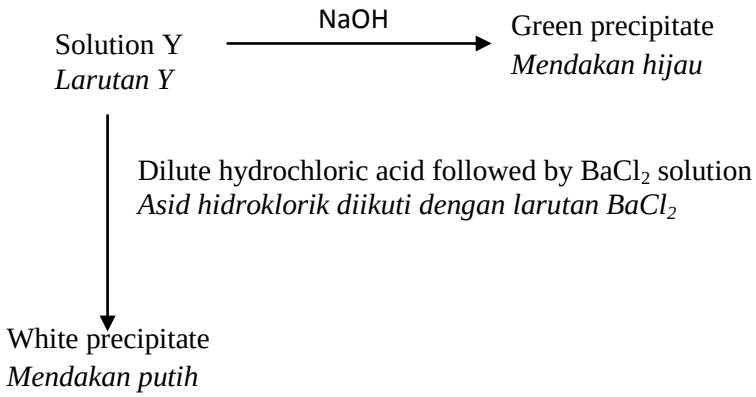


Diagram 10

Which of the following is most likely to be solution Y.
Antara berikut manakah kemungkinan larutan Y.

A Iron(II) sulphate/*Ferum(II) sulfat*
B Lead(II) sulphate/*Plumbum (II) sulfat*
C Iron(II) chloride/*Ferum(II) klorida*
D Iron(II) iodide/*Ferum(II) iodida*

44 Diagram 10 shows curve X which obtained when 4 g of granulated zinc (in excess) is reacted with 50 cm^3 of 1.0 mol dm^{-3} hydrochloric acid.
Rajah 10 menunjukkan lengkung X yang diperolehi apabila 4g ketulan zinc (berlebihan) bertindak balas dengan 50 cm^3 asid hidroklorik 1.0 mol dm^{-3}.

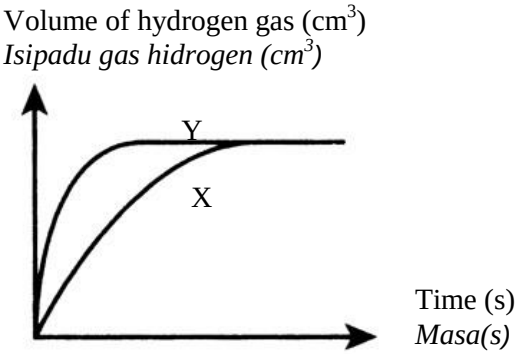


Diagram 10

Which of the following reactions produces curve Y?
Yang tindak balas berikut yang manakah menghasilkan lengkung Y?

A 4 g zinc powder + 50 cm^3 of 2 mol dm^{-3} hydrochloric acid
4 *g serbuk zink* + 50 *cm^3 of* 2 *mol dm^{-3} hidroklorik asid*
B 4 g zinc powder + 50 cm^3 of 1 mol dm^{-3} of hydrochloric acid
4 *g serbuk zink* + 50 *cm^3 of* 1 *mol dm^{-3} hidroklorik asid*
C 4 g granulated zinc + 100 cm^3 of 1 mol dm^{-3} of hydrochloric acid
4 *g ketulan zink* + 100 *cm^3 of* 1 *mol dm^{-3} hidroklorik asid*
D 4 g granulated zinc + 50 cm^3 of 2 mol dm^{-3} of hydrochloric acid
4 *g ketulan zink* + 50 *cm^3 of* 2 *mol dm^{-3} hidroklorik asid*

45 When ethanol vapour is passed through hot porcelain chips, a gas is produced. Which of the following is not the characteristic of the gas?
Apabila wap etanol dialirkan melalui ketulan kecil porselain, sejenis gas terhasil.manakah antara berikut bukan sifat gas itu?

A Changes the blue litmus paper to red
Menukarkan kertas litmus biru kepada merah

B Decolourises bromine water
Melunturkan warna air bromin

C Decolourises acidified potassium manganate (VII) solution
Melunturkan larutan kalium manganat (VII) berasid

D Produces carbon dioxide and water when burned completely
Menghasilkan gas karbon dioksida dan air apabila terbakar dengan lengkap

46 Diagram 11 shows the preparation of lead(II) chloride salt.
Rajah 11 menunjukkan persediaan garam plumbum(II) klorida.

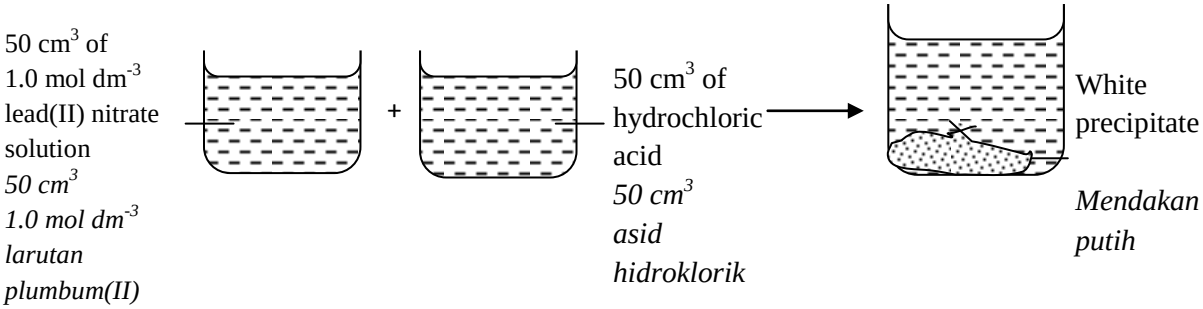


Diagram 11

What is the concentration of the hydrochloric acid needed to react completely with lead(II) nitrate solution?
Berapakah kepekatan larutan asid hidroklorik yang diperlukan untuk bertindak balas lengkap dengan larutan plumbum(II) nitrat?

A 0.5 mol dm^{-3}
B 1.0 mol dm^{-3}
C 1.5 mol dm^{-3}
D 2.0 mol dm^{-3}

47 Which of the following pairs of solutions will produce the highest temperature change when added together ?/*Yang mana satu antara pasangan larutan di bawah ini akan menghasilkan perubahan suhu yang tertinggi apabila ditindak balas bersama?*

	Volume of 1 mol dm^{-3} HCl (cm^3)	**Volume of 1 mol dm^{-3} NaOH (cm^3)**
A	50	30
B	50	40
C	50	45
D	50	60

48 Diagram 11 shows the set-up of apparatus for the reaction between an acid and a metal.
Rajah 11 menunjukkan susunan radas bagi tindak balas antara satu asid dengan satu logam

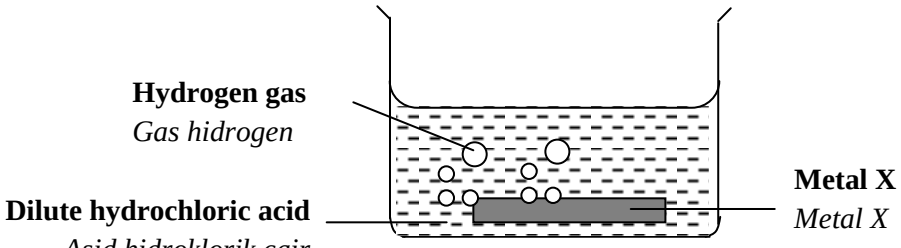


Diagram 11/*Rajah 11*

I Metal X atom is oxidized to X ions
Atom logam X dioksidakan kepada ion X
II Hydrogen ions are reduced to hydrogen atoms
Ion hidrogen telah diturunkan kepada atom hidrogen
III Metal X acts as reducing agent
Logam X bertindak sebagai agen penurunan
IV Hydrogen ion acts as oxidizing agent
Ion hidrogen bertindak sebagai agen pengoksidaan

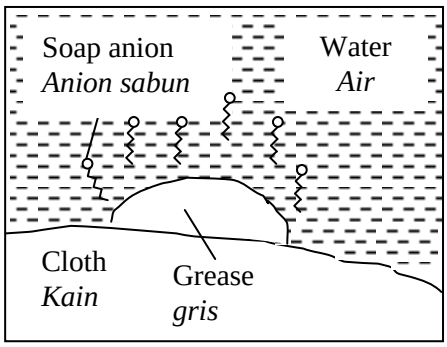
A I only
B I and II only
C III and IV only
D I, II, III and IV

49

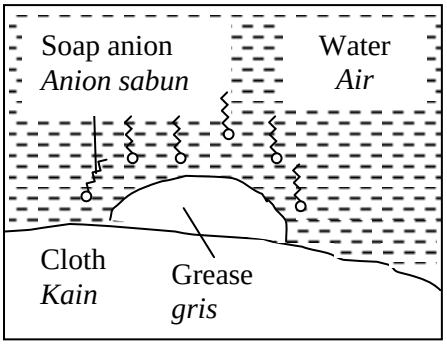
Part of soap anion dissolves in water and another part in grease.
Sebahagian dari anion sabun larut dalam air dan sebahagian lagi dalam gris.

Which of the following represents the above action?
Yang manakah di antara berikut sesuai untuk menggambarkan tindakan di atas?

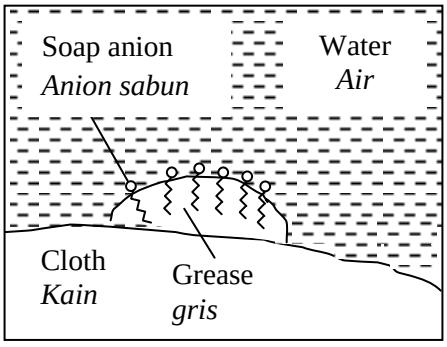
A



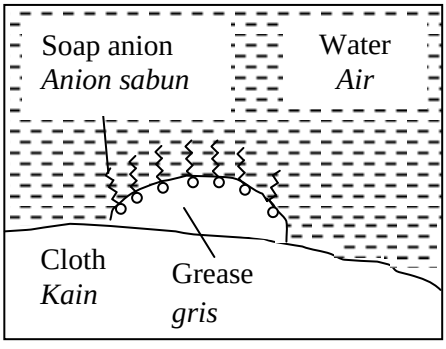
B



C



D



50 The apparatus in diagram 13 is used to determine the heat of combustion of ethanol./ *Susunan radas dalam rajah 13 digunakan untuk menentukan haba pembakaran bagi etanol.*

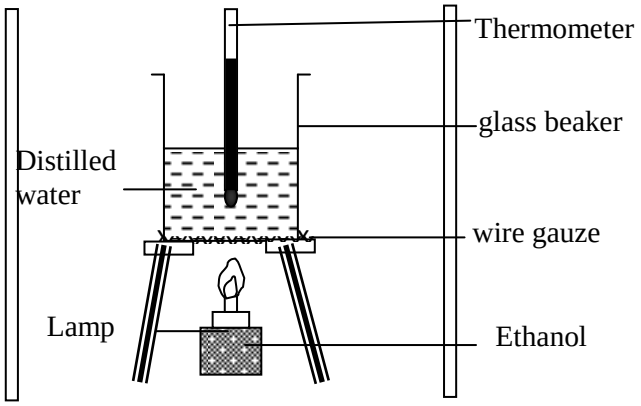


Diagram 13/*Rajah* 13

The heat of combustion obtained in this experiment is less than the theoretical value. Among the following, which factor is the cause why heat of combustionof ethanol in the experiment is less than the theoretical value.
Haba pembakaran yang diperolehi dalam eksperimen ini adalah kurang berbanding dengan nilai teori. Berdasarkan pernyataan di bawah ini, yang manakah merupakan faktor bagi penyebab mengapa haba pembakaran etanol dalam eksperimen ini kurang daripada nilai teori.

I Distilled water is placed in the glass beaker
Air suling dimasukkan kedalam bikar kaca

II Wire gauze is placed on top of tripod stand
Kasa dawai diletakkan di atas tungku kaki tiga

III Incomplete combustion of ethanol
Pembakaran tidak lengkap etanol

IV Heat is absorbed by the thermometer, tripod stand and lamp
Haba diserap oleh termometer, tungku kaki tiga dan lampu pelita

A I only
B I and II only
C I, II and III only
D I,II, III and IV

KERTAS SOALAN TAMAT

SKEMA PEMARKAHAN PAPER 1 SET I

http://cikguadura.wordpress.com/

QUESTION NO	ANSWER	QUESTION NO	ANSWER
1	B	26	B
2	C	27	A
3	A	28	D
4	C	29	D
5	D	30	C
6	C	31	B
7	C	32	C
8	A	33	A
9	B	34	B
10	C	35	D
11	D	36	D
12	A	37	C
13	A	38	C
14	C	39	A
15	B	40	D
16	D	41	C
17	B	42	C
18	C	43	C
19	C	44	D
20	A	45	C
21	D	46	B
22	B	47	C
23	D	48	A
24	A	49	D
25	C	50	D

SKEMA PEMARKAHAN PAPER 1 SET II

http://cikguadura.wordpress.com/

QUESTION NO	ANSWER	QUESTION NO	ANSWER
1	C	26	A
2	C	27	D
3	C	28	B
4	B	29	C
5	A	30	D
6	B	31	D
7	D	32	A
8	C	33	B
9	A	34	B
10	D	35	A
11	B	36	B
12	C	37	B
13	B	38	B
14	C	39	B
15	A	40	C
16	C	41	B
17	C	42	C
18	A	43	B
19	D	44	D
20	C	45	B
21	C	46	D
22	D	47	D
23	B	48	A
24	D	49	B
25	B	50	B

SKEMA PEMARKAHAN PAPER 1 SET III

http://cikguadura.wordpress.com/

1	D	26	B
2	C	27	D
3	D	28	B
4	A	29	C
5	B	30	C
6	C	31	D
7	B	32	B
8	C	33	C
9	B	34	A
10	C	35	C
11	A	36	C
12	B	37	D
13	A	38	D
14	D	39	D
15	A	40	C
16	A	41	C
17	A	42	B
18	A	43	A
19	B	44	B
20	C	45	A
21	C	46	D
22	C	47	D
23	B	48	D
24	A	49	C
25	B	50	D

KEMENTERIAN PENDIDIKAN MALAYSIA

2014

BAHAGIAN PENGURUSAN SEKOLAH BERASRAMA PENUH DAN SEKOLAH KECEMERLANGAN

MODUL PERFECT SCORE KIMIA

http://cikguadura.wordpress.com/

KERTAS 3

Nama : .....

Sekolah:.....

Kelas :.....

PANEL PENYEDIA DAN PEMURNI:

Pn. Wan Noor Afifah Binti Wan Yusoff (Ketua)	SBPI GOMBAK
Pn. Norini Binti Jaafar	SEKOLAH SULTAN ALAM SHAH
Pn. Aishah Peong Binti Abdullah	SBPI TEMERLOH
En Che Malek Bin Mamat	SBPI BATU RAKIT
Pn. Rossita Binti Radzak	SMS TUANKU MUNAWIR
Pn Noor Raini Binti Sulaiman	SMS TENGKU ABDULLAH
En Ooi Yoong Seang	SMS MUAR
Pn Masodiah Binti Mahfodz	SMS HULU SELANGOR
Cik Nurul Yusma Hanim Binti Ahmad	SMSTSSS, BUKIT MERTAJAM

1. Table 1.1 shows the results from two experiments to investigate the properties of the oxides of aluminium when dissolved in acid and alkali.
Jadual 1.1 menunjukkan keputusan dua eksperimen untuk mengkaji sifat oksida aluminium apabila di larutkan dalam asid dan alkali.

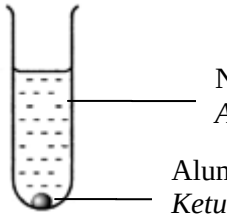
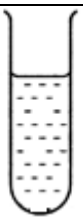
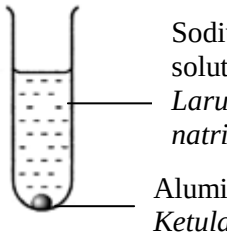
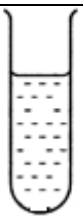
Experiment	Reaction	Observation
I		
II		

Table / *Jadual* 1,1

(a) (i) Based on Table 1.1, state **one** observation.
*Berdasarkan Jadual 1.1, nyatakan **satu** pemerhatian.*

.....

[3 marks]

(ii) State the inference based on the observation.
Nyatakan inferens berdasarkan pemerhatian.

…….....

[3 marks]

(iii)Name the property shown by aluminium oxide.
Namakan sifat yang ditunjukkan oleh aluminium oksida.

.....

[3 marks]

(b) State one hypothesis for this experiment.
Nyatakan satu hipotesis untuk eksperimen ini.

.....

.....

[3 marks]

(c) State the variables for this experiment.
Nyatakan pembolehubah-pembolehubah untuk eksperimen ini.

(i) Manipulated variable: .....
Pembolehubah dimanipulasikan:

(ii) Responding variable: .....
Pembolehubah bergerak balas:

(iii) Fixed variable : .....
Pembolehubah ditetapkan:

[3 marks]

(d) State the operational definition for the acidic properties in this experiment.
Nyatakan definisi secara operasi untuk sifat asid dalam eksperiment ini.

.....

.....

[3 marks]

(e) Experiment 1 is repeated using aluminium oxide powder to replace aluminium oxide granule. It is found that the time taken for aluminium oxide to dissolve in nitric acid is shorter. State the relationship between size of aluminium oxide and the time taken for neutralisation reaction to occurs.
Eksperimen 1 diulangi menggunakan serbuk aluminium oksida untuk menggantikan ketulan aluminium oksida.Didapati bahawa masa yang diambil untuk aluminium oksida larut dalam asid nitrik adalah lebih singkat. Nyatakan hubungan diantara saiz aluminium oksida dan masa yang diambil untuk tindak balas peneutralan berlaku

.....

.....

[3 marks]

(f) Table 1.2 shows the results from an experiment to investigate the acid-base properties of sodium oxide and sulphur dioxide when dissolved in water by dipping red or blue litmus paper into the solutions.
Jadual 1.2 menunjukkan keputusan eksperimen untuk mengkaji sifat asid-bes natrium oksida dan sulphur dioksida apabila dilarutkan dalam air dengan mencelupkan kertas litmus merah atau biru ke dalam larutan terhasil.

(i) Complete Table 1.2 for the observation on the red or blue litmus paper.
Lengkapkan Jadual 1.2 untuk pemerhatian terhadap kertas litmus merah atau biru.

Experiment *Eksperimen*	Observation on the red / blue litmus paper *Pemerhatian terhadap kertas litmus merah/biru*
Sodium oxide + water *Natrium oksida + air*	
Sulphur dioxide + water *Sulphur dioksida + air*	

Table/*Jadual*1.2

[3 marks]

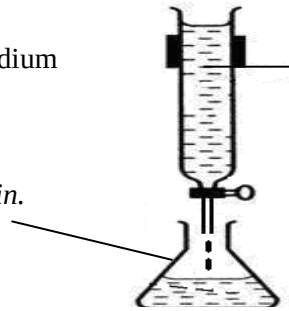
(ii) Classify the following oxides into acidic oxide and basic oxide.
Kelaskan oksida berikut kepada oksida asid dan oksida bes.

- Magnesium oxide
- Phosphorous pentoxide
- Carbon dioxide
- Calcium oxide

Acidic oxide *Oksida asid*	Basic oxide *Oksida bes*

[3 marks]

2 An experiment is carried out to determine the volume of acid for neutralization between sodium hydroxide, NaOH solution and nitric acid ,$HNO_3$by using titration method.Diagram 2.1 shows the set-up of apparatus for the experiment.
Satu eksperimen telah dijalankan untuk menentukan isipadu asid bagi peneutralan antara larutan natrium hidroksida, NaOH denganlarutanasid nitrik,HNO_3.menggunakan kaedah pentitratan.
Rajah 2.1 menunjukkan susunan radas bagi eksperimen itu.



Diagram/ *Rajah 2*

The experiment is repeated three times and the volume of nitric acid used is shown in Diagram 2
Eksperimen ini diulang tiga kali dan isipadu asid sulfurik yang digunakan ditunjukkan dalam rajah 2

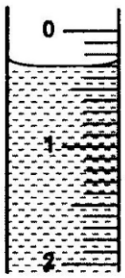
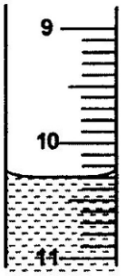
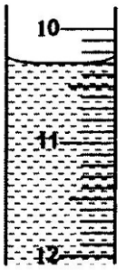
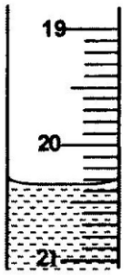
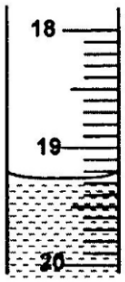
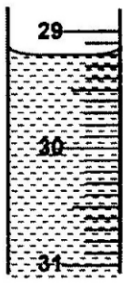
Experiment *Eksperimen*	Initial reading *Bacaan awal*	Final reading *Bacaan akhir*
1	 ..... cm^3	 ..... cm^3
2	 ..... cm^3	 ..... cm^3
3	 ..... cm^3	 ..... cm^3

Diagram /*Rajah* 2.2

(a) Record the burette readings in the spaces provided in Diagram 2.2.
Catatkan bacaan buret pada ruang yang disediakan dalam Rajah 2.2.

[3 *marks*]

(b) Construct a table to record the data from the three experiments. Your table should include initial reading, final reading and volume of sulphuric acid used in the titration.
Bina satu jadual untuk merekod data bagi ketiga-tiga eksperimen itu. Jadual anda harus mengandungi bacaan awal, bacaan akhir dan isipadu asid sulfurik yang digunakan dalam titratan tersebut.

[3 *marks*]

(c) In another experiment, nitric acid, HNO_3 is replaced by sulphuric acid, H_2SO_4 with the same concentration. It is found that the volume of sulphuric acid is **half** the volume of nitric acid, HNO_3needed to neutralize $20cm^3$of sodium hydroxide, NaOH solution.
Dalam satu eksperimen lain, asid nitrik, HNO_3digantikan dengan asid sulfurik, H_2SO_4dengan kepekatan yang sama. Didapati isipadu asid sulfurik, H_2SO_4 adalah setengah isipadu asid nitrik, HNO_3 yang diperlukan untuk meneutralkan $20cm^3$ larutan natrium hidroksida, NaOH.

(i) Ionisation of sulphuric acid, H_2SO_4 and nitric acid, HNO_3 in water are shown in the following ionic equations.
Pengionan asid sulfurik, H_2SO_4 dan asid nitric, HNO_3 dalam air ditunjukkan dalam persamaan ion di bawah.

$HNO_3(aq) \longrightarrow H^+(aq) + NO_3^-(aq)$
$H_2SO_4(aq) \longrightarrow 2H^+(aq) + SO_4^{2-}(aq)$

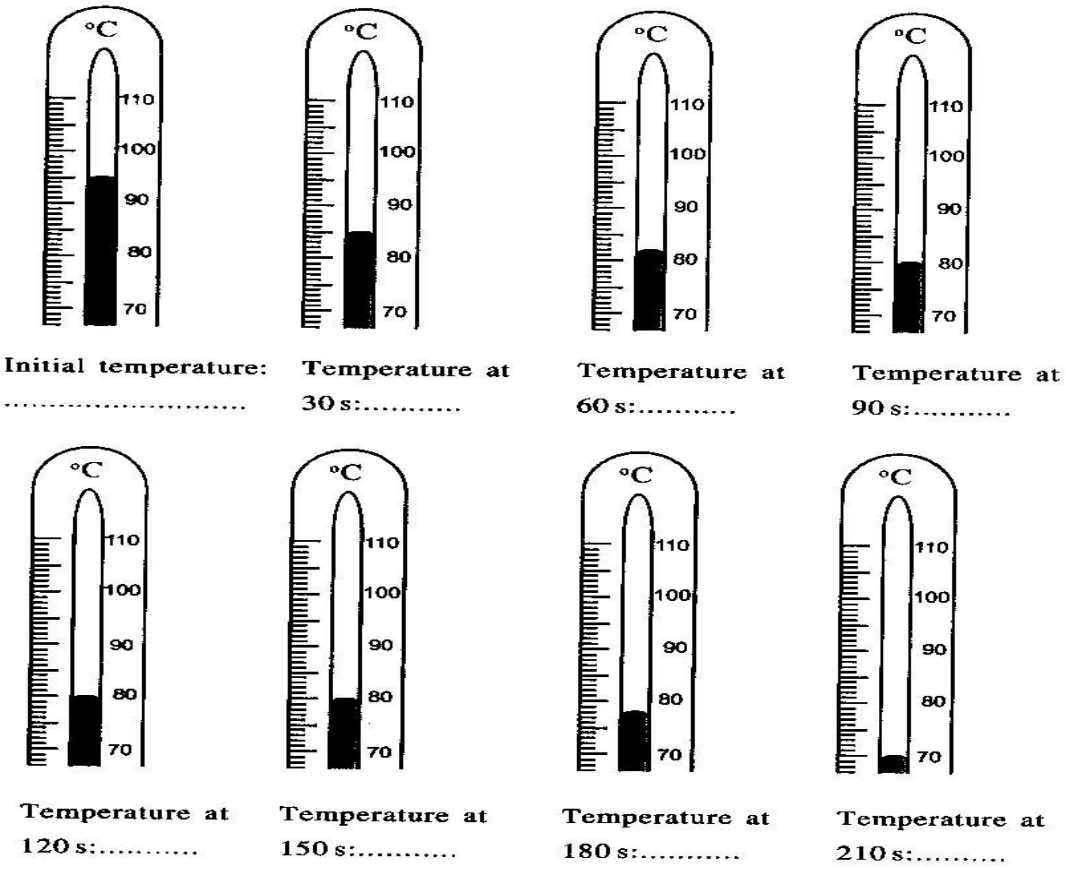
State the relationship between the concentration of hydrogen ion, H^+ and the volume of acid needed to neutralize sodium hydroxide, NaOH solution.
Nyatakan hubungan antara kepekatan ion hidrogen, H^+ dengan isipadu asid yang diperlukan untuk meneutralkan larutan natrium hidroksida, NaOH.

.....

.....

[3 *marks*]

3. An experiment was carried out to determine the freezing point of liqiud Z. A boiling tube contain molten Z at 95 ^{o}C was allowed to cool in a conical flask to room temperature.
The temperature of Zwas recorded every 30 seconds intervals.
Figure 3 shows the reading of the thermometer for this experiment.
Satu eksperimen telah dijalankan untuk menentukan takat beku cecair Z. Satu tabung didih yang mengandungi leburan Z pada suhu 95 ^{o}C diletakkan kelalang kon dan dibiarkan menyejuk dalam keadan suhu bilik. Suhu direkod setiap 30 saat.



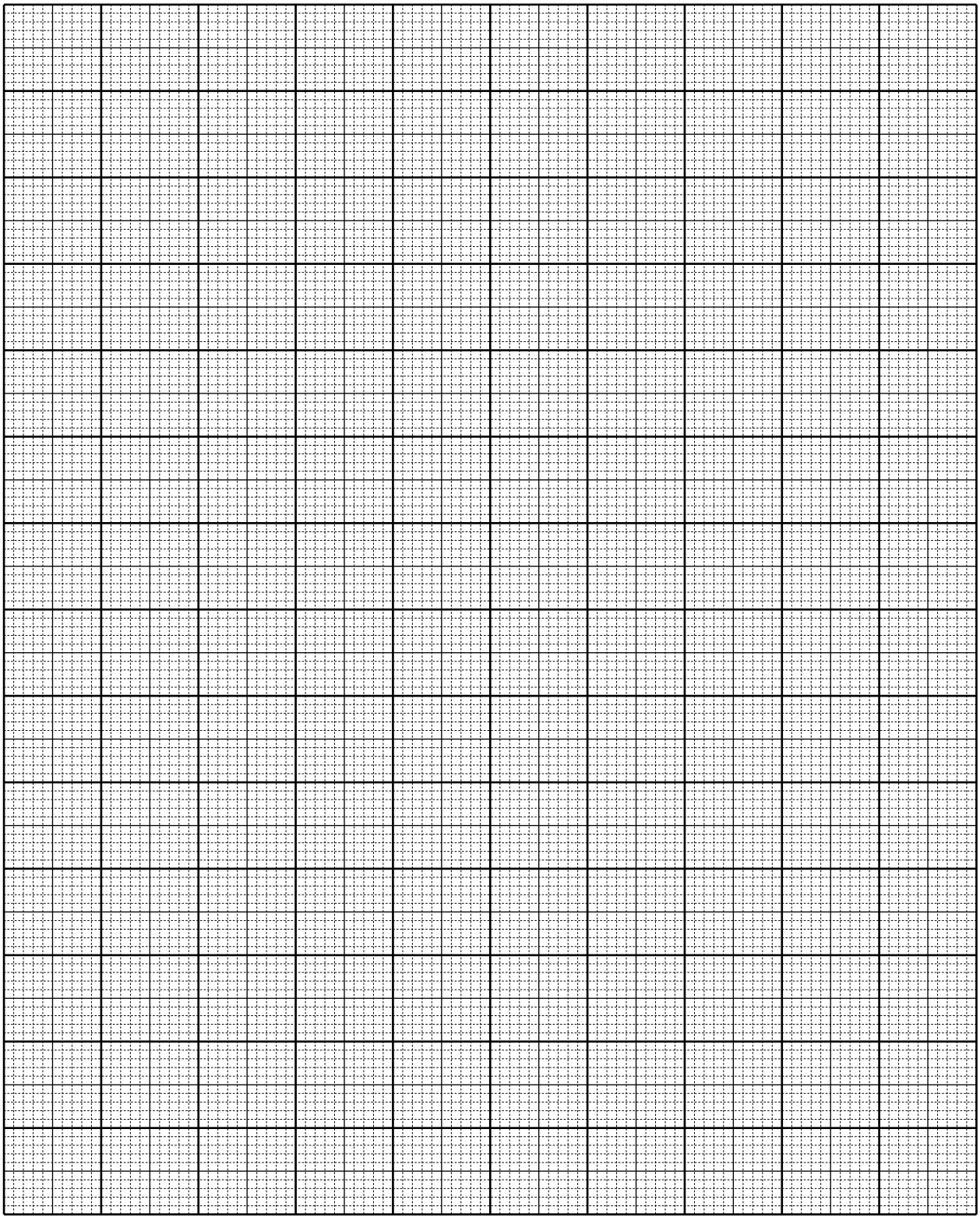
Diagram/*Rajah*3

(a) Record the temperature at each time interval in the spaces provided in Diagram 1.
Catatkan bacaan suhu bagi setiap sela masa dalam ruangan yang disediakan dalam rajah 1

[*3 marks*]

(b) On the graph paper below, draw the graph of temperature against time for the cooling of Z.
Pada kertas graf di bawah, lukiskan graf suhu melawan masa bagi penyejukan Z

[*3 marks*]



(c) On the graph in (b), determine the freezing point of Z.
Show on the graph how you determine this freezing point.
Pada graf di(b) tentukan takat beku Z. Tunjukkan pada graf bagaimana anda tentukan takat beku.

[*3 marks*]

(d) How does the graph in (b) show the freezing point of Z ?
Pada graf di(b)bagaimanakah ia menunjukkan takat beku Z.

.....

.....

[*3 marks*]

(e) The temperature of Z did not change from the 90th second until the 150th second during the cooling process. Explain why.
Suhu Z tidak berubah dari saat ke 90 hingga saat ke 150 semasa proses penyejukan. Terangkan mengapa.

.....

.....

.....

[*3 marks*]

(f) Why was the boiling tube placed in the conical flask during the cooling process?
Mengapakah tabung didih diletakkan dalam kelalang kon semasa proses penyejukan?

.....

….....

.....

[*3 marks*]

(g) State the operational definition for the melting point in this experiment.
Nyatakan definisi secara operasi untuk takat lebur dalam eksperimen ini.

….....

.....

[*3 marks*]

4. Rusting of iron can occur naturally when iron is exposed to air and water. The rusting of iron can be affected when iron is in contact with other metals. Table 4 shows the results on the rusting of iron when zinc and copper are in contact with iron.
Pengaratan besi boleh berlaku secara semula jadi apabila terdedah kepada udara dan air. Pengaratan besi boleh dipengaruhi apabila besi bersentuhan dengan logam-logam lain. Jadual 4 menunujukkan keputusan bagi pengaratan besi apabila besi bersentuhan dengan zink dan kuprum.

Metal in contact with iron *Logam yang bersentuhan dengan besi*	Results *Keputusan*
Zinc/*Zink*	Iron does not rust/*Besi tidak berkarat*
Copper/*Kuprum*	Iron rusts/*Besi berkarat*

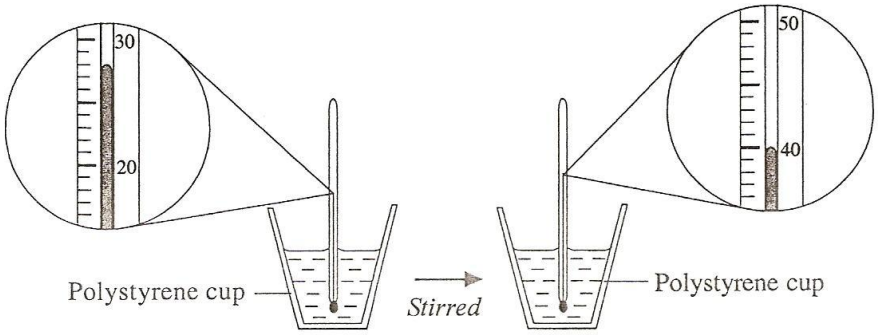
Table /*Jadual* 4

Based on the information in Table 4, plan a laboratory experiment to investigate the effect of other metals when in contact with iron on the rusting of iron.
Your planning should include the following aspects:
Berdasarkan maklumat dalam Jadual 4, rancangkan satu eksperimen makmal untuk mengkaji kesan logam lain apabila bersentuhan dengan besi terhadap pengaratan besi.
Perancangan anda hendaklah mengandungi aspek-aspek berikut:

(a) Problem statement / *Pernyataan masalah*
(b) All the variables / *Semua pembolehubah*
(c) Hypothesis / *Hipotesis*
(d) List of materials and apparatus / *Senarai bahan dan radas*
(e) Procedure / *Prosedur*
(f) Tabulation of data / *Penjadualan data*

[17 marks]

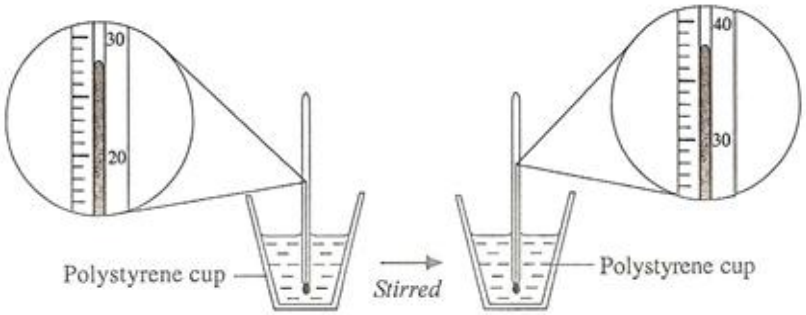
1. Diagram 1.1 shows two experiments to determine the heat of neutralization.
Rajah 1.1 menunjukkan dua eksperimen untuk menentukan haba peneutralan.



Experiment *Eksperimen 1*

Reaction between 25 cm^3 of sodium hydroxide solution, NaOH 2.0 mol dm^{-3} and 25 cm^3 of hydrochloric acid, HCl 2.0 mol dm^{-3}
Tindakbalas antara 25 cm^3 larutan natrium hidroksida, NaOH 2.0 mol dm^{-3} dan 25 cm^3 asid hidroklorik, HCl 2.0 mol dm^{-3}

Initial temperature of the mixture : _____ ^oC
Suhu awal campuran :
Highest temperature of the mixture : _____ ^oC
Suhu tertinggi campuran :
Change in temperature : _____ ^oC
Perubahan suhu :



Experiment /*Eksperimen II*

Reaction between 25 cm^3 of sodium hydroxide solution, NaOH 2.0 mol dm^{-3} and 25 cm^3 of ethanoic acid, CH_3COOH 2.0 mol dm^{-3}
Tindakbalas antara 25 cm^3 larutan natrium hidroksida, NaOH 2.0 mol dm^{-3} dan 25 cm^3 asid etanoik, CH_3COOH 2.0 mol dm^{-3}

Initial temperature of the mixture : _____ ^oC
Suhu awal campuran :
Highest temperature of the mixture : _____ ^oC
Suhu tertinggi campuran :
Change in temperature : _____ ^oC
Perubahan suhu

(a) Write the initial and the highest temperature of the mixture and the change in temperature for experiment I in Diagram 1.1.
Tulis suhu awal dan suhu tertinggi campuran serta perubahan suhu untuk eksperimen 1 dalam Rajah 1.1.
[3 marks]

(b) Construct a table that can be used to record the data from both experiments.
Bina satu jadual yang boleh digunakan untuk merekod data bagi kedua-dua eksperimen.

[3 marks]

(c) State one hypothesis for both experiments.
Nyatakan satu hipotesis bagi kedua-dua eksperimen.

……..……..

……..……..

[3 marks]

(d) Why must the initial temperature and the highest temperature be recorded in these experiments?
Mengapa suhu awal dan suhu tertinggi perlu direkodkan dalam eksperimen ini?

……..……..

……..……..

[3 marks]

(e) How can the value of the change in temperature be obtained?
Bagaimanakah nilai perubahan suhu diperolehi?

……..……..

[3 marks]

(f) State three observations that you could obtain in experiment II other than change in temperature.
Nyatakan tiga pemerhatian yang boleh anda dapati dalam eksperimen II selain daripada perubahan suhu?

……..……..

……..……..

……..……..

[3 marks]

(g) State three constant variables in this experiment.
Nyatakan tiga pembolehubah yang dimalarkan dalam eksperimen ini.

……..……..

……..……..

[3 marks]

(h) Calculate the value of heat of neutralization for the reactions in experiments I and II.
Hitung nilai haba peneutralan untuk tindakbalas dalam eksperimen I dan II

[3 marks]

(i) Give the operational definition for the heat of neutralization.
Berikan definisi secara operasi untuk haba peneutralan.

……..……..

……..……..

[3 marks]

(j) State the relationship between type of acid and value of heat of neutralization. Explain the difference.
Nyatakan hubungan antara jenis asid dan nilai haba peneutralan.Terangan perbezaannya.

……..……..

……..……..

[3 marks]

(k) Based on the temperatures in Experiment II, predict the change in temperature if sodium hydroxide solution replaced by ammonia solution
Berdasarkan suhu dalam eksperimen II, ramalkan perubahan suhu jika larutan natrium hidroksida digantikan dengan larutan ammonia

……..……..

[3 marks]

(l) The experiment is repeated using methanoic acid. The values of the heat of neutralization of these acids are given in Table 1. Complete table 1 by clasifying the acids as strong acid or weak acid.
Eksperimen diulangi dengan menggunakan asid metanoik.Nilai haba peneutralan untuk semua asid diberikan dalam Jadual 1.Lengkapkan Jadual 1 dengan membuat klasifikasi asid kepada asid kuat atau asid lemah.

Name of acid Nama asid	Heat of neutralization /kJmol^{-1} Haba peneutralan /kJmol^{-1}	Type of acid Jenis asid
Ethanoic acid	- 50.3	
Hydrochloric acid	- 57.2	
Methanoic acid	- 50.5	

Table */Jadual 1*

[3 marks]

2. An experiment was conducted to find out the effects of temperature on the rate of reaction. 50 cm^3 of sodium thiosulphate solution 0.05 mol dm^{-3} at 30°C was put into a 250 cm^3 conical flask. Then the conical flask was placed on an "X" sign on a piece of white paper.

10 cm^3 of hydrochloric acid 1.0 mol dm^{-3} was added to the sodium thiosulphate solution and shaken. At the same time, the stop watch was started. The stop watch was stopped as soon as the "X" sign was no longer visible. The same step of the experiment was repeated for sodium tiosulphate solution which was heated to 35°C, 40°C and 50°C.

Satu eksperimen telah dijalankan untuk mengkaji kesan suhu ke atas kadar tindakbalas. Sebuah kelalang kon 250 cm^3 yang mengandungi 50 cm^3 larutan natrium thiosulfat 0.05 mol dm^{-3} pada suhu 30°C, diletakkan di atas tanda "X", pada sehelai kertas putih.

10 cm^3 asid hidroklorik 1.0 mol dm^{-3} dicampurkan kepada larutan natrium tiosulfat tersebut dan digoncang. Pada masa yang sama, jam randik dimulakan. Jam randik dihentikan sebaik sahaja tanda "X" tidak kelihatan. Langkah eksperimen yang sama diulangi bagi larutan natrium tiosulfat yang dipanaskan sehingga suhu 35°C, 40°C, 45°C dan 50°C

Diagram 2 shows the readings of the stop watch for each of the reaction at different temperatures.
Rajah 2 menunjukkan bacaan jam randik bagi setiap tindakbalas pada suhu yang berlainan.

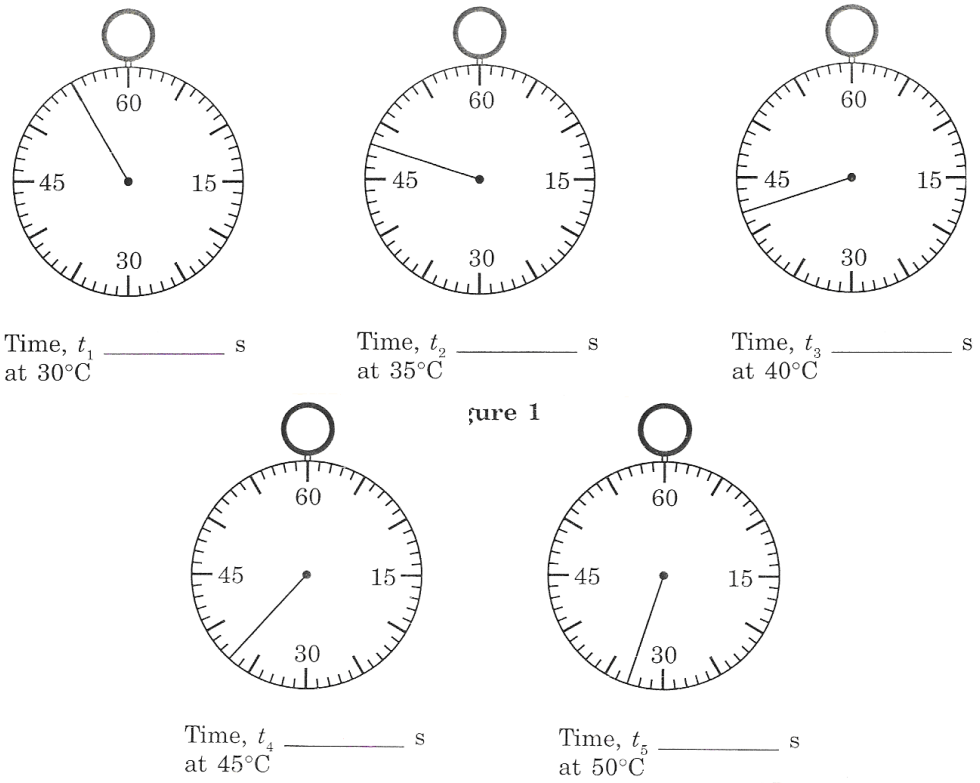


Figure 1

Diagram/ *Rajah 2*

(a) Record the time for each reaction in the spaces provided in Diagram2.
Catatkan masa bagi setiap tindakbalas pada ruang yang disediakan dalam Rajah 2.

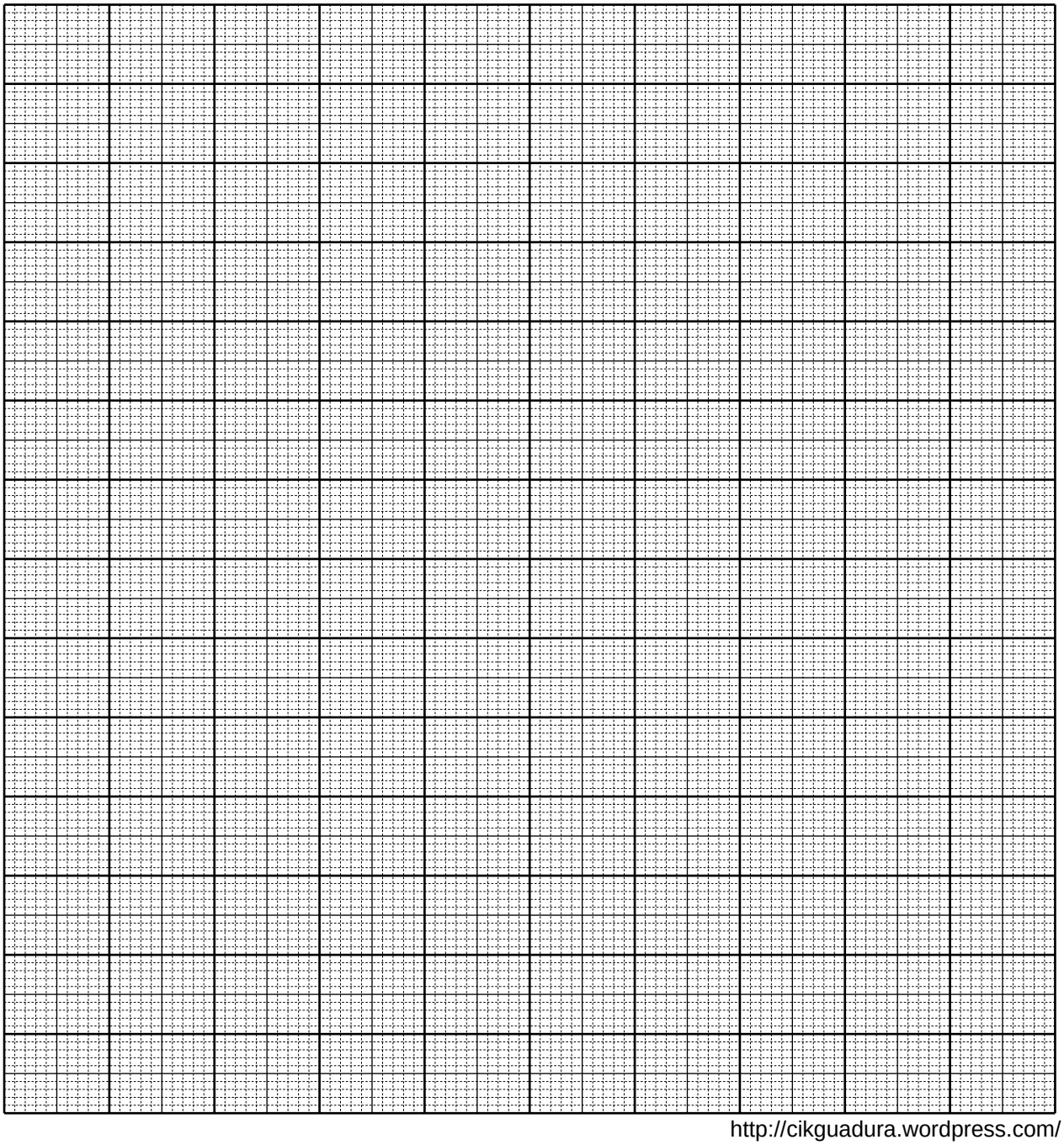
[3 marks]

(b) Construct a table and record temperature, time and 1/time for this experiment.
Bina satu jadual dan rekodkan suhu, masa dan 1/masa terlibat dalam eksperimen ini.

[3 marks]

(c) (i) Draw a graph of temperature against 1/time on the graph paper.
Lukiskan graf suhu melawan 1/masa pada kertas graf yang disediakan.

[3 marks]



(ii) Based on the graph in (c)(i), state the relationship between the rate of reaction and temperature.
Berdasarkan graf di (c)(i), nyatakan perhubungan antara kadar tindakbalas dengan suhu.

..……

……

[3 marks]

(d) Predict the time taken as soon as the sign "X" to be no longer visible if this experiment is repeated at 55^{O}C.
Ramalkan masa sebaik sahaja tanda "X" tidak boleh kelihatan jika eksperimen yang sama diulangi pada suhu $55^{O}C$.

……

……

[3 marks]

(e) (i) State the variable involved in this experiment.
Nyatakan pembolehubah yang terlibat dalam eksperimen ini.

Manipulated variable : .....
Pembolehubah dimanipulasi :

Responding variable :.....
Pembolehubah bergerakbalas

Constant variable : .....
Pembolehubah yang dimalarkan

[3 marks]

(ii) State how you would manipulate one variable while keeping the other variables constant.
Nyatakan bagaimana anda memanipulasikan satu pembolehubah manakala pembolehubah lain dimalarkan.

……..…

……..…

[3 marks]

(f) State the hypothesis for this experiment.
Nyatakan hipotesis bagi eksperimen ini.

……

……

[3 marks]

(g) From the above experiment, the student found a relationship between temperature and rate of reaction. The same situation can be applied in our daily lives, for example, keeping food that is easily spoiled in the kitchen cabinet compare to keeping food in the refrigerator.
Using your knowledge of chemistry, state the relationship between temperature and the rate at which food turns bad.
Daripada eksperimen di atas, pelajar mendapati suatu perhubungan antara suhu dengan kadar tindakbalas. Keadaan yang sama boleh diaplikasikan dalam kehidupan seharian seperti penyimpanan bahan makanan yang mudah rosak di dalam peti sejuk.
Dengan menggunakan pengetahuan kimia anda, nyatakan perhubungan antara suhu dengan kadar kerosakan makanan.

……..

……

[3 marks]

3. Concentration of ions in the electrolytes affects the product of electrolysis of an aqueous solution.
Kepekatan ion dalam elektrolit mempengaruhi hasil dalam elektrolisis suatu larutan akueus.

Plan a laboratory experiment to investigate the effect of concentration of chloride ion on the selective discharge at the anode.
Rancang satu eksperimen makmal untuk mengkaji kesan kepekatan ion klorida dalam pemilihan nyahcas pada anod.

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

(a) Statement of the problem/*Pernyataan masalah*
(b) All the variables /*Semua pembolehubah*
(c) Statement of the hypothesis /p*ernyataan hipotesis*
(d) List of substances and apparatus /*Senarai bahan dan radas*
(e) Procedure of the experiment /*Prosedur eksperimen*
(f) Tabulation of data / *Penjadualan data*

[17 marks]

1. Diagram 1.1 shows the apparatus set-up to carry out an experiment to compare the hardness of bronze and its pure metal, copper.
Rajah 1.1 menunjukkan gambarajah susunan radas untuk membandingkan kekerasan gangsa dengan logam tulennya, kuprum.

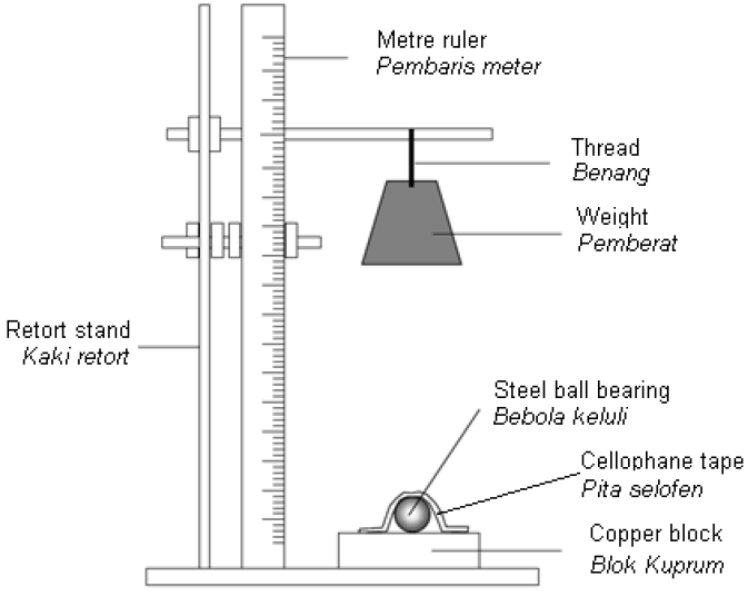


Diagram */Rajah 1.1*

A steel ball bearing is taped onto the copper block using cellophane tape. A weight of 1 kilogram is dropped at a height of 50 cm to hit the ball bearing.
Bebola keluli dilekatkan di atas blok kuprum menggunakan peta selofen. Pemberat 1 kilogram dijatuhkan pada ketinggian 50 cm untuk menghentam bebola

Diagram 1.2 shows the shape of dents formed for the experiment.
Rajah 1.2 menunjukkan lekuk yang terbentuk bagi eksperimen itu.

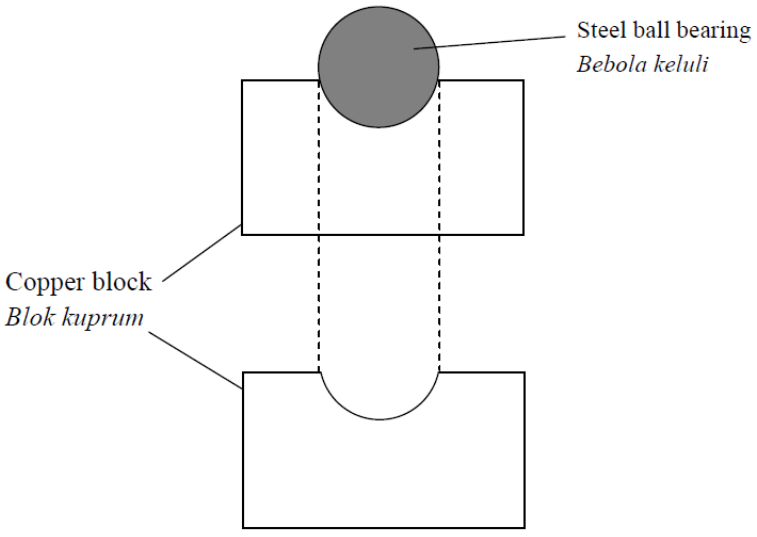


Diagram */ Rajah 1.2*

The diameter of the dent made on the copper block is measured. The experiment is repeated by replacing copper block with bronze block.
Diameter lekuk yang terhasil di atas bongkah kuprum diukur.Eksperimen diulangi dengan menggantikan bongkah kuprum dengan bongkah gangsa.

Table 1.1 shows the view of the dents made on bronze and copper block.
Jadual 1.1 menunjukkan pandangan lekuk yang terhasil di atas bongkah gangsa dan bongkah kuprum.

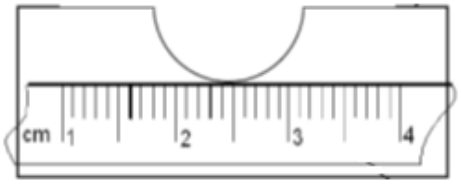
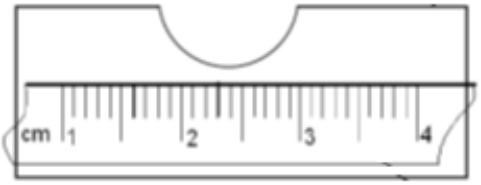
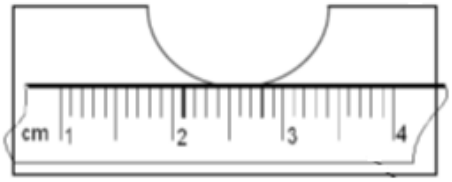
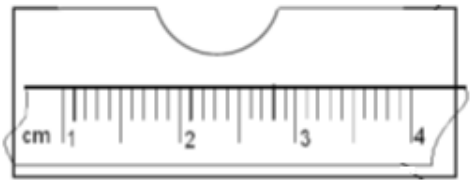
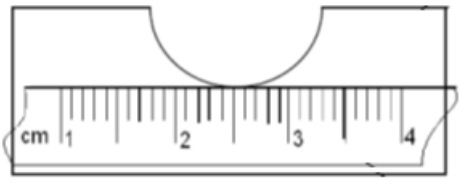
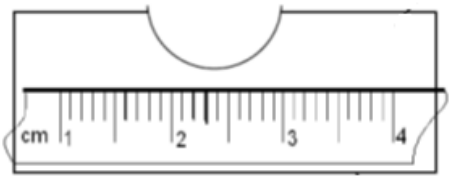
Experiment Eksperimen	Copper kuprum	Bronze Gangsa
I	 …….	 …….
II	 …….	 …….
III	 …….	 …….

Table 1.1/Jadual 1.1

(a) (i) By using the ruler given, measure the diameters of the dents made on copper and bronze blocks.
Record all the diameters of the dents in Table 1.1.
Dengan menggunakan pembaris yang diberikan, ukur diameter lekuk yang terhasil di atas bongkah kuprum dan bongkah gangsa. Catatkan semua diameter dalam Jadual 1.1

[3 marks]

(ii) Construct a table to record the diameters and the average diameter of dents on copper and bronze blocks.
Bina satu jadual untuk merekod diameter lekuk-lekuk dan purata diameter lekuk pada bongkah kuprum dan bongkah gangsa..

[3 marks]

(b) State **one** observation that can be obtained from both experiments.
Nyatakan **satu** *pemerhatian yang dapat diperoleh daripada kedua-dua eksperimen ini.*

……

[3 marks]

(c) Based on the average diameter of the dents on copper block and bronze block, state the inference that can be made.
Berdasarkan purata diameter lekuk di atas bongkah kuprum dan bongkah gangsa, nyatakan inferens yang boleh dibuat.

……

……

[3 marks]

(d) State the operational definition for the hardness of materials in the experiment
Nyatakan definisi secara operasi bagi kekerasan bahan dalam eksperimen ini.

……

……

[3 marks]

(e) Explain why there is difference in diameter of dents on copper and bronze blocks.
Terangkan kenapa terdapat perbenzaan dalam diameter lekuk di atas bongkah kuprum dan gangsa.

……

……

[3 marks]

(f) State the hypothesis for this experiment.
Nyatakan hipotesis untuk eksperimen ini.

……

……

[3 marks]

(g) Complete table below based on the experiment.
Lengkapkan Jadual di bawah berdasarkan kepada eksperimen.

Name of variables / *Nama pembolehubah*	Action to be taken / *Tindakan yang akan diambil*
(i) Manipulated variable: *Pembolehubah dimanipulasi* ……	(i)The way to manipulate variable: *Cara untuk memanipulasi pembolehubah:* ……
(ii) Responding variable: *Pembolehubah bergerak balas* ……	(ii) What to observe in the responding variable: *Apa yang diperhatikan pada pembolehubah bergerakbalas:* ……
(iii) Controlled variable: *Pembolehubah ditetapkan :* ……	(iii) The way to maintain the control variable: *Cara untuk mengekalkan pembolehubah :* ……

[6 marks]

2. Table 2.1 shows the observation in five test tubes used to investigate the effect of other metals on rusting. A mixture of jelly solution, potassium hexacyanoferrate (III), $K_3Fe(CN)_6$ solution and phenolphthalein were used as medium in each test tube.The observations were recorded after one day.
Jadual 2.1 menunjukkan pemerhatian dalam lima buah tabung uji yang digunakan untuk menyiasat kesan logam lain ke atas pengaratan. Medium yang digunakan di dalam setiap tabung uji adalah campuran larutan agar, larutan kalium heksasianoferat(III), $K_3Fe(CN)_6$ dan fenolftalein. Pemerhatian direkod selepas satu hari.

Test tube 1 *Tabung uji 1*	 Iron nail *Paku besi* Blue colour *Warna biru*
Test tube 2 *Tabung uji 2*	 Iron nail coiled with magnesium ribbon *Paku besi dililit dengan pita magnesium* High intensity of pink colour *Keamatan warna merah jambu tinggi*
Test tube 3 *Tabung uji 3*	 Iron nail coiled with copper strip *Paku besi dililit dengan kepingan kuprum* High intensity of blue colour *Keamatan warna biru tinggi*
Test tube 4 *Tabung uji 4*	 Iron nail coiled with zinc strip *Paku besi dililit dengan kepingan zink* Low intensity of pink colour *Keamatan warna merah jambu rendah*
Test tube 5 *Tabung uji 5*	 Iron nail coiled with tin strip *Paku besi dililit dengan kepingan timah* Low intensity of blue colour *Keamatan warna biru rendah*

Table / *Jadual*2.1

(a) State the observation and inference for each test tube.
Nyatakan pemerhatian dan inferens untuk setiap tabung uji.

Test tube	Observation / *Pemerhatian*	Inference / *Inferens*
1		
2		
3		
4		
5		

[6 marks]

(b) Based on this experiment, explain why there is a difference in observation between test tube 2 and 3.
Berdasarkan eksperimen ini, terangkan mengapa terdapat perbezaan pemerhatian di antara tabung uji 2 dan 3.

……..…….

……..…….

[3 marks]

(c) State the hypothesis for the experiment.
Nyatakan hipotesis bagi eksperimen ini.

……..……

……..……

[3 marks]

(d) For this experiment, state:
Bagi eksperimen ini, nyatakan

(i) The manipulated variable : ……..
Pembolehubah dimanipulasi :

(ii) The responding variable : ……..
Pembolehubah bergerakbalas :

(iii) The constant variable : ……..
Pembolehubah dimalarkan :

[3 marks]

(e) State the operational definition for the rusting of iron nail.
Nyatakan definisi secara operasi bagi pengaratan paku besi.

……

……

[3 marks]

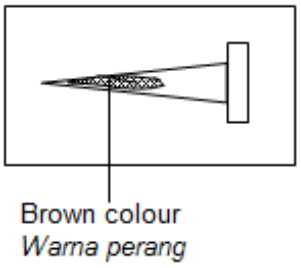
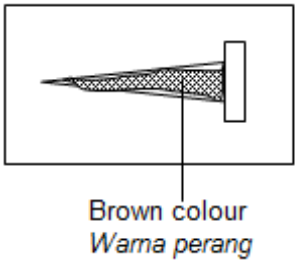
(f) Magnesium, copper, zinc and tin were used in this experiment to investigate the effect of other metals on the rusting of iron nails. Classify the metals by completing Table 2.2.
Magnesium, kuprum, zink dan timah digunakan dalam eksperimen ini untuk mengkaji kesan logam lain ke atas pengaratan paku besi. Kelaskan logam-logam dengan melengkapkan Jadual 2.2.

Metals that inhibit rusting *Logam yang melambatkan pengaratan*	Metals that speed up rusting *Logam yang mempercepatkan pengaratan*

Table */Jadual 2.2*

[3 marks]

(g) An iron nail was placed on a moist cotton to investigate the time taken for the iron nail to rust completely. The observations are shown below.
Sebatang paku besi diletakkan di atas kapas lembap untuk mengkaji masa yang diambil untuk paku besi itu berkarat dengan lengkap. Pemerhatian adalah ditunjuk seperti di bawah.

	
After one day Selepas satu hari	After two days Selepas dua hari

(i) State the relationship between the time taken and the amount of rust formed.
Nyatakan hubungan di antara masa yang diambil dan kuantiti karat yang terbentuk.

……..……..

……..……..

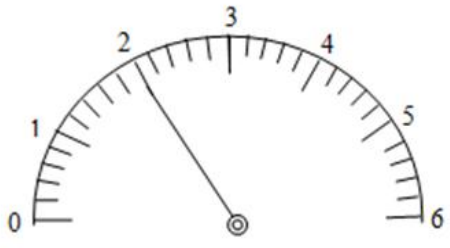
[3 marks]

(ii) The iron nail will take 5 days to rust completely in the water. Predict the time taken for the iron nail to rust completely if it is placed in salt solution.
Sebatang paku besi mengambil masa 5 hari untuk berkarat dengan lengkap. Ramalkan masa yang diambil untuk paku besi itu berkarat dengan lengkap jika diletakkan dalam larutan garam.

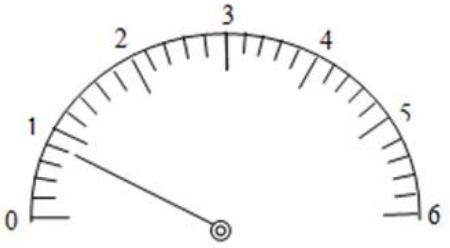
……..

[3 marks]

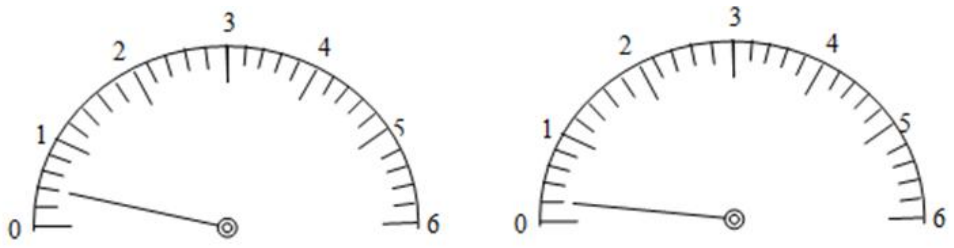
(h) In another experiment, the pairs of metals in test tube 2, 3, 4 and 5 were dipped into dilute sulphuric acid, H_2SO_4 and were connected to a voltmeter. The reading of the voltmeter are shown in Diagram 1.
Dalam eksperimen yang lain, pasangan logam dalam tabung uji 2, 3, 4 dan 5 dicelupkan ke dalam asid sulfurik cair, H_2SO_4 dan disambungkan kepada voltmeter. Bacaan voltmeter ditunjukkan dalam Rajah 1.



Magnesium and iron
Magnesium dan besi



Iron and copper
Besi dan kuprum



Diagram/*Rajah 2*

(i) Based on Diagram 2, record the voltmeter readings in Table 2.3.

Pairs of metal *Pasangan logam*	Positive terminal *Terminal positif*	Voltmeter reading (V) *Bacaan voltmeter (V)*
Magnesium and iron *Magnesium dan besi*	Iron *Besi*	
Iron and copper *Besi dan kuprum*	Copper *Kuprum*	
Iron and zinc *Besi dan zink*	Iron *Besi*	
Iron and tin *Besi dan timah*	Tin *Timah*	

Table / *Jadual 2.3*

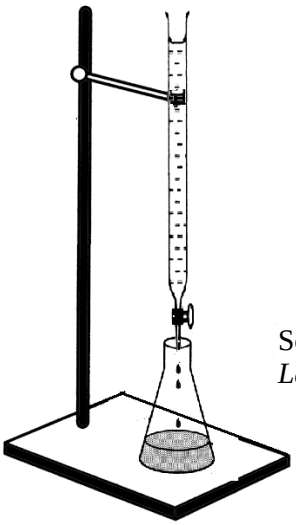
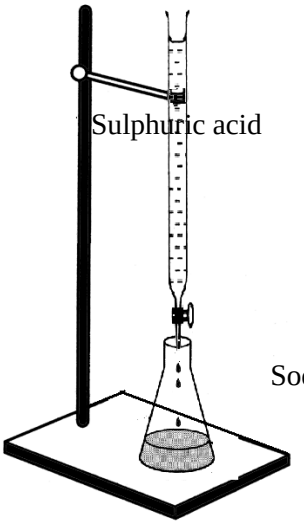
Based Diagram 2, record ammeter reading in Table 2.3
Berdasarkan rajah 1, rekod bacaan voltmeter dalam Jadual 2.3

[3 marks]

(ii) Draw a labelled diagram to show the voltaic cell using magnesium and iron with dilute sulphuric acid as electrolyte.
Lukis gambarajah berlabel untuk menunjukkan sel voltan bagi magnesium dan besi dengan menggunakan asid sulfurik cair sebagai elektrolit.

[3 marks]

3. A group of student carried out an experiment to determine the end-point of titration. Diagram 3 describes the activity in this experiment.
Sekumpulan pelajar telah menjalankan satu eksperimen untuk menentukan takat akhir pentitratan. Diagram 3 menghuraikan aktiviti dalam eksperimen ini.

<table>
<tr>
<td>Activity I
Aktiviti I</td>
<td>Titration between 25.0 $cm^3$of 0.1 mol dm^{-3} sodium hydroxide solution with acid by using phenolphthalein as the indicator.
Pentitratan di antara 25.0 cm^3 larutan natrium hidroksida berkepekatan 0.1 mol dm^{-3} dengan asid hidroklorik dan menggunakan fenolftalein sebagai penunjuk.
 
Hydrochloric acid
Asid hidroklorik
Sodium hydroxide solution + phenolphthalein indicator
Larutan natrium hidroksida + penunjuk fenolftalein</td>
</tr>
<tr>
<td>Activity II
Aktiviti II</td>
<td>Titration between 25.0 cm^3 of 0.1 mol dm^{-3} sodium hydroxide solution with sulphuric acid by using phenolphthalein as the indicator.
Pentitratan di antara 25.0 cm^3 larutan natrium hidroksida berkepekatan 0.1 mol dm^{-3} dengan asid sulfurik dan menggunakan metil jingga sebagai penunjuk
 
Sulphuric acid
Asid sulfurik
Sodium hydroxide solution + phenolphthalein indicator
Larutan natrium hidroksida + penunjuk fenolftalein</td>
</tr>
</table>

Diagram/ *Rajah3*

Table 3 shows the reading of burette for the titration that have been conducted for Activity I.
Jadual 3 menunjukkan tiga bacaan buret bagi pentitratan yang telah dijalankan dalam Aktiviti I

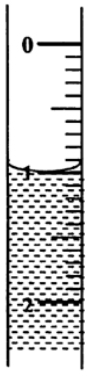
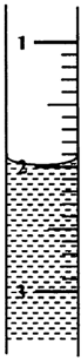
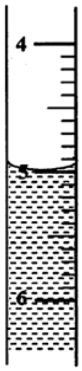
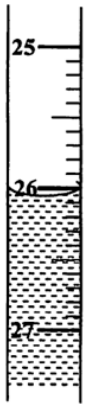
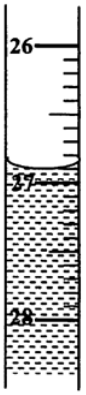
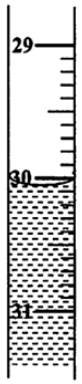
Titration number	***1***	***2***	***3***
Initial burette reading *Bacaan awal buret*	 …….	 …….	 …….
Final burette reading *Bacaan akhir buret*	 …….	 …….	 …….

Table / *Jadual* 3.1

Table 3.2 shows the the reading of burette for the titration that have been conducted for Activity II.
Jadual 3.2 menunjukkan tiga bacaan buret bagi pentitratan yang telah dijalankan dalam Aktiviti II

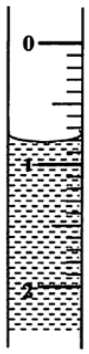
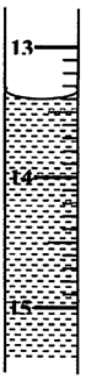
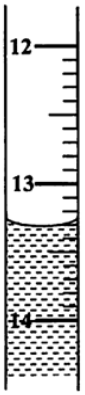
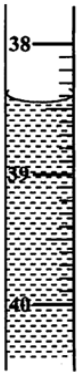
Titration number	***1***	***2***	***3***
Initial burette reading *Bacaan awal buret*	 …….	 …….	 …….
Final burette reading *Bacaan akhir buret*	 …….	 …….	 …….

Table / *Jadual 3.2*

(a) Record the initial reading and final reading of burette for the six titration in the spaces provided in Table 3.2 and Table 3.3.
Rekod bacaan awal dan akhir buret bagi enam pentitratan di dalam ruang yang diberikan pada Jadual 2 dan Jadual 3.

[3 marks]

(b) Construct a table and record the initial burette reading, final burette reading and the volume of acid used for Activity II.
Bina satu jadual yang merekodkan bacaan awal buret, bacaan akhir buret dan isipadu asid yang telah digunakan bagi Aktiviti II.

[3 marks]

(c) Based on the data from Activity II, calculate the concentration of sulphuric acid that is used to neutralize the sodium hydroxide solution.
Berdasarkan data yang diperolehi daripada Aktiviti II, kira kepekatan asid sulfurik yang digunakan untuk meneutralkan larutan natrium hidroksida.

[3 marks]

(d) State the observation for the changes in colour of the indicator during titration in the experiment.
Nyatakan pemerhatian kepada perubahan warna penunjuk semasa pentitratan dalam eksperimen.

.....

[3 marks]

(e) Hydrochloric acid and sulphuric acid are strong acids. Based on the average volume of the acid in Activity I and Activity II in (c), what inference can be made for the basicity of acid. Give a reason for your answer.
Asid hidroklorik dan asid sulfurik adalah asid kuat. Berdasarkan kepada isipadu purata asid dalam Aktiviti I dan Aktiviti II di(c), apakah inferen yang boleh dibuat tentang kebesan asid. Berikan satu sebab bagi jawapan anda.

.....

.....

[3 marks]

(f) In Activity II, if the experiment repeated using methyl orange indicator and 25.0 cm^3 sulphuric acid 0.1 mol dm^{-3} is added to the sodium hydroxide solution , state the colour of the methyl orange indicator.
Bagi Aktiviti II, jika eksperimen diulang dengan menggunakan metil jingga dan 25.0 cm^3 asid sulfurik 0.1 mol dm^{-3} ditambahkan kepada larutan natrium hidroksida, nyatakan perubahan warna penunjuk metil jingga.

.....

[3 marks]

(g) For this experiment, state
Bagi eksperimen ini, nyatakan

(i) The manipulated variable : ……
Pembolehubah dimanipulasikan

(ii) The responding variable : ……
Pembolehubah bergerak balas

(iii) The constant variable : ……
Pembolehubah dimalarkan

[3 marks]

(h) State one hypothesis for this experiment.
Nyatakan satu hipotesis bagi eksperimen ini.

.....

[3 marks]

(i) Give the operational definition for the end-point of titration in Activity I.
Berikan definasi secara operasi takat akhir tindak balas bagi Aktiviti 1.

.....

.....

[3 marks]

(j) Classify the following acids into strong acid and weak *acid.*
Kelaskan asid berikut kepada asid kuat dan asid lemah.

Nitric acid	hydrochloric acid	Ascorbic acid	Phosphoric acid
Asid nitrik	*Asid hydrochloric*	*Asid askorbik*	*Asid fosforik*

[3 marks]

4. Diagram 4 shows the set-up of apparatus used to investigate the cleansing action of soap and detergent on a piece of cloth stained with oil.
Rajah 3 menunjukkan susunan radas yang digunakan untuk menyiasat tindakan pembersihan sabun dan detergen pada pakaian yang dikotori minyak.

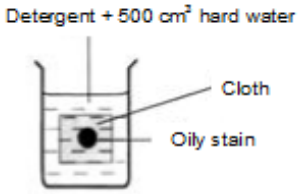
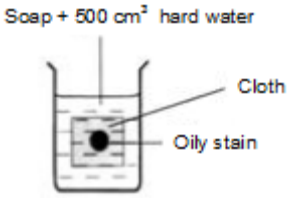
Experiment	Apparatus	Observation
I		Oilstainedremoved
III		Oilstainedremains

Diagram */ Rajah 4*

Based on the above diagram, plan one laboratory experiment to compare the effectiveness of soap and detergent in hard water.
Berdasarkan rajah di atas, rancang satu eksperimen untuk membandingkan keberkesanan sabun dan detergen dalam air liat.

Your planning should include the following aspects:
Perancangan anda perlu mengikut aspek berikut:

(a) Problem statement / *pernyataan masalah*
(b) All the variables / *semua pembolehubah*
(c) Statement of the hypothesis / *pernyataan hipotesis*
(d) List of substances and apparatus / *senarai bahan dan radas*
(e) Procedure of the experiment / *kaedah eksperimen*
(f) Tabulation of data / *penjadualan data*

[17 marks]

BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KLUSTER
http://cikguadura.wordpress.com/

JAWAPAN
KERTAS 3 2014

CHEMISTRY

- Set 1
- Set 2
- Set 3

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td>1(a)(i)</td><td>Able to give correct observation
Sample answer:
Colourless solution formed//Aluminium oxide powder dissolved in nitric acid/sodium hydroxide solution.</td><td>3</td></tr>
<tr><td>1(a)(ii)</td><td>Able to give the correct inference.
Sample answer
Aluminium oxide is react with nitric acid/sodium hydroxide solution//Aluminium oxide shows basic/acidic properties</td><td>3</td></tr>
<tr><td>1(a) (iii)</td><td>Able to give the correct property of aluminium oxide.
Answer: amphoteric</td><td>3</td></tr>
<tr><td>1(b)</td><td>Able to state the hypothesis correctly.
Sample answer:
When aluminium oxide dissolves/react in nitric acid, it shows basic properties, when aluminium oxide dissolves/react in sodium hydroxide solution, shows acidic properties.</td><td>3</td></tr>
<tr><td>1(c)</td><td>Able to state all the variables correctly.
Sample answer:
Manipulated variable: type of solutions // nitric acid and sodium hydroxide solution
Responding variable: solubility of aluminium oxide in acid and alkali//property of aluminium oxide
Fixed variable: aluminium oxide</td><td>3</td></tr>
<tr><td>1(d)</td><td>Able to state the operational definition correctly.
Sample answer.
When aluminium oxide solid is added into sodium hydroxide solution, the solid dissolved.</td><td>3</td></tr>
<tr><td>1 (e)</td><td>Able to state the relationship between size of solid reactant and the time taken for reaction correctly.
Example:
When the size of aluminium oxide is smaller, the time taken for the neutralisation/ reaction to complete is shorter.</td><td></td></tr>
<tr><td>1(f)(i)</td><td>Able to give the correct observations for both experiments.
Red litmus paper turns blue
Blue litmus paper turns red</td><td>3</td></tr>
<tr><td>1(f)(ii)</td><td>Able to classify all the oxides correctly.
<table><tr><td>Acidic oxide</td><td>Basic oxide</td></tr><tr><td>Carbon dioxide
Phosphorous pentoxide</td><td>Magnesium oxide
Calcium oxide</td></tr></table></td><td>3</td></tr>
</table>

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td>2(a)</td><td>Able to record all the readings accurately to two decimal point
Example:
Experiment Initial reading Final reading
1 0.30 10.30
2 10.30 20.35
3 19.25 29.20</td><td>3</td></tr>
<tr><td>2(b)</td><td>Able to construt the table that contains the following information
1. Headings in the table: Experiment, Initial reading, Final reading, volume of nitric acid
2. Transfer all readings from (a) correctly
3. With unit
Example:
<table><tr><td>Experiment</td><td>Initial reading/cm^3</td><td>Final reading/cm^3</td><td>Volume of nitric acid/cm^3</td></tr><tr><td>1</td><td>0.30</td><td>10.30</td><td>10.00</td></tr><tr><td>2</td><td>10.30</td><td>20.35</td><td>10.05</td></tr><tr><td>3</td><td>19.25</td><td>29.20</td><td>9.95</td></tr></table></td><td>3</td></tr>
<tr><td>2(c)</td><td>Able to state relationship between the concentration of H^+ ions and the volume of acid needed for neutralization accurately
Example:
Acid with higher concentration of H^+ ions need less volume of acid to neutralize the sodium hydroxide solution//When the concentration of H^+ ions in the acid is increased, the volume of the acid needed to neutralize the sodium hydroxide solution is decreased//The concentration of H^+ ions in sulphuric acid is twice of that in nitric acid therefore the volume of sulphuric acid needed to neutralize the sodium hydroxide solution is half of the volume of hydrochloric acid</td><td>3</td></tr>
<tr><td>3(a)</td><td>Able to write all temperatures with units accurately
95.0^oC, 85.0 ^oC, 82.0 ^oC, 80.0 ^oC, 80.0 ^oC, 80.0 ^oC, 78.0 ^oC, 75.0 ^oC</td><td>3</td></tr>
<tr><td>3(b)</td><td>Able to draw the graph correctly and completely
The graph consist of:
i. Both axis are labelled and with unit
- y axis, temperature/^oC , x axis, time /s
ii. All points are transferred correctly
iii. Uniform scale
iv. Best fit curve</td><td>3</td></tr>
<tr><td>3(c)</td><td>Able toshow the freezing point on the graph accurately and stating the freezing point of Z with unit
1. The freezing point is marked accurately on the graph
2. Stating 80^oC</td><td>3</td></tr>
<tr><td>3(d)</td><td>Able to state the meaning of freezing point based on the cooling graph correctly
Example:
The temperature which doesn’t change(constant) within a certain period of time (90s – 150s)</td><td>3</td></tr>
<tr><td>3(e)</td><td>Able to explain why the temperature of Z from the 90th to 150th second did not change during the cooling process correctly</td><td>3</td></tr>
</table>

<table>
<tr><td></td><td>Example:
Heat released to the surrounding is balanced by heat released when the particles attract one another to form a solid during the cooling process.</td><td></td></tr>
<tr><td>QUESTION</td><td>RUBRIC</td><td>SCORE</td></tr>
<tr><td>3(f)</td><td>Able to state an accurate reason correctly
Example:
Minimize heat loss to surroundings to ensure uniform cooling</td><td>3</td></tr>
<tr><td>3(g)</td><td>Able to state the operational definition correctly.
Example:
When solid Z is heated in the water bath, a constant temperature is recorded.</td><td>3</td></tr>
<tr><td>4(a)</td><td>Able to give the problem statement correctly.
Sample answer:
How do other metals in contact with iron affect the the rusting of iron ?</td><td>3</td></tr>
<tr><td>4(b)</td><td>Able to state the three variables correctly.
Sample answer:
Manipulated variable : Type of metals//Zinc and copper
Responding variable : Rusting of iron
Fixed variable : iron nail</td><td>3</td></tr>
<tr><td>4(c)</td><td>Able to state the hypothesis correctly.
Sample answer:
When iron is in contact with a more electropositive metal/zinc, rusting will not occur, when iron is in contact with less electropositive metal/copper, rusting will occur.</td><td>3</td></tr>
<tr><td>4(d)</td><td>Able to list the apparatus and materials needed for the experiment.
Apparatus: two test tubes, test-tube rack,
Materials: hot agar-agar solution added with phenolphthalein and potassium hexacyanoferrate(III) solution, iron nails, zinc strip, copper strip, sand paper.</td><td>3</td></tr>
<tr><td>4(e)</td><td>Able to give the procedures correctly
Sample answer:
1. Clean 2 pieces of iron nails, zinc strip and copper strip with sand paper.
2. Coil the iron nails with zinc strip and copper strip each.
3. Put the iron nails into two different test tubes
4. Pour hot agar into each test tube until the iron nail is immersed.
5. Leave the apparatus for about 1 day and record the observations.</td><td>3</td></tr>
<tr><td>4(f)</td><td>Able to tabulate the data correctly

Answer:
<table><tr><td>Experiment</td><td>Observation</td></tr><tr><td>Iron nail coiled with zinc</td><td></td></tr><tr><td>Iron nail coiled with copper</td><td></td></tr></table></td><td>2</td></tr>
</table>

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td>1(a)</td><td>Able to record all the temperature accurately
Answer :
<u>Experiment 1</u>
Initial temperature = 28.0
Highest temperature = 40.0
Change of temperature = 12.0
<u>Experiment II</u>
Initial temperature = 28.0
Highest temperature = 38.0
Change of temperature = 10.0</td><td>3</td></tr>
<tr><td>1(b)</td><td>Able to construct table accurately with correct title and unit
Sample answer :
<table><tr><td>Temperature</td><td>Experiment I</td><td>Experiment II</td></tr><tr><td>Initial temperature of mixture, ^{o}C</td><td>28.0</td><td>28.0</td></tr><tr><td>Highest temperature of mixture, ^{o}C</td><td>40.0</td><td>38.0</td></tr><tr><td>Change of temperature, ^{o}C</td><td>12.0</td><td>10.0</td></tr></table></td><td>3</td></tr>
<tr><td>1(c)</td><td>Able to state the relationship between manipulated variable and responding variable with direction correctly
Sample answer :
The reaction between a strong acid and strong alkali produce a greater heat of neutralization than the reaction between a weak acid and strong alkali.//
The reaction between hydrochloric acid and sodium hydroxide produce a greater heat of neutralization than the reaction between ethanoic acid and sodium hydroxide//
The heat of neutralization between a strong acid and a strong alkali is greater than the heat of neutralization between a weak acid and a strong alkali</td><td>3</td></tr>
<tr><td>1(d)</td><td>Able to explain with two correct reasons
Sample answer :
• This is to enable the change in temperature to be measured.
• The change of temperature is needed to calculate the heat of neutralization</td><td>3</td></tr>
<tr><td>1(e)</td><td>Able to state the formula accurately
Sample answer :
Change in temperature = Highest temperature of mixture - initial temperature of mixture</td><td>3</td></tr>
<tr><td>1(f)</td><td>Able to state three observation correctly
Sample answer :
1. A colourless mixture of solution is obtained
2. The vinegar smell of ethanoic acid disappears
3. The polystyrene cup becomes warmer</td><td>3</td></tr>
<tr><td>1(g)</td><td>Able to state three constant variables correctly
Examples :
1. The volumes and concentration of the acid and the alkali
2. The type of cup used in the experiment
3. The type of alkali</td><td>3</td></tr>
</table>

QUESTION	RUBRIC	SCORE
1(h)	*Able to calculate the heat of neutralisation for experiment I and II correctly* Sample answer : Experiment I Heat released = mcΘ = 50 x 4.2 x 12 = 2520 J Number of mole of sodium hydroxide = MV = 2.0 x 25/1000 = 0.05 mol 0.05 mole of sodium hydroxide releases 2520 J heat energy 1.0 mole of sodium hydroxide releases = heat released / number of mole = 2520 / 0.05 = 50400 J Heat of neutralisation = - 50.40 kJ/mol Experiment II Heat released = mcΘ = 50 x 4.2 x 10 = 2100 J Number of mole of sodium hydroxide = MV = 2.0 x 25/1000 = 0.05 mol 0.05 mole of sodium hydroxide releases 2100 J heat energy 1.0 mole of sodium hydroxide releases = heat released / number of mole = 2100 / 0.05 = 42000 J Heat of neutralisation = - 42.0 kJ/mol	3
1(i)	*Able to write the operational definition for the heat of neutralisation correctly. Able to describe the following criteria* (i) What should be done (ii) What should be observed Sample answer : The heat of neutralization is defined as the temperature rises when one mole of water is produced from reaction between acid and alkali	3

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td>1(j)</td><td>Able to state the relationship between type of acid and value of heat of neutralization and explain the difference correctly.

Sample answer :
1. The heat of neutralization of a weak acid by a strong alkali is less than the heat of neutralization of a strong acid by a strong alkali.

Explanation :
2. Experiment I uses a strong acid whereas Experiment II uses a weak acid.
3. During neutralization of a weak acid such as ethanoic acid, small portion of the heat released in experiment II is absorbed to ionise/dissociate of the ethanoic acid molecules</td><td>3</td></tr>
<tr><td>1(k)</td><td>Able to predict the temperature change accurately

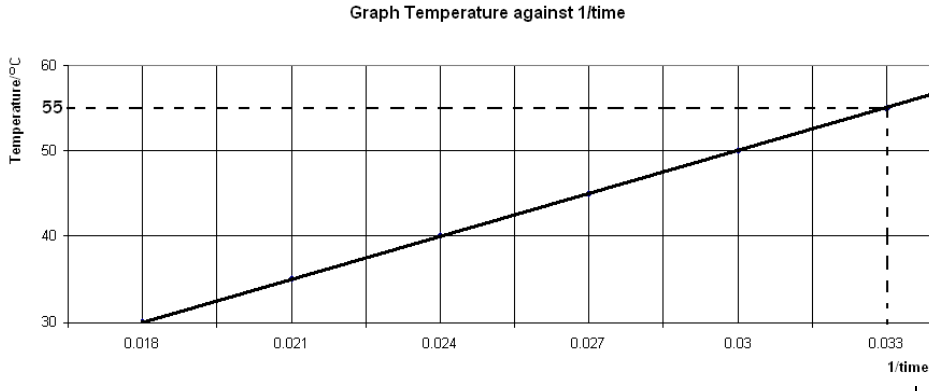
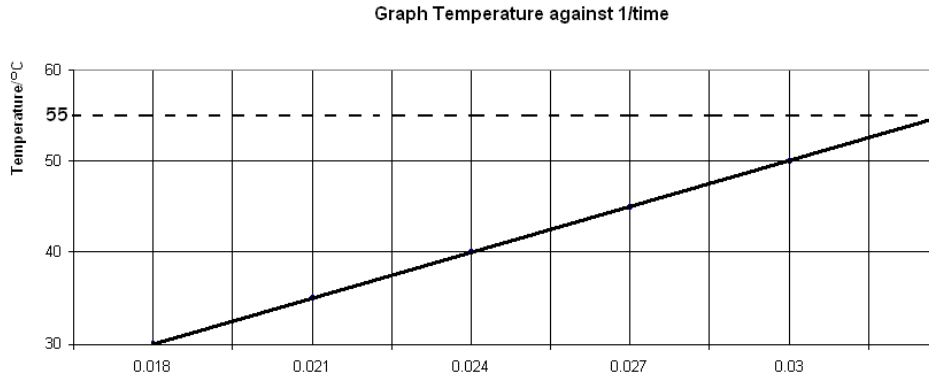
Sample answer :
Lower than 10^{o}C</td><td>3</td></tr>
<tr><td>1(l)</td><td>Able to classify the acids as strong acid or weak acid.

Sample answer :
<table><tr><th>Name of acid</th><th>Heat of neutralization /kJmol^{-1}</th><th>Type of acid</th></tr><tr><td>Ethanoic acid</td><td>- 50.3</td><td>Weak acid</td></tr><tr><td>Hydrochloric acid</td><td>- 57.2</td><td>Strong acid</td></tr><tr><td>Methanoic acid</td><td>- 50.5</td><td>Weak acid</td></tr></table></td><td>3</td></tr>
<tr><td>2(a)</td><td>Able to record all the temperature accurately one decimal places.

Time 55.0 s at 30^{o}C</i>
<i>Time 48.0 s at 35^{o}C</i>
<i>Time 42.0 s at 40^{o}C</i>
<i>Time 37.0 s at 45^{o}C</i>
<i>Time 33.0 s at 50^{o}C</td><td>3</td></tr>
<tr><td>2(b)</td><td>Able to construct table accurately with correct title and unit

Sample answer :

<table><tr><td>Temperature/^{o}C</i></td><td><i>30</i></td><td><i>35</i></td><td><i>40</i></td><td><i>45</i></td><td><i>50</i></td></tr><tr><td><i>Time/s</i></td><td><i>55.0</i></td><td><i>48.0</i></td><td><i>42.0</i></td><td><i>37.0</i></td><td><i>33.0</i></td></tr><tr><td><i>1/time / s^{-1}</td><td>0.018</td><td>0.021</td><td>0.024</td><td>0.027</td><td>0.030</td></tr></table></td><td>3</td></tr>
</table>

QUESTION	RUBRIC	SCORE
2(c)(i)	*Able to draw the graph of temperature against 1/time correctly* i) Axis x : temperature / ^{0}C and axis y : 1/time /1/s ii) Consistent scale and the graph half of graph paper iii) All the points are transferred correctly iv) Correct curve 	3
2(c)(ii)	*State the relationship between the rate of reaction and temperature correctly* The rate of reaction increases with the increase in temperature	3
2(d)	*Able to predict the time taken*  *From the graph, when temperature = 55^{o}C,* *1/time = 0.033 s^{-1}* *Time = 1/0.033* *= 30.3 s*	3
2(e)(i)	Able to state all variables correctly Manipulated variable : Temperature of sodium thiosulphate solution Responding variable : Rate of reaction between sodium thiosulphate and hydrochloric acid//time taken for the sign X disappear Constant variable : Concentration and volume of sodium thiosulphate solution and hydrochloric acid	3

QUESTION	RUBRIC	SCORE
2(e)(ii)	*Able to state how to manipulate one variable while keeping the other variables constant.* Temperature is the manipulated variable. Heating sodium thiosulphate with several different temperatures by remaining the concentration and volume of sodium thiosulphate and hydrochloric acid constant helps maintain the responding variable.	3
2(f)	*Able to give the hypothesis accurately* Manipulated variable : Temperature of sodium thiosulphate solution Responding variable : Rate of reaction between sodium thiosulphate and hydrochloric acid//time taken for the sign X disappear The higher the temperature of sodium thiosulphate solution, the higher the rate of reaction is	3
2(g)	*Able to state the relationship between temperature and the rate reaction in our daily lives correctly* The lower the temperature, the lower the rate of food turns bad	3
3(a)	*Able to Mark a statement of the problem accurately and must be in question form* Does concentration of ions affect the product of electrolysis process at the anode?	3
3(b)	*Able to state all the three variables correctly* Manipulated variables : concentration of sodium chloride solution Responding variables : product formed at anode Controlled variables : quantity of current, carbon electrodes	3
3(c)	*Able to state the relationship between manipulated variable and responding variable correctly* The higher the concentration of ions at the **anode**, the higher its tendency to be discharged.	3
3(d)	*Able to state the list of substances and apparatus correctly and completely* Materials : 0.0001 mol dm-3 sodium chloride solution, 2.0 mol dm-3 sodium chloride solution. Apparatus : carbon electrode, electrolytic cell, test tubes, dry cell, blue litmus paper, wooden splinter, Bunsen burner.	3

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td>3(e)</td><td>Able to state a complete experimental procedure

1. Fill electrolytic cell with 0.0001 mol dm^{-3} sodium chloride solution.
2. Connect carbon electrodes to the power supply and ammeter.
3. Switch on the circuit for half hour.
4. Collect the gas at the anode and test with a glowing wooden splinter and a damp blue litmus paper.
5. Repeat the step 1 to 4 by replacing 0.0001 mol dm^{-3} sodium chloride solution with 2.0 mol dm^{-3} sodium chloride solution.</td><td>3</td></tr>
<tr><td>3(f)</td><td>Able to draw a suitable table with title correctly

<table><tr><th>Solution</th><th>Observation</th><th>Product formed at anode</th></tr><tr><td>0.0001 mol dm^{-3} sodium chloride solution</td><td></td><td></td></tr><tr><td>2.0 mol dm^{-3} sodium chloride solution</td><td></td><td></td></tr></table></td><td>3</td></tr>
</table>

PAPER 3 SET 3 http://cikguadura.wordpress.com/

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td>1(a)(i)</td><td>Able to record all reading accurately with units

Sample answer :
<table><tr><th>Experiment</th><th>Copper</th><th>Bronze</th></tr><tr><td>I</td><td>1.3 cm</td><td>1.2 cm</td></tr><tr><td>II</td><td>1.6 cm</td><td>1.0 cm</td></tr><tr><td>III</td><td>1.5 cm</td><td>1.2 cm</td></tr></table></td><td>3</td></tr>
<tr><td>1(a)(ii)</td><td>Able to construct the table with correct label and unit

Sample answer :
<table><tr><th rowspan="2">Type of blocks</th><th colspan="3">Diameter of dents (cm)</th><th rowspan="2">Average diameter of dents (cm)</th></tr><tr><th>I</th><th>II</th><th>III</th></tr><tr><td>Copper</td><td>1.3</td><td>1.6</td><td>1.5</td><td>1.5</td></tr><tr><td>Bronze</td><td>1.2</td><td>1.0</td><td>1.2</td><td>1.1</td></tr></table></td><td>3</td></tr>
<tr><td>1(b)</td><td>Able to state the observation correctly and accurately
Sample answer :
The size / diameter of dents on bronze block is smaller than size / diameter of dents on copper block//</td><td>3</td></tr>
<tr><td>1(c)</td><td>Able to state the inference correctly and accurately
Sample answer :
Bronze is harder than copper //Copper is less harder than bronze</td><td>3</td></tr>
<tr><td>1 (d)</td><td>Able to state operational definition correctly

Sample answer :
When1 kg weight is dropped on the block , a smller dent is formed.</td><td>3</td></tr>
</table>

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td>1 (e)</td><td>Able to explain the arrangement of particles in the materials correctly

Sample answer :
1. The atomic size of tin is bigger than copper // the atomic size of tin and copper are different.
2. The presence of tin atoms in bronze disrupts the orderly arrangement of copper atoms.
3. Reduces / prevent the layers of atoms from sliding over each other easily</td><td>3</td></tr>
<tr><td>1 (f)</td><td>Able to state the hypothesis correctly

Sample answer :
Bronze is harder than copper //
Copper is less harder than bronze</td><td>3</td></tr>
<tr><td>1 (g)</td><td>Able to state all three variables and all three action correctly

Sample answer :

<table>
<tr><th>Name of variables</th><th>Action to be taken</th></tr>
<tr><td>(i) Manipulated variable:
<u>Type of materials // copper and bronze</u></td><td>(i) The way to manipulate variable:
<u>Replace copper with bronze</u></td></tr>
<tr><td>(ii) Responding variable:
<u>Diameter of dent</u></td><td>(ii) What to observe in the responding variable:
<u>The diameter of the dent formed on copper block and bronze block</u></td></tr>
<tr><td>(iii) Controlled variable:
<u>Mass of weight // height of the weight // size of steel ball bearing</u></td><td>(iii) The way to maintain the control variable:
<u>Uses same mass of weight // same height of the weight // same size of ball bearing</u></td></tr>
</table>
</td><td>3</td></tr>
</table>

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td>2(a)</td><td>Able to state 5 correct observations.
<u>Sample answer</u>

<table>
<tr><th>Test tube</th><th>Observation</th></tr>
<tr><td>1</td><td>blue colour /solutions</td></tr>
<tr><td>2</td><td>High intensity of pink colour/ solutions</td></tr>
<tr><td>3</td><td>High intensity of blue colour /solutions</td></tr>
<tr><td>4</td><td>Low intensity of pink colour/ solutions</td></tr>
<tr><td>5</td><td>Low intensity of blue colour /solutions</td></tr>
</table></td><td>3</td></tr>
<tr><td>2(a)</td><td>Able to state 5 correct inferences.
<u>Sample answer</u>
<table>
<tr><th>Test tube</th><th>Inference</th></tr>
<tr><td>1</td><td>Iron(II) / Fe^{2+} ions formed / produced in the solutions //
Iron / Fe rusted/corroded/oxidised</td></tr>
<tr><td>2</td><td>Iron(II) / Fe^{2+} ions are not formed /produced in the solutions //
Iron / Fe does not rust/ corrode/oxidised
Magnesium/Mg rusted/corroded /oxidised</td></tr>
<tr><td>3</td><td>Iron(II) / Fe^{2+} ions formed / produced in the solutions //
Iron / Fe rusted/ corroded/ oxidised</td></tr>
<tr><td>4</td><td>Iron(II) / Fe^{2+} ions are not formed /produced in the solutions //
Iron / Fe does not rust/ corrode/oxidised //
Zinc/Zn rusted/ corroded / oxidised</td></tr>
<tr><td>5</td><td>Iron(II) / Fe^{2+} ions formed / produced in the solutions //
Iron / Fe is rusted / corroded/ oxidised</td></tr>
</table></td><td>3</td></tr>
<tr><td>2(b)</td><td>Able to explain a difference in observation correctly between test tube 2 and 3
<u>Sample answer</u>

Iron/Ferum/Fe in test tube 2 does not rust/ corrode/ oxidised because ferum is in contact with a more electropositive metal, but iron/Ferum/Fe in test tube 3 rusts/ corrodes/ is oxidised because ferum is in contact with a less electropositive metal. //In test tube 2, magnesium is more electropositive than ferum/iron and and in test tube 3, copper is less electropositive the ferum/iron.</td><td>3</td></tr>
<tr><td>2(c)</td><td>Able to state the hypothesis correctly.

<u>Sample answer</u>
When a more/less electropositive metal is in contact with iron/ferum/Fe, the metal inhibits/(speeds up) rusting/corrosion of iron //
When the metal in contact with iron is higher/lower than iron/ferum/Fe in electrochemical series, the rusting/corrosion of iron is slower/faster //</td><td>3</td></tr>
<tr><td>2(d)</td><td>Able to state all the variables in this experiment correctly.

<u>Sample answer</u>
(i) Manipulated variables : Type/different metal // position of metal in electrochemical series
(ii) Responding variable : Rusting / corrosion // presence of blue/pink colour
(iii) Constant variable : Size/mass of iron nail // type of nail // clean iron nails // temperature // medium in which the iron nail are kept</td><td>3</td></tr>
<tr><td>2(e)</td><td>Able to state the operational definition for the rusting of iron nail correctly.

<u>Sample answer</u>
Rusting occurs when iron nail is in contact with copper/tin /less electropositive metal and form blue colouration in potassium hexacyanoferrate(III) solution</td><td>3</td></tr>
</table>

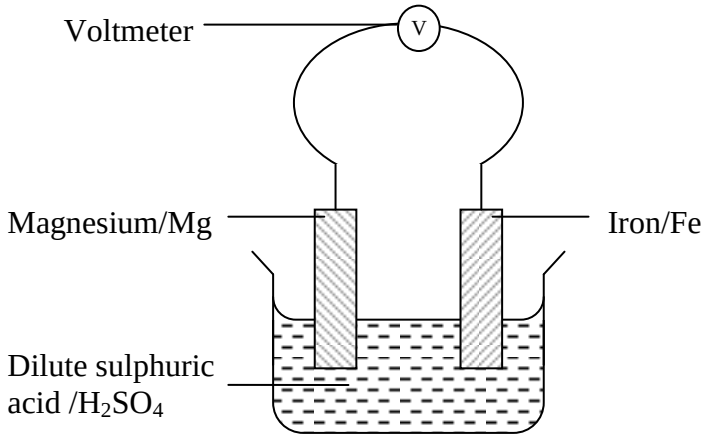
<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td>2(f)</td><td>Able to classify all the metals correctly.

Sample answer
<table><tr><td>Metals that inhibit rusting</td><td>Metals that speed up rusting</td></tr><tr><td>Magnesium/Mg
Zinc/Zn</td><td>Tin/Sn
Copper/Cu</td></tr></table></td><td>3</td></tr>
<tr><td>2(g)(i)</td><td>Able to state the relationship between the time taken and the amount of rust formed correctly.

Sample answer
The longer the time taken, the greater/bigger/larger the rust formed // The longer the time taken, more rust is formed // The rust formed is greater/bigger/larger, when the time taken is longer.</td><td>3</td></tr>
<tr><td>2(g)(ii)</td><td>Able to predict the time taken for the iron nail to completely rust correctly.

Answer
Less than 5 days</td><td>3</td></tr>
<tr><td>2(h)(i)</td><td>Able to record the voltmeter readings correctly in one decimal place.

Answer
<table><tr><td>Pairs
of metal</td><td>Positive
terminal</td><td>Voltmeter reading
(V)</td></tr><tr><td>Magnesium and iron</td><td>Iron</td><td>2.0</td></tr><tr><td>Iron and copper</td><td>Copper</td><td>0.8</td></tr><tr><td>Iron and zinc</td><td>Iron</td><td>0.4</td></tr><tr><td>Iron and tin</td><td>Tin</td><td>0.2</td></tr></table></td><td>3</td></tr>
<tr><td>2(h)(ii)</td><td>Able to draw a labelled diagram accurately.

Sample Answer
 
</td><td>3</td></tr>
</table>

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td>3 (a)</td><td>Able to record all the readings accurately to two decimal points with units.

<u>Sample answer:</u>

Activity I : 26.05 cm^3, 26.90 cm^3, 30.05 cm^3
Activity II : 13.30 cm^3, 25.85 cm^3, 38.45 cm^3</td><td>3</td></tr>
<tr><td>3(b)</td><td>Able to construct a table containing the following information:
1. Headings in the table
2. Transfer all data from 1(a) correctly
3. With units

<u>Sample answer:</u>

<table><tr><th>Titration number</th><th>Initial burette reading / cm^3</th><th>Final burette reading / cm^3</th><th>Volume of acid / cm^3</th></tr><tr><td>1</td><td>0.80</td><td>13.30</td><td>12.50</td></tr><tr><td>2</td><td>13.40</td><td>25.85</td><td>12.45</td></tr><tr><td>3</td><td>25.90</td><td>38.45</td><td>12.55</td></tr></table></td><td>3</td></tr>
<tr><td>3(c)</td><td>Able to show all the steps to calculate the concentration of sulphuric acid correctly.

<u>Sample answer:</u>
Step 1: Write the chemical equation:
$2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$
Step 2: Calculating the number of moles of sodium hydroxide
Number of mol of NaOH : $\frac{0.1 \times 25}{1000}$ // 0.0025
Step 3: Calculating the concentration of sulphuric acid
Concentration of H_2SO_4 : ($\frac{0.0025 \times 1000}{12.50 \times 2}$) // 0.1 mol/dm^3</td><td>3</td></tr>
<tr><td>3(d)</td><td>Able to state the colour change correctly
<u>Sample answer</u>:
Activity I : Pink change to colourless
Activity II : Yellow change to orange</td><td>3</td></tr>
<tr><td>3(e)</td><td>Able to state the correct type of acid in activity I and II and give the correct reason.
<u>Sample answer:</u>
Type of acid : Activity I use monoprotic acid and Activity II use diprotic acid.
Reason : The volume of acid used in activity I is twice with the volume of acid used in activity II.</td><td>3</td></tr>
<tr><td>3(f)</td><td>Able to state the colour change correctly
<u>Sample answer:</u>
Yellow change to orange and finally change to red</td><td>3</td></tr>
<tr><td>3(g)</td><td>Able to state all the variable correctly
Manipulated Variable : Type of acid used/basicity of acid
Responding Vvariable : Volume of acid to neutralize 25.0 cm^3 of mol dm^{-3} sodium hydroxide solution .
Fixed Variable : Concentration and volume of sodium hydroxide solution.</td><td>3</td></tr>
<tr><td>3(h)</td><td>Able to state the hypothesis (relate the manipulated variable with the responding variable) correctly.
<u>Sample answer:</u>
When 0.1 mol dm^{-3} hydrochloric acid is used to neutralize 25 cm^3 of 1.0 mol dm^{-3}</td><td>3</td></tr>
</table>

<table>
<tr><th>QUESTION</th><th>RUBRIC</th><th>SCORE</th></tr>
<tr><td></td><td>sodium hydroxide solution, the volume of acid used is 25 cm^3 , when 0.1 mol dm^{-3} sulphuric acid is used to neutralize 25 cm^3 of 1.0 mol dm^{-3} sodium hydroxide solution, the volume of acid used is 12.5 cm^3</td><td></td></tr>
<tr><td>3(i)</td><td>Able to give the operational definition for the end-point of titration in activity I correctly. Able to describe the following criteria
(i) What should be done
(ii) What should be observed
<u>Sample answer:</u>
When hydrochloric acid is added to sodium hydroxide solution with phenolphthalein, pink turns to colourless.</td><td>3</td></tr>
<tr><td>3(j)</td><td>Able to classify all the acids into strong acid and weak acid correctly.

<u>Sample answer:</u>
<table><tr><th>Strong acid</th><th>Weak acid</th></tr><tr><td>Nitric acid</td><td>Ethanoic acid</td></tr><tr><td>Phosphoric acid</td><td>Ascorbic acid</td></tr></table></td><td>3</td></tr>
<tr><td>4(a)</td><td>Able to state the problem statement accurately
<u>Sample answer</u>
Is detergent more effectife than as cleaning agent in the hard water?</td><td>3</td></tr>
<tr><td>4(b)</td><td>Able to state the three variables accurately.
<u>Sample answer</u>
Manipulated variable: Soap and detergent
Responding variable: Effectiveness of cleansing action // the ability to remove the oily stains on cloth
Fixed variable : cloth with oily stains, hard water</td><td>3</td></tr>
<tr><td>4(c)</td><td>Able to state the hypothesis accurately with direction

<u>Sample answer</u>
The cleansing action of a detergent is more effective in hard water than a soap</td><td>3</td></tr>
<tr><td>4(d)</td><td>Able to state the complete list of apparatus and material as follows

List of apparatus : 2 beakers, , glass rod
List of material : Dilute calcium nitrate solution//dilute magnesium nitrate solution, soap and detergent solution, 2 pieces of cloths stained with oil</td><td>3</td></tr>
<tr><td>3(e)</td><td>Able to state procedures correctly as follows
1. Pour dilute calsium nitrate solution//dilute magnesium nitrate solution into a beaker until half full
2. Soap is added into the beaker
3. A piece of cloth stained with oil is immersed in the solution
4. The cloth is shaken/rubbed/stirred
5. Observation is recorded
6. Repeat steps 1 –5 by replacing soap with detergent .</td><td>3</td></tr>
<tr><td>3(f)</td><td>Able to tabulate the data correctly
<u>Sample answer</u>
<table><tr><td>Type of cleaning agent</td><td>Observation</td></tr><tr><td>Soap</td><td></td></tr><tr><td>Detergent</td><td></td></tr></table></td><td>3</td></tr>
</table>

KEMENTERIAN PENDIDIKAN MALAYSIA

BAHAGIAN PENGURUSAN SEKOLAH BERASRAMA PENUH DAN SEKOLAH KECEMERLANGAN

2014

MODUL PECUTAN KIMIA

http://cikguadura.wordpress.com/

Nama : .....

Sekolah:.....

Kelas :.....

PANEL PENYEDIA DAN PEMURNI:

Pn. Wan Noor Afifah Binti Wan Yusoff (Ketua)	SBPI GOMBAK
Pn. Norini Binti Jaafar	SEKOLAH SULTAN ALAM SHAH
Pn. Aishah Peong Binti Abdullah	SBPI TEMERLOH
En Che Malek Bin Mamat	SBPI BATU RAKIT
Pn. Rossita Binti Radzak	SMS TUANKU MUNAWIR
Pn Noor Raini Binti Sulaiman	SMS TENGKU ABDULLAH
En Ooi Yoong Seang	SMS MUAR
Pn Masodiah Binti Mahfodz	SMS HULU SNELANGOR
Cik Nurul Yusma Hanim Binti Ahmad	SMSTSSS, BUKIT MERTAJAM

CHEMICAL FORMULA AND EQUATIONS

SECTION A

1 Diagram 1 shows the formulae of 4 types of gases released during the eruption of a volcano.
Rajah 1 *menunjukkan formula bagi 4 jenis gas yang terbebas semasa letusan gunung berapi.*

N_2	CO_2	H_2S	H_2O

Diagram 1*/Rajah* 1

a) State the meaning of 'molar mass' of a substance by using one suitable examples.
Nyatakan maksud 'jisim molar' bagi suatu bahan dengan menggunakan satu contoh yang sesuai.

……

[1 mark/1 *markah*]

b) Calculate the molar mass of each gas shown in Diagram 1
[Relative atomic mass : H, 1; C, 12; O, 16; N, 14; S, 32]
Hitung jisim molar bagi setiap gas yang ditunjukkan dalam Rajah 1.
[Jisim atom relatif : H,1 ; C,12 ; O,16 ; N,14 ; S,32]

[4 marks/4 *markah*]

c) Compare the number of molecules in 0.9 g of water vapour and 2.2 g of carbon dioxide.
Explain.
[Relative atomic mass: H, 1; C, 12; O, 16; Avogadro Constant, $N_A = 6.02 \times 10^{23}$]
Bandingkan bilangan molekul dalam 0.9 g wap air dan 2.2 g karbon dioksida.Terangkan.
[Jisim atom relatif : H,1 ; C,12 ;O,16 : Pemalar Avogadro ,$N_A = 6.02 \times 10^{23}$]

[4 marks/4 *markah*]

2 (a) In a close container, there is 3.0 dm^3 of carbon dioxide gas at room temperature.
Dalam satu bekas yang tertutup, terdapat 3.0 dm^3 *gas karbon dioksida pada suhu bilik*.

(i) How many molecules are there in 3.0 dm^3 of carbon dioxide gas, CO_2 ?
Berapa bilangan molekul terdapat dalam 3.0 dm^3 gas karbon dioksida itu?
[Avogadro's number = 6.02×10^{23} mol^{-1}]
[1 mole of gas occupies 24 dm^3 at room temperature]
[*Nombor avogadro* = 6.02×10^{23} mol^{-1}]
[1 *mol gas menempati* 24 dm^3 *pada suhu bilik*]

Use: $\text{Number of mole} = \dfrac{\text{Number of particles}}{6.02 \times 10^{23}\ mol^{-1}}$

[1 marks/1 *markah*]

(ii) Calculate the mass of carbon dioxide gas in the container.
Hitungkan jisim karbon dioksida di dalam bekas itu.
[Relative molecular mass for CO_2 = 44]
[*Jisim molekul relatif* CO_2 = 44]

Use: $\text{Number of mole} = \dfrac{\text{mass}}{\text{molar mass}}$

[1 marks/1 *markah*]

(b) Diagram 2 shows the set-up of apparatus for an experiment to determine the empirical formula of magnesium oxide.
Rajah 2 *menunjukkan susunan radas bagi eksperimen untuk menentukan formula empirik magnesium oksida*.

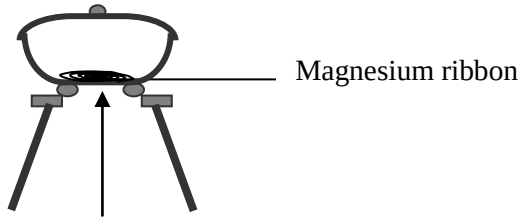


Diagram 2/ *Rajah* 2

Table 2 shows the results of this experiment.
Jadual 2 *menunjukkan keputusan eksperimen ini*

Description	**Mass (g)**
Mass of crucible + lid *Jisim mangkuk pijar + penutup*	34.0
Mass of crucible + lid + magnesium ribbon *Jisim mangkuk pijar + penutup + pita magnesium*	36.4
Mass of crucible + lid + magnesium oxide *Jisim mangkuk pijar + penutup + magnesium oksida*	38.0

Table 2 / *Jadual* 2

(b) (i) What is the meaning of empirical formula?
Apakah yang dimaksudkan dengan formula empirik?

…….

……..

[1 marks/1 *markah*]

(ii) Base on table 2, calculate the mass of:
Berdasarkan Jadual 2, *hitungkan jisim bagi*:

Magnesium :
Magnesium

Oxygen :
Oksigen

[2 marks/2 *markah*]

(iii) Calculate the ratio of mole of magnesium atoms to oxygen atoms
Hitungkan nisbah bilangan mol atom magnesium kepada bilangan mol atom oksigen
[Relative atomic mass: O=16, Mg =24]
[*Jisim atom relatif*: O=16, Mg=24]

[1 marks/1 *markah*]

(iv) Determine the empirical formula of magnesium oxide.
Tentukan formula empirik bagi magnesium oksida.

[1 marks/1 *markah*]

(v) Why the crucible lid was is opened once in a while during the experiment?
Mengapakah penutup mangkuk pijar dibuka sekali sekala?

……..……..

[1 marks/1 *markah*]

(v) State why the empirical formula of copper oxide cannot be determine by using the same technique.
Nyatakan mengapa formula empirik kuprum oksida tidak dapat ditentukan dengan menggunakan teknik yang sama.

……..……..

[1 marks/1 *markah*]

SECTION B

3 (a) The following are the formulae of two compounds.
Berikut adalah formula bagi dua sebatian.

Al_2O_3 PbO_2

(i) Based on the two formulae, write the formula for aluminium ion and lead ion
Berdasarkan kedua-dua formula tersebut, tuliskan formula bagi ion aluminium dan ion plumbum.

[2 marks/2 *markah*]

(ii) Name both compounds based on the IUPAC nomenclature system.
Namakan kedua-dua sebatian tersebut berdasarkan sistem penamaan IUPAC .

[2 marks/2 *markah*]

(b) The following information is about an organic compound, K.
Berikut adalah penerangan tentang sebatian karbon K

- Empirical formula is CH_2O
  Formula empirikal
- Relative molecular mass is 60
  Jisim molekul relatif
- Reactis with calcium carbonate to produce a type of gas turns lime water cloudy
  Bertindak balas dengan kalsium karbonat menghasilkan gas yang menukarkan air kapur menjadi keruh

Based on the information given:
Berdasarkan penerangan yang diberikan.

(i) Determine the molecular formula of K.
[Relative atomic mass: H = 1, C = 12, O = 16]
Tentukan formula molekul bagi K.[Jisim atom relative : H = 1 , C=12 , O = 16]

[3 *marks*]

(ii) Write a balanced chemical equation for the reaction of compound K with calcium carbonate.
Tuliskan persamaan kimia seimbang bagi tindak balas antara sebatian K dengan kalsium karbonat.

[2 *marks*]

(c) Diagram 3 shows the apparatus set up for experiment of decomposition of copper (II) carbonate. In this experiment copper(II) oxide and carbon dioxide gas are formed.
Diagram 3 menunjukkan susunan radas untuk eksperimen penguraian kuprum(II) karbonat. Dalameksperimen ini kuprum(II)oksida dan karbon dioksida dihasilkan.

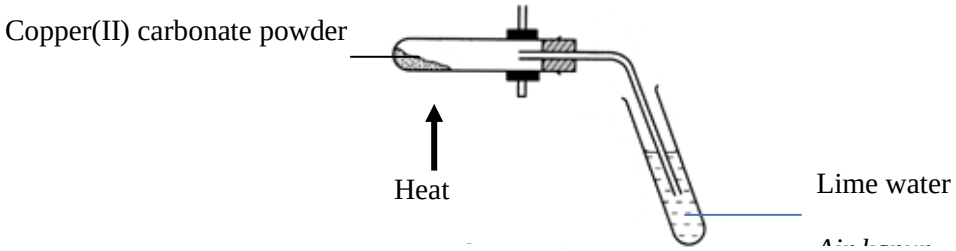


Diagram 3/ *Rajah 3*

Based on Diagram 3,
Berdasarkan rajah 3,

(i) State two observations.
Nyatakan dua pemerhatian.

[2 marks]

(ii) Write a balanced chemical equation for the reaction
Tuliskan persamaan kimia seimbang bagi tindak balas

[2 marks]

(iii) State two informations from the chemical equation in (c)(ii).
Nyatakan dua maklumat dari persamaan kimia dalam (c)(ii)

[2marks]

(iv) Calculate the mass of the copper(II) oxide formed from the decomposition of 12.4 g of copper(II) carbonate.
[Relative atomic mass of C = 12; O = 16; Cu = 64]
Hitungkan jisim kuprum(II)oksida yang terbentuk dari penguraian 12.4 g kuprum(II)karbonat.
[Jisim atom relatif of C = 12, O = 16, Cu = 64]

[3 *marks*]

(v) In other experiment 4.0 g copper(II) oxide is reacted with hydrogen gas to produce copper and water. If the mass of copper in copper(II) oxide is 3.2 g, calculate the mass of oxygen and the simplest mole ratio for the copper atoms to oxygen atoms
[Relative atomic mass of O = 16; Cu = 64]
Dalam eksperimen 4.0 g kuprum(II) oksida bertindak balas dengan hidrogen gas menghasilkan kuprum dan air. Jika jisim kuprum dalam kuprum(II) oksida ialah 3.2g, Hitungkan jisim oksigen dan nisbah teringkas bilangan mol kuprum atom kepada oksigen atoms. [Jisim atom relative of : O = 16; Cu=64

[2 marks]

SECTION C

4 (a) By using suitable example, explain what are meant by empirical formula and molecular formula./*Dengan menggunakan contoh yang sesuai, terangkan apa yang dimaksudkan dengan formula empirik dan formula molekul.*

[3 marks]

(b) The information below is for compound Q.
Maklumat berikut adalah bagi sebatian Q.

• Carbon *Karbon*	40.00%
• Hydrogen *Hidrogen*	6.66%
•	

Based on the information of compound Q, determine:
Berdasarkan maklumat bagi sebatian Q, tentukan:

(i) The empirical formula/*Formula empiriknya*

(ii) The molecular formula/*Formula molekulnya*
[Relative atomic mass: C,12; H,1; O,16]/[*Jisim atom relatif: C,12; H,1; O,16]*

[5 marks]

(c) Diagram 4shows the set-up of apparatus to determine the empirical formula of two different compounds.
Rajah 4 menunjukkan susunan radas bagi menentukan formula empirik dua sebatian yang berlainan.

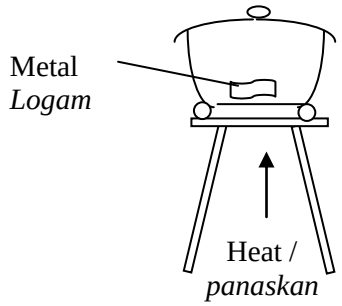
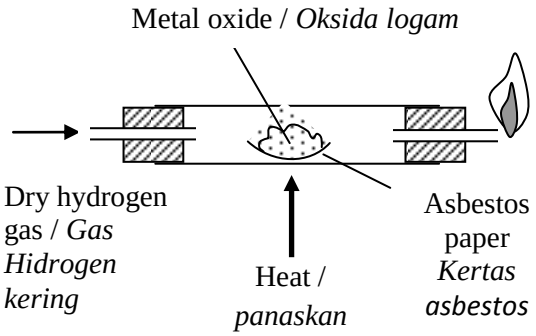
Method I/*Kaedah I*	Method II/*Kaedah II*
	

Table 4/*Rajah 4*

(i) Explain why method II is not suitable to determine the empirical formula of magnesium oxide?
Terangkan mengapa kaedah II tidak sesuai bagi menentukan formula empirik bagi magnesium oksida?

[1mark]

(ii) Suggest one metal oxide in method II.
*Cadangkan satu oksida logam dalam kae*dah II.

[1 mark]

(iii) Using a suitable example, describe a laboratory experiment to determine the empirical formula of an oxide of a reactive metal. Your explanation should include:
Dengan menggunakan contoh yang sesuai, huraikan suatu eksperimen di makmal untuk menentukan formula empirik bagi suatu oksida logam reaktif.. Penerangan anda mestilah meliputi :

- Procedure of the experiment/*Prosedur bagi eksperimen*
- Tabulation of data/*Penjadualan data*

[10 marks]

SECTION A

1 Diagram 1.1 shows the heating curve of solid naphthalene, $C_{10}H_8$.
Rajah 1.1 menunjukkan lengkung pemanasan pepejal naftalena, $C_{10}H_8$.

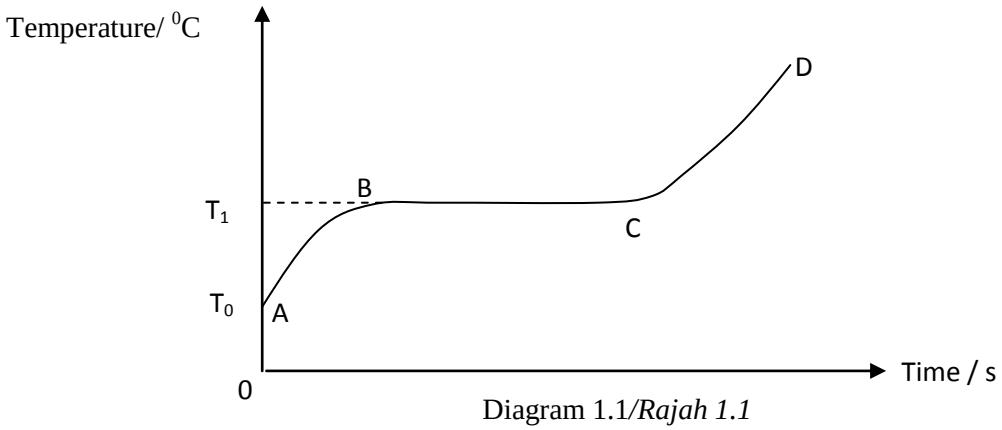


Diagram 1.1/*Rajah 1.1*

(*a*) (i) Name the process involved in Diagram 1.1
Namakan proses yang terlibat dalam Rajah 1.1.

.....

[1 mark]

(ii) State the type of particle present in naphthalene, $C_{10}H_8$.
Nyatakan jenis zarah yang terdapat dalam naftalena, $C_{10}H_8$.

.....

[1 mark]

(*b*) Explain why there is no change in temperature from B to C
Terangkan mengapa tiada perubahan suhu dari B ke C

.....

.....

[2 *marks*]

(*c*) State how the movement of naphthalene particles changes from C to D during heating.
Nyatakan bagaimana pergerakan zarah-zarah naftalena berubah semasa pemanasan dari C ke D.

.....

[1 *mark*]

(*d*) Diagram 1.2 shows the atomic model proposed by Neils Bohr.
Rajah 1.2 menunjukkan model atom yang dicadangkan oleh Neils Bohr.

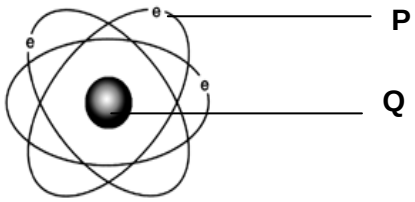


Diagram 1.2/ *Rajah 1.2*

(i) Name P and Q.
Namakan P *dan* Q.

P : ..... Q : .....

[1 mark]

(ii) Which subatomic particles are involved in a chemical reaction?
Zarah-zarah sub-atom yang manakah terlibat dalam tindak balas kimia?

.....

[1 mark]

(e) Table 1 shows the number of protons and neutrons of four different atoms.
Jadual 1 menunjukkan bilangan proton dan neutron bagi empat atom yang berlainan.

Atom	Number of protons *Bilangan proton*	Number of neutrons *Bilangan neutron*
W	16	17
X	16	16
Y	3	4
Z	19	20

Table 1/ *Jadual 1*

(i) Which atoms are isotopes?
Atom-atom yang manakah adalah isotop?

.....

[1 mark/1 *markah*]

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

.....

.....

[2 marks/2 *markah*]

2 (a) Table 2 shows the information of atom Q, R and S.
Jadual 2 menunjukkan maklumat bagi atom-atom Q, R dan S.

Atom	Number of proton	Number of neutron	Nucleon number
Q	12	12	24
R	17		35
S	19	20	39

Table 2/*Jadual 2*

(i) What is meant by nucleon number?
Apakah yang dimaksudkan dengan nombor nucleon?

……

[1 mark]

(ii) State the number of neutrons for element R.
Nyatakan bilangan neutron bagi unsur R.

……

[1 mark]

(iii) Draw and label electron arrangement of ion Q.
Lukis dan labelkan susunan elektron bagi ion Q.

[1 mark]

(iv) State the number of electron for element S.
Nyatakan bilangan elektron bagi unsur S.

……

[1 mark/1 *markah*]

(b) Diagram 2 shows the graph temperature against time when liquid naphthalene is cooled.
Rajah 2 menunjukkan graf suhu melawan masa apabila cecair naftalena disejukkan.

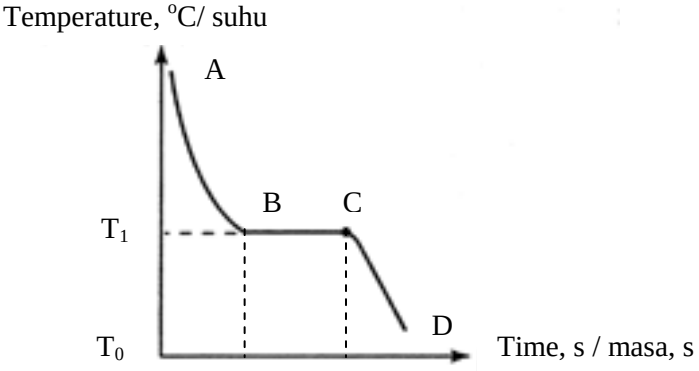


Diagram 2/ *Rajah 2*

State the freezing point of naphthalene.
Nyatakan takat beku bagi naftalena.

……

[1 mark/1 *markah*]

(c) What is the physical state of naphthalene at:
Apakah keadaan fizik bagi naftalena pada:

(i) AB :
……
[1 mark/1 *markah*]

(ii) CD:
……
[1 mark/1 *markah*]

(d) Explain why there is no change in temperature from B to C?
Terangkan mengapa tiada perubahan suhu dari B ke C?

……
[1 mark/1 *markah*]

(e) Draw the arrangement of naphthalene particles at CD.
Lukiskan susunan zarah naftalena pada CD.

[1 mark/1 *markah*]

3 Diagram 3 shows the electron arrangement of five atoms of element A, B, C, D and E.
Rajah 3 menunjukkan susunan elektron bagi lima atom unsur A, B, C, D dan E.

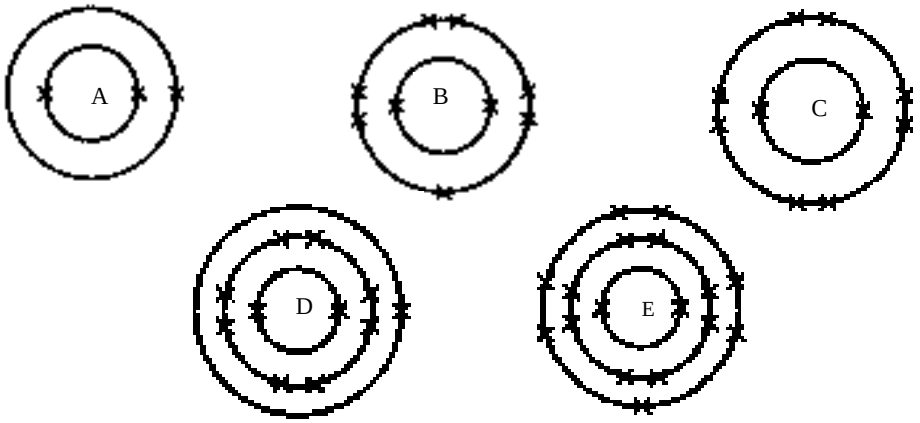


Diagram 3/ *Rajah 3*

(a) Write the electron arrangement for atoms of element A
Tuliskan susunan elektron bagi atom unsur A.

……
[1 mark/1 *markah*]

(b) Identify the position of element B in the Periodic Table of Elements.
Kenalpasti kedudukan unsur B dalam Jadual Berkala Unsur.

……
[1 mark/1 *markah*]

(c) (i) Which element is chemically inert?
Unsur yang manakah lengai dari segi kimia?

……
[1 mark/1 *markah*]

(ii) Explain your answer in (c)(i).
Terangkan jawapan anda dalam (c)(i).

……

[1 mark/1 *markah*]

(d) Element B dissolves in water to form an acid and a strong bleaching agent.
Write the chemical formula of the bleaching agent.
Unsur B larut dalam air untuk membentuk satu asid dan satu agen peluntur yang kuat.
Tuliskan formula bagi agen peluntur itu.

……

[1 mark/1 *markah*]

(e) Which element shows similar chemical property?
Explain.
Unsur yang manakah menunjukkan sifat kimia yang sama ?
Terangkan.

……
……

[2 marks/2 *markah*]

(f) (i) Compare the reactivity of element A and element D toward water.
Explain.
Bandingkan kereaktifan unsur A dan unsur D terhadap air.
Terangkan.

……

[2 mark/2 *markah*]

(ii) Based on the answer in (f)(i) write chemical equation for the reaction.
Berdasarkan jawapan dalam (f)(i) tuliskan persamaan kimia bagi tindak balas itu.

……

[1 mark/1 *markah*]

4 Diagram 4 shows part of the Periodic Table of Elements.
Rajah 4 menunjukkan sebahagian daripada Jadual Berkala Unsur

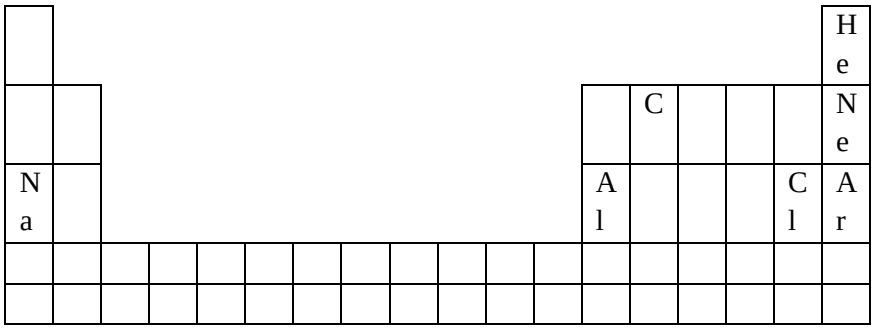


Diagram 4/*Rajah 4*

(a) Based on the Diagram 4, answer the following questions:
Berdasarkan Rajah 4, jawab soalan-soalan berikut:

(i) Choose an element which is a halogen.
Pilih satu unsur yang merupakan halogen.

……

[1 mark/1 *markah*]

(ii) Which element exists as monoatomic?
Unsur yang manakah wujud monoatom?

……

[1 mark/1 *markah*]

(iii) Which element forms an amphoteric oxide?
Unsur yang manakah membentuk oksida bersifat ampoterik?

……

[1 mark/1 *markah*]

(iv) Compare the atomic size of elements helium, neon and argon.
Explain.
Bandingkan saiz atom bagi unsur-unsur helium, neon dan argon.
Terangkan.

……

[2 marks/2 *markah*]

(b) Diagram shows the proton number and nucleon number for Na and Cl.
Rajah menunjukkan nombor proton dan nombor nucleon bagi Na dan Cl.

$^{23}_{11}Na$ $^{35}_{17}Cl$

(i) Draw an electron arrangement of compound formed between elements Na and Cl.
Lukiskan sususan elektron bagi sebatian yang terbentuk di antara unsur Na dan Cl.

[1 mark/1 *markah*]

(ii) State the type of compound formed.
Nyatakan jenis sebatian yang terbentuk.

……

[1 mark/1 *markah*]

(iii) Name the force that exists between the particles in the compound.
Namakan daya yang wujud di antara zarah-zarah dalam sebatian itu.

……

[1 mark/1 *markah*]

(iv) State one physical property of this compound.
Nyatakan satu fizik bagi sebatian ini.

……
……

[1 mark/1 *markah*]

SECTION B

5 Diagram 5, shows 3 state of matter that is P, Q and R.
Rajah 5 menunjukkan 3 keadaan jirim, iaitu P, Q dan R.

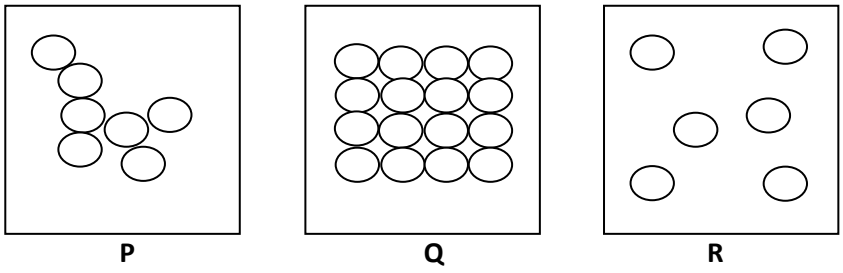


Diagram 5/*Rajah* 5

(a) Based on Diagram 5, what is the state of matter for P, Q and R.?
Berdasarkan rajah 5, *apakah keadaan jirim bagi P, Q dan R?*

[3 marks]

(b) By using the kinetic theory of matter, explain how the following changes occur.
Dengan menggunakan teori kinetik jirim, huraikan bagaimana perubahan di bawah berlaku.

- P to Q/ P *ke* Q
- P to R/ P *ke* R
- R to P/ R *ke* P

In your explanation include the process occurs, the energy contents and the movement of the particles.
Huraian anda mestilah meliputi proses yang terlibat, kandungan tenaga dan pergerakan jirim.

[9 marks]

(c) Table 5 shows the temperature from an experiment to determine the freezing point of substance X.
Jadual 5*menunjukkan suhu daripada satu eksperimen untuk menentukan takat beku bahan* X.

Time (s)	0	30	60	90	120	150	180	210
Temperature (^oC)	95	85	82	80	80	80	80	70

Table 5/ *Jadual* 5

(i) On the graph paper provided, draw the graph of temperature against time for the cooling of substance X.
Pada kertas graf yang disediakan, lukiskan graf suhu melawan masa bagi penyejukan bahan X.

[3 marks]

(ii) Using the graph in (c), determine the freezing point of substance X. Show on the graph how you determine this freezing point.
Menggunakan graf di (c), *tentukan takat beku bahan* X. *Tunjukkan pada graf bagaimana anda menentukan takat beku ini.*

[2 marks]

(iii) Explain why there is no change in temperature from 90^{th} to 180^{th} second.
Terangkan sebab tiada perubahan suhu dari saat ke 90 sehingga 180.

[2 marks]

(iv) What will happen if substance X is not stirred during experiment? .
Apakah yang akan berlaku sekiranya bahan X *tidak dikacau dengan sekata semasa eksperimen dijalankan?*

[1 mark]

6 Diagram 6 shows the symbols which represent three elements, W, X and Y.
Rajah 6 menunjukkan simbol yang mewakili tiga unsur W, X *dan* Y.

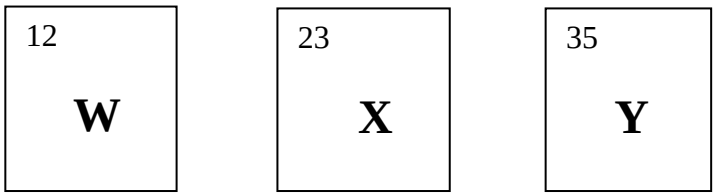


Diagram 6/ *Rajah 6*

Based on Diagram 6, answer the following questions:
Berdasarkan Rajah 6, *jawab soalan-soalan berikut*

(a) What is represented by number 12 and 6 in the symbol of element W?
Apakah yang diwakili oleh angka 12 *dan* 6 *dalam simbol bagi unsur* W*?*

[2 marks]

(b) Atoms W and X can form chemical bonds with atom Y.
State the type of chemical bond and explain how the bond is formed between:
Atom W *dan* X *boleh membentuk ikatan kimia dengan atom* Y.
Nyatakan jenis ikatan kimia dan terangkan bagaimana ikatan terbentuk antara:

(i) Atoms W and Y
Atom W *dan* Y

(ii) Atoms X and Y
Atom X *dan* Y

[10 marks]

(c) Compare the physical properties of compound in (b)(i) and (b)(ii).
Explain your answer.
Bandingkan sifat fizik sebatian dalam (b)(i) dan (b)(ii)
Terangkan jawapan anda.

[8*marks*]

SECTION C

7 Table 7 shows the melting point, boiling point and electrical conductivity of compound P and compound Q.
Jadual 7 menunjukkan takat lebur dan kekonduksian elektrik sebatian Pdan sebatian Q.

Compound ***Sebatian***	**Melting point and Boiling point*Takat lebur dan takat didih***	**Electrical conductivity** ***Kekonduksian elektrik***	
		Solid ***Pepejal***	**Molten** ***Lebur***
P	Low *Rendah*	No Tidak	No Tidak
Q	High *Tinggi*	No Tidak	Yes *Ya*

Table 7 / *Jadual 7*

(a) Suggest one possible compound for **P** and state the type of compound for **P**.
Explain why **P** has low melting and boiling points
*Cadangkan satu sebatian yang mungkin bagi Pdan n*yatakan jenis sebatian P
Terangkan mengapa P mempunyai takat lebur dan takat didih yang rendah.

[4 *marks*]

(b) Chemical formula of compound **Q** is XY
Formula kimia sebatian Q ialah XY

(i) Suggest one possible electron arrangement of atom X and atom Y.
Cadangkan satu susunan elektron yang mungkin untuk atom X dan atom Y

(ii) State the type of chemical bond in XY and explain how the bond is formed between atom X and atom Y.
Nyatakan jenis ikatan kimia dalam XY dan terangkan bagaimana ikatan terbentuk antara atom X dan atom Y.

[7 marks]

(c) Describe one laboratory experiment to investigate the electrical conductivity of compound **Q**. Your answer should include the following:

- A list of material and apparatus
- Procedure of the experiment
- Observation of the experiment
- A labeled diagram showing the apparatus set-up

Huraikan satu eksperimen dalam makmal untuk mengkaji kekonduksian elektrik sebatian Q.
Jawapan anda harus mengandungi yang berikut :

- *Senarai radas dan bahan*
- *Prosedur eksperimen*
- *Pemerhatian*
- *Rajah berlabel menunjukkan susunan radas.*

[9 *marks*]

8 (a) Table 8 shows the atomic radius and melting points a part of group 18 elements.
Jadual 8 menunjukkan jejari atom dan takat lebur sebahagian unsur kumpulan 18.

Group 18 Elements ***Unsur Kumpulan 18***	**Physical Properties** ***Sifat Fizik***	
	Atomic radius/ nm ***Jejari atom / nm***	**Melting Point / ^{o}C** ***Takat Lebur /^{o}C***
Helium *Helium*	0.050	-270
Neon *Neon*	0.070	-248
Argon *Argon*	0.094	-189
Krypton *Krypton*	0.109	-156

Table 8 / *Rajah 8*

(i) By referring to the table, describe trend of change in physical properties of the Group 18 elements as we down the group in the Periodic Table.
Dengan merujuk kepada jadual ini, huraikan pola perubahan sifat fizik unsur-unsur Kumpulan 18 apabila menuruni kumpulan ini dalam Jadual Berkala.

[6 marks]

(ii) Which element is used to fill electric bulbs?
Explain why this element does not react with hot tungsten filament?
Unsur yang manakah digunakan untuk mengisi mentol lampu?
Terangkan mengapakah unsur ini tidak bertindak balas dengan dawai tungsten filamen yang panas?

[3*marks*]

(b)

Group 1 elements react with water to produce alkaline solution.

Unsur Kumpulan 1 bertindak balas dengan air membentuk larutan beralkali

Using an example of Group 1 element, describe an experiment to prove above statement.
Your description should include the following :

- List of material and apparatus
- Procedures of the experiment
- Observation
- Chemical equation

Menggunakan contoh unsur Kumpulan 1, huraikan eksperimen untuk membuktikan pernyataan di atas.
Huraian anda harus mengandungi yang berikut:

- *Radas dan bahan*
- *Prosedur eksperimen*
- *Pemerhatian*
- *Persamaan kimia*

[11*marks*]

SECTION A

1 Table 1 shows the apparatus set-up, description and observation for experiment I and II.
Jadual 1 menunjukkan susunan radas, penerangan dan pemerhatian bagi eksperimen I dan II.

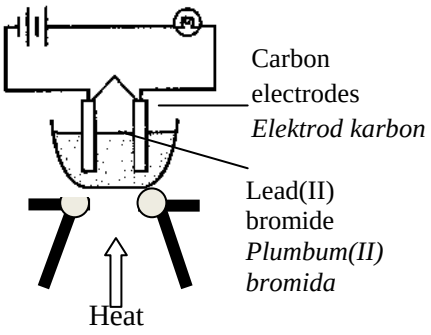
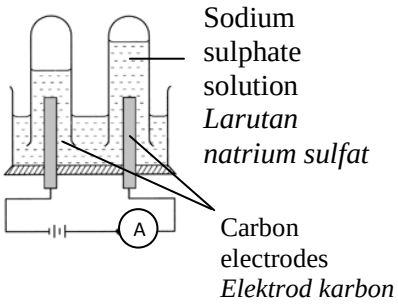
Experiment	I	II
Apparatus Set-up *Susunan radas*		
Description *Huraian*	Electrolysis of molten lead(II) bromide using carbon electrodes *Elektrolisis leburan plumbum(II) bromida menggunakan elektrod karbon*	Electrolysis of 1.0 mol dm^{-3} sodium sulphate solution using carbon electrodes *Elektrolsis* 1.0 mol dm^{-3} *larutan natrium sulfat menggunakan elektrod karbon*
Observation *Pemerhatian*	Grey solid is formed at the cathode *Pepejal kelabu terenap di katod*	Gas bubbles are released at the anode and cathode *Gelembung –gelembung gas dibebaskan di anod dan di katod*

Table 1/*Jadual 1*

(a) State all the ions present in
Nyatakan semua ion yang hadir dalam

(i) Molten lead(II) bromide
Leburan plumbum(II) bromide

……

(ii) Sodium sulphate solution
Larutan natrium sulfat

……

[2 marks]

(b) Based on experiment I:
Berdasarkan eksperimen I:

(i) Name the grey solid produced
Namakan pepejal kelabu yang terhasil.

……..

[1 mark]

(ii) Write the half-equation for the formation of grey solid.
Tuliskan persamaan setengah bagi pembentukan pepejal kelabu.

……

[1 mark]

(iii) State the observation at anode.
Nyatakan pemerhatian di anod.

……..

[1 mark]

(c) Based on experiment II:
Berdasarkan eksperimen II:

(i) Name the ion that is discharged at anode.
Namakan ion yang dinyahcaskan di anod.

……..

[1 mark]

(ii) Name the product formed at
Namakan hasil tindak balas yang terbentuk di

Anode : ……..
Anod:

Cathode : ……
Katod :

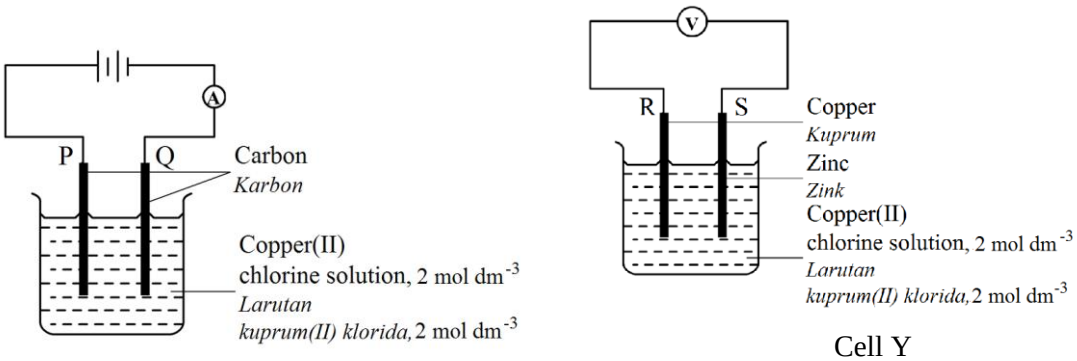
[2 marks]

(iii) Name another solution that will give the same products of electrolysis as in experiment II.
Namakan larutan lain yang boleh memberikan hasil yang sama seperti di eksperimen II.

……..……..

[1 mark]

2 Diagram 2 shows two types of cell.
Rajah 2 menunjukkan dua jenis sel.



Cell X/
Sel X

Cell Y
Sel Y

Diagram 2/*Rajah 2*

(a) State the name of cell X and cell Y.
Nyatakan nama bagi sel X dan sel Y.

Cell X:
Sel X: ……..……

Cell Y:
Sel Y: ……

[2 marks]

(b) Write the formulae of all anions present in copper(II) chloride solution.
Tuliskan formula bagi semua anion yang wujud dalam larutan kuprum(II) klorida.

……..……

[1 mark]

(c) Based on the cell X,

Berdasarkan sel X,

(i) State the observation at carbon electrode Q.
Nyatakan pemerhatian pada elektrod karbon Q.

……..……

[1 mark]

(ii) Write a half equation for the reaction that occurs at the carbon electrode Q.
Tulis satu persamaan setengah bagi tindak balas yang berlaku pada elektrod karbon Q.

……..……

[1 mark]

(iii) If copper(II) sulphate solution 2 mol dm^{-3} is replaced by copper(II) sulphate solution 0.001 mol dm^{-3}.
State the product formed at carbon electrode P.
Jika larutan kuprum(II) sulfat 2 mol dm^{-3} digantikan oleh larutan kuprum(II) sulfat 0.001 mol dm^{-3}.
Nyatakan hasil yang terbentuk pada elektrod karbon P.

……..……

[1 mark]

(d) Based on the cell Y,
Berdasarkan sel Y,

(i) Draw arrows (→) to show the direction of the electron flow.
Lukiskan panah (→) untuk menunjukkan arah aliran elektron.

[1 mark]

(ii) Which electrode act as negative terminals?
Elektrod manakah yang bertindak sebagai terminal negatif?

……..……

[1 mark]

(iii) If the zinc S is replaced by magnesium strip, the voltmeter reading increases.
State **one** reason.
Jika zink S digantikan dengan jalur magnesium, bacaan voltmeter bertambah.
*Nyatakan **satu** sebab.*

……..……

[1 mark]

(e) Compare the intensity of blue colour of copper(II) chloride solution after a few minutes in both cells.
Explain your answer.
Bandingkan keamatan warna biru larutan kuprum(II) klorida selepas beberapa minit dalam kedua-dua sel.
Terangkan jawapan anda.

……

……

[2 marks]

SECTION B

3 Diagram 3.1 shows the apparatus set-up for the electrolysis of copper(II) sulphate solution using carbon electrode and electrode Q. After 60 minutes, there are changes at both electrodes.
Rajah 3.1 menunjukkan susunan radas bagi elektrolisis larutan kuprum(II) sulfat dengan menggunakan elektrod karbon dan elektrod Q. Selepas 60 minit, terdapat perubahan pada kedua-dua elektrod.

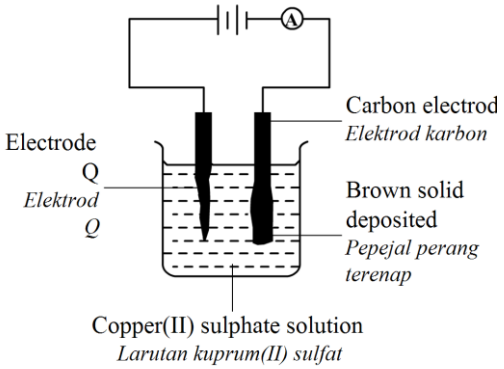


Diagram 3.1/ *Rajah 3.1*

(a) Based on Diagram 3.1, state the factor that determine the product at electrode Q and carbon electrode.
Berdasarkan Rajah 3.1, nyatakan faktor yang menentukan hasil pada elektrod Q dan elektrod karbon.

[2 marks]

(b) Explain the reaction at electrode Q and carbon electrode. Your explanation should include:
Terangkan tindak balas pada elektrod Q dan elektrod karbon. Penerangan anda harus termasuk:

- All ions present in electrolyte
  Semua ion wujud dalam elektrolit
- Ions attracted to each electrodes
  Ion-ion yang ditarik kepada setiap elektrod
- Name the product formed at electrode Q. Explain why.
  Nama hasil tindak balas pad elektrod Q. Terangkan mengapa.
- State the ions selectively discharge at the cathode. Explain why.
  Nyatakan ion yang dinyahcas terpilih pada katod . Terangkan mengapa.
- Half equation for the reaction at each electrodes
  Persamaan setengah bagi tindak balas yang berlaku pada setiap elektrod

[10 marks*]*

If electrode Q is replaced by carbon electrode.
Jika elektrod Q digantikan oleh elektrod karbon.

(c) (i) State the observation at the anode. Give **one** reason.
*Nyatakan pemerhatian pada anod. Berikan **satu** sebab.*

[2 marks*]*

(ii) Write the half equation for the reaction at the anode.
Tuliskan persamaan setengah bagi tindak balas pada anod.

[2 marks]

(d) Diagram 3.2 shows a chemical cell.
Rajah 3.2 menunjukkan satu sel kimia.

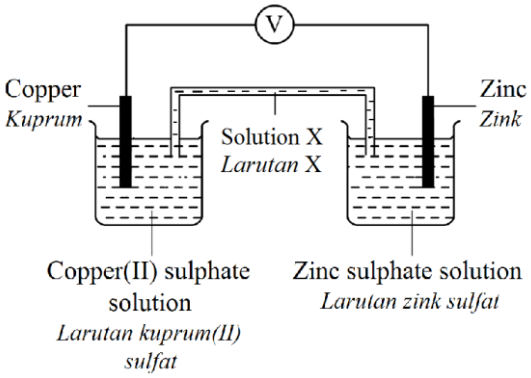


Diagram 3.2/ *Rajah 3.2*

(i) State the negative terminal of the chemical cell. Give your reason.
Nyatakan terminal negatif bagi sel kimia. Berikan sebab anda.

[2 marks*]*

(ii) Suggest **one** suitable substances that can be used as solution X and state the function.
*Cadangkan **satu** bahan yang sesuai digunakan sebagai larutan X dan nyatakan fungsinya.*

[2 marks*]*

SECTION C

4 (a) Table 4 shows the voltage of chemical cells using different pairs of metal. The negative terminal and the value of voltage for the pair of metals Y and Z is not given. X, Y and Z are not the actual symbols of the metals.
Jadual 4 menunjukkan voltan bagi sel-sel kimia yang menggunakan pasangan logam yang berlainan. Terminal negatif dan nilai voltan bagi pasangan logam Y dan Z tidak diberi. X, Y, dan Z bukan merupakan simbol sebenar logam-logam itu.

Electrode pairs ***Pasangan elektrod***	**Voltage value/ V** ***Nilai voltan/ V***	**Negative terminal** ***Terminal negatif***
X/Cu	1.90	X
X/Y	0.60	X
Z/Cu	0.70	Cu
Y/Z		

Table 4/*Jadual 4*

(i) Based on the voltage values, arrange the metals in ascending order in electrochemical series.
Berdasarkan nilai voltan, susunkan logam dalam urutan menaik dalam siri elektrokimia.

[1mark*]*

(ii) Predict the negative terminal and the voltage value for the pair of metals Y and Z. Explain your answer.
Ramalkan terminal negatif dan nilai voltan bagi pasangan logam Y dan Z. Terangkan jawapan anda.

[3 marks*]*

(b) You have iron spoon that rust easily.
Describe the experiment to electroplate the iron spoon with silver.
Your answer should include the following:

Anda mempunyai sebuah sudu besi yang mudah berkarat.
Huraikan satu eksperimen untuk menyadurkan sudu besi dengan argentum.
Jawapan anda harus termasuk yang berikut:

- Material and apparatus required
  Bahan dan radas yang diperlukan
- Procedure of the experiment
  Prosedur eksperimen
- Diagram
  Rajah
- Half equation at anode and cathode
  Persamaan setengah pada anod dan katod
- Observation
  Pemerhatian

[10 marks*]*

(c) Table 4.2 shows the result of experiment for the displacement reaction between substance S, T and U with salt solution of S, salt solution of T and salt solution of U.
Jadual 4.2 menunjukkan keputusan eksperimen bagi tindak balas penyesaran antara bahan S, T, dan U dengan larutan garam S, larutan garam T, dan larutan garam U.

	Salt solution of S ***Larutan garam S***	**Salt solution of T** ***Larutan garam T***	**Salt solution of U** ***Larutan garam U***
S		✗	✗
T	✓		✗
U	✓	✓	

✓ − Reaction occurs
Tindak balas berlaku

✗ − No change
Tiada perubahan

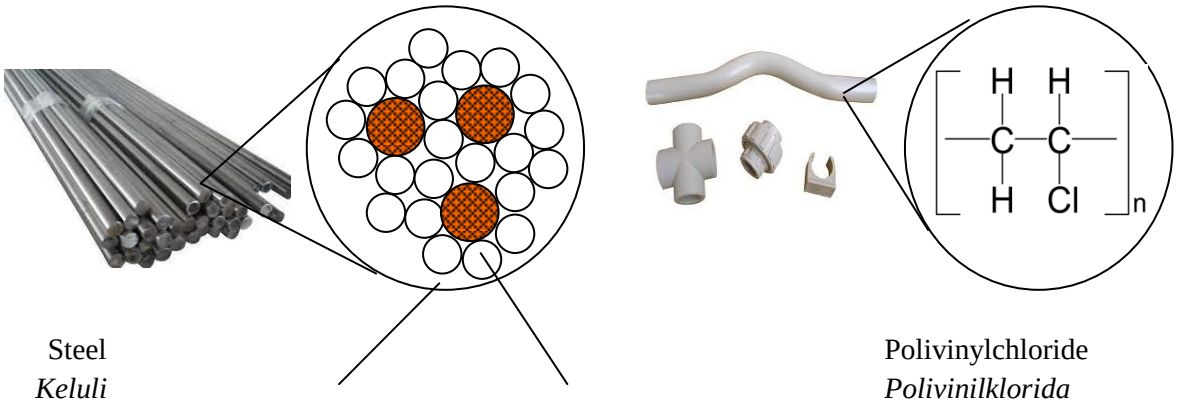
Table 4.2
Jadual 4.2

Arrange S, T and U in descending order of electropositivity. Explain your answers.
Susunkan S, T, dan U dalam urutan electropositif yang menurun. Terangkan jawapan anda.

[6 marks]
[6 markah]

SECTION A

1 Diagram 1 shows three manufactured substances in the industry.
Rajah 1 *menunjukkan tiga bahan buatan dalam industry.*



Steel
Keluli

Iron/besi

P

Polivinylchloride
Polivinilklorida

Composition
Komposisi

- Silicon dioxide
  Silikon dioksida
- Sodium oxide
  Natrium oksida
- Calcium oxide
  Kalsium oksida
- Substance **X**
  Bahan **X**

Diagram 1 / *Rajah* 1

(a) Steel is an alloy. Iron is the main element in steel.
Keluli ialah sejenis aloi. Besi ialah unsur utama dalam keluli.

(i) State the meaning of alloy.
Nyatakan maksud aloi.

……

[1 mark / 1 *markah*]

(ii) Element P is added to iron to produce steel. What is element P?
Unsur P *ditambahkan kepada besi untuk menghasilkan keluli. Apakah unsur* P?

……

[1 mark / 1 *markah*]

(iii) Compare the hardness between pure iron and steel.
Bandingkan kekerasan antara besi tulen dengan keluli.

……

[1 mark / 1 *markah*]

(iv) Explain your answer in (a)(iii)/*Terangkan jawapan anda di (a)(iii)*

……

[1 mark / 1 *markah*]

(b) Polyvinyl chloride is produced when its monomers link together to form a molecule with a very long chain.
Polivinil klorida terhasil apabila monomernya bersambung antara satu sama lain untuk Membentuk suatu molekul yang berantai panjang.

(i) State the name of process that produces polyvinyl chloride.
Nyatakan namabagi proses yang menghasilkan polivinilklorida.

……**.....**

[1 mark / 1 *markah*]

(ii) Draw the structure formula of the monomer of polyvinyl chloride
Lukiskan formula struktur bagi monomer polivinil klorida

[1 mark / 1 *markah*]

(iii) Polyvinyl chloride pipes are preferred in the construction of buildings compared to iron pipes. Give one reason.
Paip polivinil klorida adalah lebih digemari dalam pembinaan bangunan berbanding dengan paip besi.Berikan satu sebab.

……**.....**

[1 mark / 1 *markah*]

(c) Substance X is one of the compositions of borosilicate glass.
Bahan X *adalah salah satu komposisi bagi kaca borosilikat*.

……**.....**

[1 mark / 1 *markah*]

(i) State the name of the substance X
Nyatakan nama bagi bahan X

……**.....**

[1 mark / 1 *markah*]

(ii) State **one** of the special properties of borosilicate glass compared the others glass.
Nyatakan **satu** *sifat istimewa bagi kaca borosilikat berbanding kaca lain*.

……**.....**

[1 mark / 1 *markah*]

SECTION C

1 (a) Ammonium sulphate,$(NH_4)_2SO_4$ and urea,$(NH_2)_2CO$ are two fertilisers. Which is the better fertiliser?. Explain your answer.
Ammonium sulfat,$(NH_4)_2SO_4$ dan urea,$(NH_2)_2CO$ adalah dua contoh baja. Baja yang manakah lebih baik?.Terangkan jawapan anda
[Relative atomic mass; H=1,C=12, N=14, O=16, S=32]

[4 marks]

(b) Diagram 1 shows the arrangement of atoms in pure copper and bronze.
Rajah 1menunjukkan susunan atom dalam kuprum tulen dan gangsa.

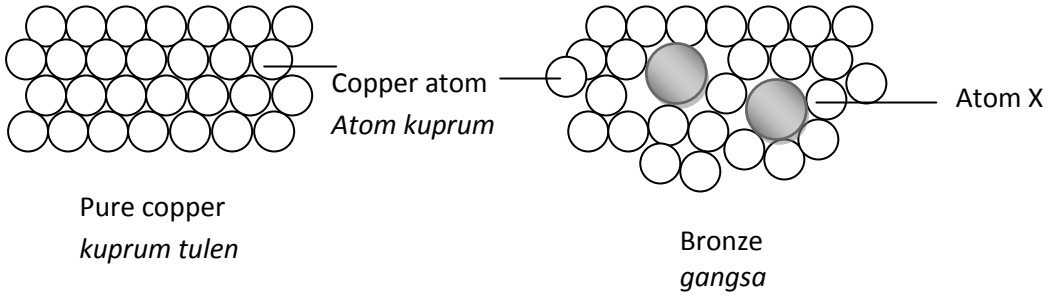


Diagram 1/*Rajah* 1

(i) Name atom X.
Namakan atom X.

[1 *mark*]

(ii) Explain why bronze is harder than pure copper.
Terangkanmengapagangsalebihkerasdaripadakuprumtulen.

[6 *marks*]

(c) You are given liquid soap, sample of hard water, sample of soft water and other materials.
Describe an experiment to investigate the effectiveness of cleaning action of the soap in different types of water. Your description must include example of hard and soft water, observation and conclusion.
Anda dibekalkan dengan cecair sabun, contoh air liat, contoh air lembut serta bahan-bahan lain. Huraikan satu eksperimen untuk menyiasat kesan pencucian sabun dalam jenis air yang berbeza.
Huraianandahendaklahmengandungicontoh air liatdan air lembut, pemerhatiandankesimpulan.

[10 *marks*]

SECTION A

1 Soap is one of the chemical used widely by consumers.
Diagram 1.1 shows the set-up of apparatus to prepare soap in the laboratory.
Sabun merupakan salah satu bahan kimia yang digunakan secara meluas oleh pengguna.
*Rajah*1.1*menunjukkan susunan radas untuk menyediakan sabun dalam makmal.*

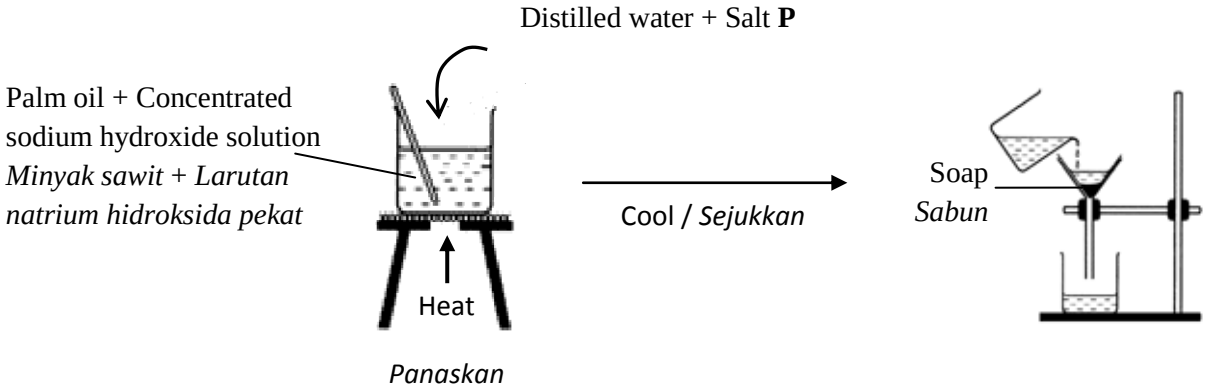


Diagram / *Rajah* 1.1

(a) State the name of salt **P**.
Nyatakan nama garam **P**.

…….....

[1 *mark*]

(b) State the purpose of adding salt **P** in the preparation of soap.
Nyatakan tujuan menambahkan garam **P** *dalam penyediaan sabun.*

…….....

[1 *mark*]

(c) Diagram 1.2 shows part of the cleaning action of soap particles on a cloth stained with grease.
Rajah 1.2 *menunjukkan sebahagian daripada tindakan pencucian oleh zarah-zarah sabun keatas kotoran bergris pada kain.*

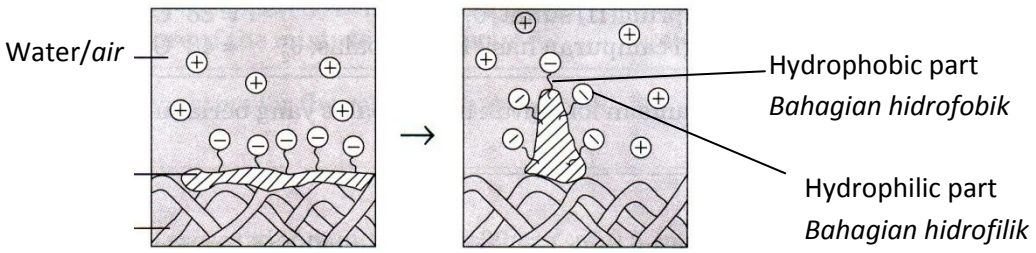


Diagram 1.2 / *Rajah* 1.2

Based on Diagram 1.2;
Berdasarkan Rajah 1.2;

(i) Which part of soap particles is soluble in the water?
Bahagian manakah daripada zarah sabun yang larut dalam air?

…….....

[1 *mark*]

(ii) Explain how the anion of soap acts on grease.
Terangkan bagaimana anion sabun bertindak keatas gris.

……

……

……

[2 *marks*]

(d) Soap is not effective in hard water.
State another cleaning agent that effective in hard water.
Explain your answer.
Sabun tidak berkesan dalam air liat.
Nyatakan agen pencuci lain yang berkesan dalam air liat.
Terangkan jawapan anda.

……

……

……

[3 *marks*]

(e) Additives are added to a detergent to enhance its cleaning efficiency and to meet the needs of consumers. Table 1 shows incomplete table for additive and its function.
Complete table 1.

Bahan tambah detergen ditambah untuk menambahkan kuasa pencucian dan memenuhi kehendak pelanggan.Jadual 1 *menunjukkan bahan tambah dan fungsinya yang tidak lengkap. Lengkapkan Jadual* 1 *itu*.

Additive ***BahanTambah dalam detergen***	**Function** ***Fungsi***
Biological enzyme *Enzim biologi*.	
	To add fragrance to both the detergent and fabrics *Untuk menambahkan keharuman detergent dan fabrik.*

Table/*Jadual* 1

[2 *marks*]

SECTION B

1(a)(i) The information below is about modern medicine.
Maklumat dibawah ialah tentang ubat moden.

- Aspirin
Aspirin
- Penicilin
Penisilin
- Paracetamol
Paracetamol
- Codeine
kodeina
- Chloropromazin
Kloropromazin
- Caffeine
Kafein

Moden medicines can be classified as analgesics , antibiotics and psychotherapeutic drugs. Construct a table to group the medicines into three different classes.
Ubat moden boleh dikelaskan sebagai analgesik , antibiotik dan ubat psikoterapeutik. Bina satu jadual untuk mengelaskan ubat itu kepada tiga kelas yang berlainan.

[4 *marks*]

(ii)Diagram 1.1 shows a conversation between Epah and Timah
Rajah 1.1 *menunjukkan perbualan antara Epah dan Timah*

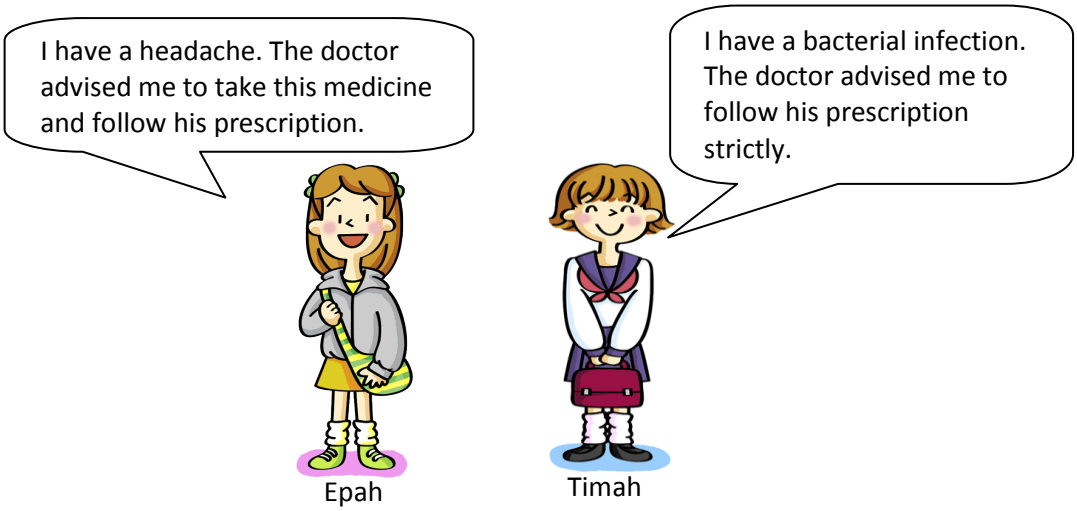


Diagram 1.1

These two students met a doctor and some medicines were prescribed to them.
For each medicine, state its name, type and the correct usage.
Kedua-dua orang murid ini berjumpa dengan doctor dan beberapa ubat telah dipreskripsi kepada mereka. Bagi setiap ubat, nyatakan nama,jenis dan cara penggunaan yang betul

[6 *marks*]

(b) Diagram 1.2 shows the apparatus used to investigate how to remove an oily stain from a cloth and observation made from that investigation.
Rajah 1.2 *menunjukkan radas yang digunakan untuk mengkaji bagaimana membersihkan kesan minyak daripada sehelai kain dan pemerhatian yang diperoleh daripada kajian itu*.

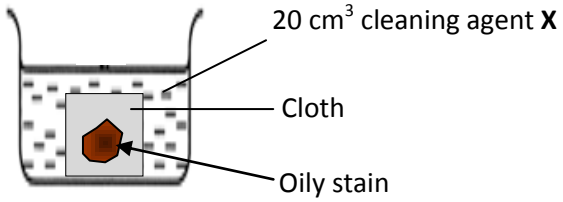
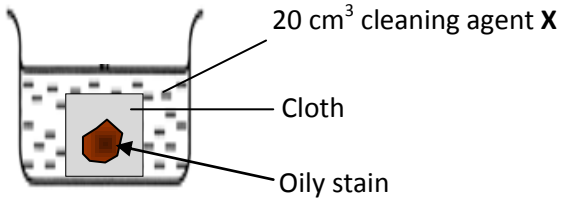
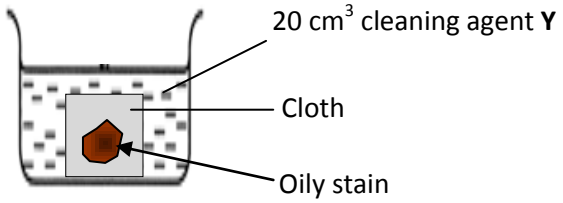
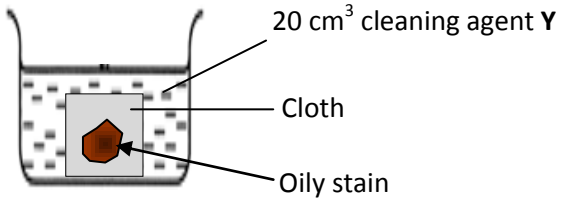
Experiment ***Eksperimen***	**Apparatus** ***Radas***	**Observation** ***Pemerhatian***
I		Oily stain is removed *Kesan minyak hilang*
II		Oily stain remains *Kesan minyak kekal*
III		Oily stain is removed *Kesan minyak hilang*
IV		Oily stain is removed *Kesan minyak hilang*

Diagram 1.2

(i) Based on the given information in Diagram 1.2, compare and explain the effectiveness of the cleaning action between :
Berdasarkan maklumat yang diberi dalam Rajah 1.2 , *banding dan terangkan keberkesanan tindakan pencucian antara :*

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

(ii)Identify the cleaning agents X and Y.
State which cleaning agent is more effective.
Kenalpasti agen pencuci X dan Y.
Nyatakan agen pencuci yang lebih berkesan.

[10 *marks*]

SECTION A

1. (a) Diagram 1.1 shows the observations in test tube I and test tube II when hydrogen chloride in tetrachloromethane and hydrogen chloride in solvent X are reacted with zinc.
Rajah 1.1 *menunjukkan pemerhatian dalam tabung uji* I *dan tabung uji* II *apabila hidrogen klorida dalam tetraklorometana dan hidrogen klorida dalam pelarut* X *bertindak balas dengan zinc.*

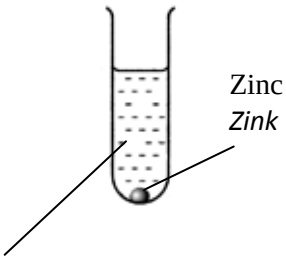
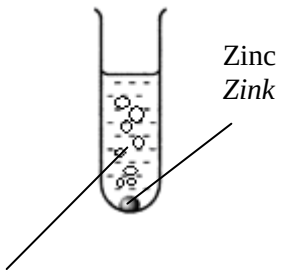
Test tube	I	II
Apparatus set-up *Susunanradas*	 Hydrogen chloride in tetrachloromethane *Hidrogenkloridadalamtetra klorometana*	 Hydrogen chloride in solvent X *Hidrogen klorida dalam pelarut* X
Observation	No change *Tiada perubahan*	Bubbles of gas are produced *Gelembung udara terbebas*

Diagram 1.1/ *Rajah* 1.1

(i) State the name of solvent X.
Nyatakan nama pelarut X.

……

[1 *mark*]

(ii) Write the formula of ion that causes an acid shows its acidic properties.
Tuliskan formula ion yang menyebabkan asid menunjukkan sifat asid.

……

[1 *mark*]

(iii) Explain the differences in observation in test tube I and II.
Terangkan perbezaan pemerhatian dalam tabung uji I *dan* II.

……

……

……

[2 *marks*]

(b) Vinegar consists of an ethanoic acid. Describe briefly a chemical test to verify the acid without using an indicator./*Cuka mengandungi asid etanoik. Huraikan secara ringkas satu ujian kimia untuk mengenal pasti asid tanpa menggunakan penunjuk.*

……

……

……

[2 *marks*]

(c) Diagram 1.2 shows standard solution of sodium hydroxide in two volumetric flasks. Volumetric flask A contain 500 $cm^3$of 1.0 mol dm^{-3} sodium hydroxide solution and volumetric flask B contain 750 cm^3 sodium hydroxide solution.
Rajah 2 *menunjukkan larutan piawai natrium hidroksida dalam dua kelalang volumetrik.Kelalang volumetrik* A *mengandungi* 500 cm^3 *larutan natrium hidroksida.*1.0 mol dm^{-3}*dan kelalang volumetrik* B *mengandungi* 700 cm^3 *larutan natrium hidroksida*.

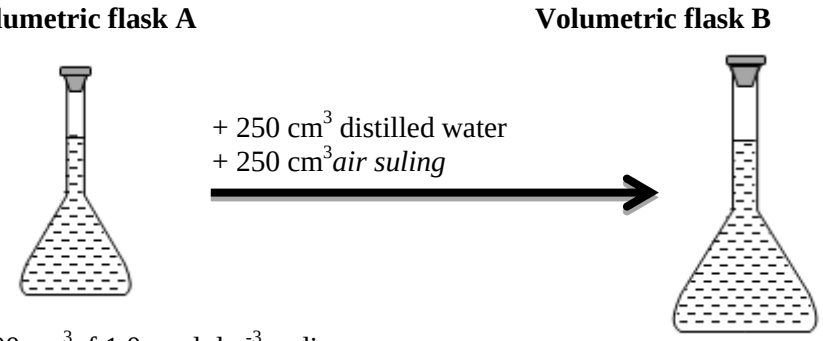


Diagram 1.2 /*Rajah 1.2*

(i) Calculate the mass of sodium hydroxide needed to prepare 500 cm^3 of 1.0 mol dm^{-3} sodium hydroxide solution in volumetric flask A.
[Relative atomic mass: H = 1; O = 16; Na = 23]
Hitung jisim natrium hidroksida yang diperlukan untuk menyediakan 500 cm^3*larutan natrium hidroksida* 1.0 mol dm^{-3} *dalam kelalang volumetrik* A.
[*Jisim atom relatif*: H = 1; O = 16; Na = 23]

[2 *marks*]

(ii) Sodium hydroxide solution in volumetric flask B is prepared using dilution method.
Calculate the concentration of sodium hydroxide solution in volumetric flask B in mol dm^{-3}.
Larutan natrium hidroksida dalam kelalang volumetrik B *disediakan melalui kaedah pencairan.Hitung kepekatan larutan natrium hidroksida dalam kelalang volumetrik* B *dalam* mol dm^{-3}.

[2*mark*]

2. Table 1 shows the concentrations and pH values of three solutions.
Jadua1menunjukkan kepekatan dan nilai pH *bagi tiga larutan.*

Solution *Larutan*	Concentration/mol dm^{-3} *Kepekatan* / mol dm^{-3}	pH value *nilai* pH
P	0.1	14.0
Q	0.1	7.0
R	0.1	3.0
S	0.1	1.0

Table 1 / *Jadual* 1

(a) (i) State the meaning of acid./*Nyatakan maksud asid.*

.....

[1 *mark*]

(ii) Name one example of solution P./*Namakan satu contoh bagi larutan P.*

…….....

[1 *mark*]

(iii) Which solution possibly can be potassium nitrate.
Antara larutan yang manakah mungkin kalium nitrat.

.....

[1*mark*]

(iv) Explain why the pH value of solution S is lower than solution R.
Terangkan mengapa nilai pH *bagi larutan S lebih rendah dari larutan R.*

.....

.....

[2 *marks*]

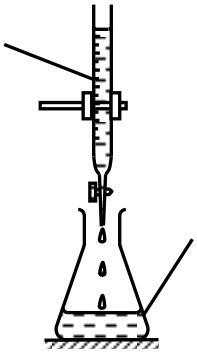
(v) State one observation when calcium carbonate powder is added until excess into solution S.
Nyatakan satu pemerhatian apabila serbuk kalsium karbonat ditambah sehingga berlebihan kedalam larutan S.

.....

[1 *mark*]

(b) Diagram 1.3 shows the apparatus set-upfor the neutralisation reaction between sulphuric acid and solution P to prepare salt X.
*Rajah 1.*3 *menunjukkan susunan radas untuk tindak balas peneutralan antara asid sulfurik dan larutan P untuk menyediakan garam* X.

20.0 cm^3 of 0.1mol dm^{-3} sulphuric acid
20.0 cm^3 *asid sulfurik* 0.1mol dm^{-3}



Solution P + phenolphthalein indicator
Larutan P+ penunjuk fenolftalein

Diagram 1.3 / *Rajah 1.*3

(i) State the colour change of the solution in the conical flask at the end point.
Nyatakan perubahan warna larutan dalam kelalang kon pada takat akhir.

……

[1 *mark*]

(ii) Write a balanced chemical equation for the above reaction.
Tuliskan persamaan kimia seimbang bagi tindak balas di atas

.....

[1 *mark*]

(iIi) Calculate the volume of solution P used./ *Isipadu larutan yang digunakan.*

[3 mark]

(iv) The experiment is repeated with 0.1 mol dm^{-3} hydrochloric acid to replace sulphuric acid. Predict the volume of hydrochloric acid needed to neutralize solution P.
Eksperimen diulang dengan menggunakan asid hidroklorik 0.1 mol dm^{-3}untuk menggantikan asid sulfurik. Ramalkan isipadu asid hidroklorik yang diperlukan untuk meneutralkan larutanP.

.....

[1 *mark*]

SECTION B

3 (a) Your brother's hand is stung by wasp.
What should you apply to his hand to relieve the pain without causing further injury? Explain why.
Tangan adik anda disengat oleh tebuan. Apakah yang harus anda sapu pada tangannya untuk mengurangkan kesakitan tanpa menyebabkan kecederaan lebih teruk?Terangkan mengapa.

[3 *marks*]

(b) A student carried out an experiment to investigate the properties of two solutions. Diagram 3.1 shows the results of the experiments
Seorang pelajar menjalankan eksperimen untuk mengkaji sifat-sifat bagi dua larutan.Rajah 3.1 menunjukkan keputusan eksperimenitu.

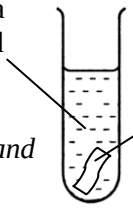
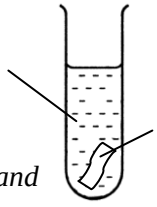
Test tube ***Tabung uji***	**X**	**Y**
Apparatus set-up *Susunan radas*	Dry ammonia gas dissolved in water *Gas ammonia keringdilarutkand alam air*  Red litmus Paper *Kertas litmus merah*	Dry ammonia gas dissolved in propanone *Gas ammonia keringdilarutkand alampropanon*  Red litmus Paper *Kertas litmus*
Observation *Pemerhatian*	The red litmus paper turned blue. *Kertas litmus merahbertukarbiru*	No change *Tiada perubahan*

Diagram 3.1/ *Rajah* 3.1

Explain the difference in observation between test tube X and test tube Y.
Terangkam perbezaan pemerhatian antara tabung uji X *dan tabung uji* Y.

[6 *marks*]

(c) Table 3 shows the concentration and pH value of sulphuric acid and nitric acid.
Jadual 3 menunjukkan kepekatan dan nilai pH bagi asid sulfurik dan asid nitrik.

Acid/*Asid*	**Concentration / mol dm^{-3}** ***Kepekatan*** **/ mol dm^{-3}**	**pH**
Sulphuric acid/*Asidsulfurik*	0.005	2.0
Nitric acid/*Asidnitrik*	0.005	2.3

Table 3 / *Jadual* 3

Compare the pH value between sulphuric acid and nitric acid. Explain why.
Bandingkan nilai pH *antara asid sulfurik dan asid nitrik. Terangkan mengapa.*

[4 *marks*]

(d) Diagram 3.2 shows the steps in preparation of potassium chloride salt.
Rajah 3.2 *menunjukkan langkah-langkah dalam penyediaan garam kalium klorida.*

STEP 1 /*LANGKAH* 1

Preparation of potassium hydroxide solution
14.0 g solid potassium hydroxide is dissolve in water to produce 250 cm^3solution
Penyediaanlarutankaliumhidroksida
14.0 g *pepejal kalim hidroksida dilarutkandalam air untukmenghasilkan*250 cm^3*larutan.*

STEP 2 / *LANGKAH* 2

Preparation of potassium chloride salt
25.0 cm^3 of potassium hydroxide solution neutralised 24.50 cm^3 of the hydrochloric acid.
Penyediaangaramkaliumklorida
25.0 cm^3*larutankaliunhidroksidameneutralkan*24.50 cm^3*asidhidrochlorik*

Diagram 3.2 / *Rajah 3.2*

Based on the information in Diagram 3.2 calculate
[Relative atomic mass: H=1, O=16, K=39, Cl=35.5]
Berdasarkanmaklumatdalam Rajah 7.2 *hitungkan*
[*Jisim atom relatif*: H=1, O=16, K=39, Cl=35.5]

(i) the concentration of potassium hydroxide solution in mol dm^{-3}.
*kepekatanlarutankaliumhidroksidadalam*mol dm^{-3}.

[2 *marks*]

(ii) the mass of potassium chloride obtained.
Jisimkalium klorida yang diperolehi.

[5 *marks*]

SECTION C

4 (a) Diagram 4.1 shows the information of acids HX and H_2X
Rajah 4.1 *menunjukkan maklumat bagi asid* HX *dan* H_2X

- Acid HX is a monoprotic acid while H_2X is a diprotic acid.
- Both acid HX and H_2X are strong acids.

- *Asid* HX *adalah asid monoprotik manakala asid* H_2X *adalah asid diprotik*
- *Kedua-dua asid* HX *dan* H_2X *adalah asid kuat*

Diagram 4.1 / *Rajah* 4.1

Referring to the information in Diagram 4.1,
Merujuk kepada maklumat dalam Rajah 4.1,

(i) suggest suitable examples of
cadangkan contoh yang sesuai bagi
- diprotic acid / *asid diprotik*
- monoprotic acid / *asid monoprotik*

(ii) based on your answer in (a)(i), explain what is meant by
berdasarkan jawapan anda di (a)(i),*terangkan apakah yang dimaksudkan dengan*
- diprotic acid / *asid diprotik*
- strong acid / *asid kuat*

[4 *marks*]

(b) Table 4.1 shows the pH value of sodium hydroxide solution and ammonia aqueous solution of the same concentration
Jadual 4.1 *menunjukkan nilai* pH *bagi larutan natrium hidroksida dan larutan berair ammonia yang berkepekatan sama.*

Alkali	Concentration / mol dm^{-3} *Kepekatan* / mol dm^{-3}	pH
Sodium hydroxide solution *Larutan natrium hidroksida*	0.1	13
Ammonia aqueous solution *Larutan berair ammonia*	0.1	10

Table 4.1 / *Jadual* 4.1

Explain why sodium hydroxide solution and ammonia aqueous solution of the same concentration have different pH value.
Terangkan mengapa larutan natrium hidroksida dan larutan berair ammonia yang berkepekatan sama mempunya inilai pH *berbeza.*

[6 *marks*]

(c) Describe how to prepare 250 cm^3 of 1.0 mol dm^{-3} potassium hydroxide starting from solid potassium hydroxide. State the size of volumetric flask used and calculate the mass of potassium hydroxide needed.
Huraikan bagaimana menyediakan 250 cm^3 larutan kalium hidroksida 1.0 mol dm^{-3} bermula dengan pepejal kalium hidroksida. Nyatakan saiz kelalang volmetrik yang digunakan dan hitungkan jisim kalsium hidroksida yang diperlukan
[Relative atomic mass: H, 1; O, 16; K, 39]
[*Jisim atom relatif* : H, 1; O, 16; K, 39]

[10 *marks*]

++END OF QUESTIONS++

SKEMA PEMARKAHAN SET PECUTAN

CHEMICAL FORMULAE AND EQUATIONS/(SECTION A)

Question No			Mak scheme http://cikguadura.wordpress.com/	Mark
1	(a)		**Molar mass** is the mass of a substance that contains one mole of the substance. Example : Molar mass of one mole of magnesium is $24gmol^{-1}$.	1
	(b)		<table><tr><td>Substance</td><td>**Molar mass / $gmol^{-1}$**</td></tr><tr><td>N_2</td><td>14x2 = 28</td></tr><tr><td>CO_2</td><td>12+2(16) = 44</td></tr><tr><td>H_2S</td><td>2(1)+ 32 = 34</td></tr><tr><td>H_2O</td><td>2(1)+16 = 18</td></tr></table>	4
	(c)		Mole of water = 0.9/ 18 = 0.05 Number of molecules = $0.05 \times 6.02 \times 10^{23}$ = 0.3×10^{23} // 3×10^{22} Mole of carbon dioxide = 2.2 / 44 = 0.05 Number of molecules = $0.05 \times 6.02 \times 10^{23}$ = 0.3×10^{23} // 3×10^{22} Number of molecule is similar	1 1 1 1 **Total 9**

No	Mak scheme	Mark
2(a)(i)	0.125 mol $0.125 \times 6.02 \times 10^{23}$ // 1.7525×10^{23} molecules	1 1
(ii)	$0.125 \times 44 = 5.5$ g	1
(b)(i)	Chemical formula that shows simplest ratio of atoms of elements/each element in a compound	1
(ii)	Mg = 2.4g , O = 1.6g	1+1
(iii)	1 : 1	1
(iv)	MgO	1
(v)	To allow oxygen enter the crucible	1
(vi)	Copper **is less reactive** towards oxygen than hydrogen, reject: electropositve	1
		Total 10

CHEMICAL FORMULAE AND EQUATIONS/(SECTION B)

No			Mak scheme	Mark
3	(a)	(i)	Al^{3+} , Pb^{4+}	1+ 1
		(ii)	Aluminium oxide Lead(IV) oxide	1 + 1
	(b)	(i)	$(CH_2O)n = 60$ $12n + 2n + 16n = 60$ $n = 2$ Molecular formula = $C_2H_4O_2$//CH_3COOH	1 1 1
		(ii)	$CaCO_3 + 2CH_3COOH \longrightarrow (CH_3COO)_2Ca + H_2O + CO_2$	2

	(c)	(i)	1.Green solid turn Black 2. Lime water becomes cloudy	1 1
		(ii)	$CuCO_3 \rightarrow CuO + CO_2$	1 + 1
		(iii)	1. 1 mol of copper(II) carbonate decomposed into 1 mol of copper(II) oxide and 1 mol of carbon dioxide 2. copper(II) carbonate is in solid state, copper(II) oxide is in solid state and carbon dioxide is in gaseous state	1 1
		(iv)	1. No. of mole for $CuCO_3$ = 12.4 / 124 = 0.1 mol 2. 1 mol of $CuCO_3$ produces 1 mol of CuO Therefor No. of mole for CuO = 0.1 mol 3. Mass of CuO = 0.1 mol X 80 g mol^{-1} = 8 g	1 1 1
		(v)	Mass of oxygen is 0.8g Simplest mol ratio : Cu : O = 3.2/64 : 0.8/16 = 1 : 1	1 1
				20

CHEMICAL FORMULAE AND EQUATIONS/(SECTION C)

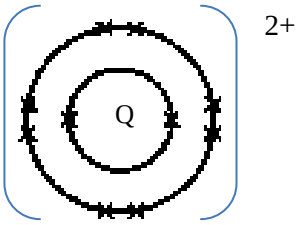
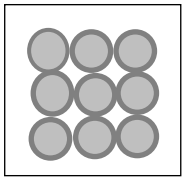
http://cikguadura.wordpress.com/

<table>
<tr><th>No.</th><th colspan="3">Mak scheme</th><th>Mark</th></tr>
<tr><td>4</td><td>(a)</td><td></td><td>1. Empirical formula is the formula that shows the simplest ratio of atoms of each element in the compound.
2. Molecular formula is the formula that shows the actual number of atoms of each element in the compound.
3. Example : empirical formula of ethene is CH_2 and the molecular formula is C_2H_4</td><td>3</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td><table><tr><td>Element</td><td>Carbon</td><td>Hydrogen</td><td>Oxygen</td></tr><tr><td>Percentage</td><td>40.00</td><td>6.66</td><td>53.33</td></tr><tr><td>Number of moles</td><td>$\frac{40}{12} = 3.33$</td><td>$\frac{6.66}{1} = 6.66$</td><td>$\frac{53.33}{16} = 3.33$</td></tr><tr><td>Ratio of moles</td><td>1</td><td>2</td><td>1</td></tr></table></td><td>3</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Empirical formula is CH_2O
$n(CH_2O) = 180$
$12n + 2n + 16n = 180$
$30n = 180$
$n=6$
molecular formula = $C_6H_{12}O_6$</td><td>2</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>Magnesium is more reactive than hydrogen// because magnesium oxide does not react with hydrogen gas.</td><td>1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Lead oxide / Stanum oxide / iron oxide / copper oxide</td><td>1</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>1. Clean [5 – 15] cm magnesium ribbon with sandpaper and coil it.
2. 10. Weigh an empty crucible with its lid.
3. Place the magnesium in the crucible and weigh again.
4. Record the reading.
5. Heat the crucible very strongly without lid.
6. Open and close the lid very quickly.
7. When burning is complete stop the heating</td><td></td></tr>
</table>

			8. Let the crucible cool and then weigh it again 9. The heating, cooling and weighing process is repeated until a constant mass is recorded. Description / Mass(g) Crucible + lid Crucible + lid + Mg / Zn / Al Crucible + lid + MgO / ZnO / Al_2O_3	10
				20

THE STRUCTURE OF ATOM, PERIODIC TABLE OF ELEMENTS AND CHEMICAL BONDS(/SECTION A)

Question No			Mark scheme	Mark
1	(a)	(i)	Melting	1
		(ii)	Molecule	1
	(b)		The heat energy absorbed by the molecule/ particles is used to overcome the forces of attraction between the naphthalene molecules / particles.	1+1
	(c)		The particles move faster	1
	(d)	(i)	P : electron Q : nucleus	1
		(ii)	Electron	1
	(e)	(i)	W and X	1
		(ii)	The atoms/Atoms Wand X have different number of neutrons but same number of protons // have different nucleon number but same proton number	1+1
				10

2	(a)	(i)	Total number of proton and number of neutron in the nucleus of an atom.	1
		(ii)	18	1
		(iii)		1+1
		(iv)	19	1
	(b)		$T_1{}^{O}C$	1
	(c)	(i)	liquid	1
		(ii)	solid	1
	(d)		Heat loss to the surrounding is exactly balanced by the heat released as the molecules /particles attract one another to form a solid.	1+1
	(e)			1
				11

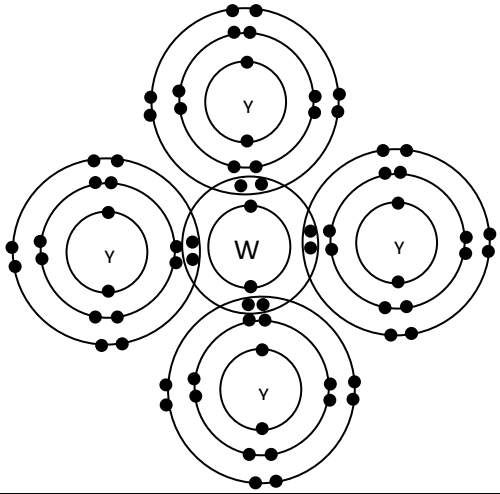
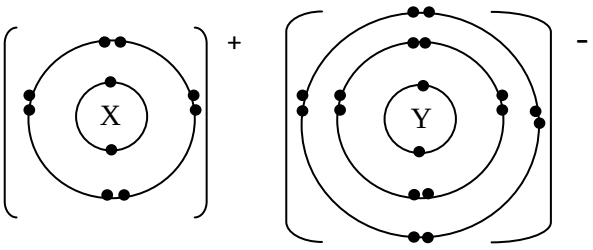
3	(a)		2.1	1
	(b)		Group 17, period 2	1
	(c)	(i)	C	1
		(ii)	Atom C has achieved stable octet electron arrangement / valence electron 8 Atom C cannot release, receive or share electron with other atoms.	1+1
	(d)		HOB	1
	(e)		B and E Atoms B and E have same number of valence electron / 7 Located in the same group / 17 OR A and D Atoms A and D have same number of valence electron / 1 Located in the same group / 1	1 1
	(f)	(i)	D is more reactive than A 1. number of proton of atom D is bigger than atom A // atomic size of atom D is bigger than atom A // number of occupied shell with electron of atom D bigger than atom A 2. forces of attraction between nucleus and valence electrons of atom D weaker than atom A 3. Atom D is easier to release its valence electron	1
		(ii)	$2D + 2H_2O \rightarrow 2DOH + H_2$	1+1

4	(a)	(i)	Cl	1
		(ii)	He/Ne/Ar	1
		(iii)	Al	1
		(iv)	Ar is bigger than Ne and He. Number of occupied shell with electrons in argon atom is is bigger	1+1
	(b)	(i)	1- correct number of electrons in the shell 2- correct ratio of atoms, labelled nucleus and charge of ions	1+1
		(ii)	Ionic	1
		(iii)	Electrostatic force	1
		(iv)	High melting or boiling point // soluble in water // conduct electricity in molten or aqueous solution.	1
				9

THE STRUCTURE OF ATOM, PERIODIC TABLE OF ELEMENTS AND CHEMICAL BONDS/(SECTION B)

5	(a)		P : liquid Q : solid R : gas	1 1 1
	(b)	(i)	1. P can be change to Q through freezing process. 2. When the liquid cooled, the particles in liquid lose energy and move slower. 3. As temperature drops, the liquid particles continue to lose more energy until they do not have enough energy to move freely and change into solid	1 1 1
		(ii)	1. P can change to R through boiling. 2. When liquid is heated, the particles of the liquid gain kinetic energy and move faster as the temperature increase 3. The particles have enough energy to completely overcome the forces holding them together // The particles are now able to move freely and far apart, and gas is formed	1 1 1
		(iii)	1. R can be change to P through condensation process. 2. When the gas cooled, the particles in gas lose energy and move slower. 3. The movement of particles becomes slow enough for the gas to change into liquid	1 1 1

	(c)	(i)	1. Uniform scale for X-axis and Y-axis and labelled/size of graph plotted ½ of graph paper. 2. Tranfer of point 3. Smooth curve	1 1 1 1
		(ii)	1. Dotted line on the graph from the horizontal line to Y-axis at 80^oC. 2. Arrow mark freezing point at 80^oC	1 1
		(iii)	1. Heat released 2. is the same as the energy lost to the surrounding during cooling.	1 1
		(iv)	Supercooling	1
				20

Question No.			Mark Scheme	Mark
6	(a)		12 represent the nucleon number. 6 represent the proton number	1 1
	(b)	(i)	1.Atoms W and Y form covalent bond. 2. To achieve the stable **octet** electron arrangement, 3. Atom W **contributes** 4 electrons while atom Y contributes one electron for sharing. 4. Thus, atom W **shares** 4 pairs of electrons with 4 atoms of Y, 5. forming a molecule with the formula WY_4// diagram	1 1 1 1 1
				
		(ii)	1. Atom X and atom Y formed ionic bond. 2. **Atom** X has the electron arrangement 2.8.1, and **atom**Y has the electron arrangement 2.8.7. 3. To achieve a stable**octet**electron arrangement, 4.atom X donates 1 electron to form a positive ion // equation $X \longrightarrow X^+ + e$ 5. Atom Y receives an electron to form ion Y^-//equation and achieve a stable octet electron arrangement. $Y + e \longrightarrow Y^-$ 6. **Ion X^+ and ion Y^-** are pulled together by the strong electrostatic forces to form a compound with the formula XY// diagram	1 1 1 1 1 1
				

	(c)		Melting point 1. The melting point of the ionic compound/ (b)(ii) is higher than that of the covalent compound/ (b)(i) . 2. This is because in ionic compounds oppositely ions are held by stronger electrostatic forces. 3. Higher energy is needed to overcome these forces. 4. In covalent compounds, molecules are held by weaker intermolecular forces. 5. Only a small amount of heat energy is required to overcome the attractive forces. **Electrical conductivity** 6. The ionic compound/(b)(ii) conducts electricity in the molten or aqueous state whereas the covalent compound/(b)(i) does not conduct electricity. 7. This is because in the molten or aqueous state, ionic compounds consist of freely moving ions carry electrical charges. 8. Covalent compounds are made up of molecules only	 1 1 1 1 1 1 1 1
				20

THE STRUCTURE OF ATOM, PERIODIC TABLE OF ELEMENTS AND CHEMICAL BONDS/(SECTION C)

7	(a)		1. Glucose // naphthalene // *any solid covalent compound* 2. covalent 3. Intermolecular forces are weak 4. Small amount of heat energy needed to overcomes the forces	1 1 1 1

	(b)	(i)	X = 2.1 X = 2.2
			Y = 2.7 // Y = 2.6 //
			Suitable electron aranggement
				1
				1

		(ii)	1. Ionic bond 2. to achieve octet electron arrangement 3. One atom of X donates 1 electron to form ion X^+ 4. One atom of Y receives an electron to form ion Y^- 5. Ion X^+ and ion Y^- are attracted together by the strong electrostatic forces	1 1 1 1 1
	(c)		*Material and apparatus;* compound XY, Carbon electrode, cell, wire, crucible, bulb/ammeter/galvanometer *Procedure* 1. A crucible is filled half full with solid XY powder 2. Dipped two carbon electrode 3. Connect two electrode with connecting wire with bulb 4. Observed whether bulb glow 5. Heated the solid XY in the crucible 6. Observed whether bulb glow *Observation* Solid XY - bulb does not glow Molten XY - bulb glow *Diagram* *Functional diagram* *Labeled*	 1 1 1 1 1 1 1 1
				20

Question No			Mark Scheme	Mark
8	(a)	(i)	1. atomic radius increases as 2. more number of shells is needed to fill the increasing number of electrons present in the atoms. 3. melting points increases down the group. 4.atomic size increases down the group 5. attraction forces between atoms become stronger 6. more heat is needed to overcome this stronger force attraction	1 1 1 1 1 1
		(ii)	Argon 1. electron arrangement of argon atom is 2.8.8// valence electron of argon atom 8 2.Argon atom does not need to release, receive and share electrons with other atom.	1 1 1
	(c)		Name : Sodium/*any group 1 element* Material : *group 1 elements*, water, Apparatus : forceps , knife, filter paper, basin, litmus paper. [*procedure*] 3. Pour some water into the basin until half full 4. Group 1 metal is take out from paraffin oil using forceps 5. A small piece of group 1 metal is cut using a small knife 6. Oil on group 1 element is dried using a filter paper 7. The group 1 metal is placed in the basin contain water. 8. Put litmus paper into water [*observation*] 9. Color of red litmus paper turn to blue [*chemical equation]* *Sample answer* $2\ Na + 2\ H_2O \rightarrow 2NaOH + H_2$ *Chemical formulae* *Balance equation*	1 1 1 1 1 1 1 1 1 1 1

ELECTROCHEMISTRY/(BAHAGIAN A)

1(a)(i)	Lead(II) ion// Pb^{2+}, bromide ion// Br^- *Ion plumbum*(II)// Pb^{2+}, *ion bromida*// Br^-	1
(ii)	Sodium ion // Na^+, hydrogen ion// H^+, sulphate ion// SO_4^{2-}, hydroxide ion//OH^- *ion natrium // Na^+, ion hidrogen// H^+, ion sulfat // SO_4^{2-}, ion hidroksida //OH^-*	1
(b)(i)	Lead / *Plumbum*	1
(ii)	$Pb^{2+} + 2e \rightarrow Pb$	1
(iii)	Brown gas / *Gas berwarna perang*	1
(c)(i)	hydroxide ion / *ion hidroksida*	1
(ii)	Anode : Oxygen gas *anod* : *Gas oksigen* Cathode : hydrogen gas *Katod* : *gas hidrogen*	1 1
(iii)	Sodium nitrate solution // sulphuric acid *Larutan natrium nitrat // asid sulfurik* (Any suitable electrolyte)	 1
		9

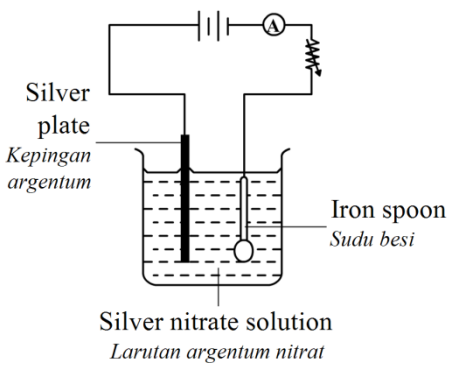
2	(a)	Cell X: Electrolytic cell Cell Y: voltaic cell/ chemical cell	1 1
	(b)	Cl^- and OH^-	1
	(c)	(i) Brown solid deposited (ii) $Cu^{2+} + 2e \rightarrow Cu$ (iii) Oxygen gas	1 1 1
	(d)	(i) → from zinc to **copper through external circuit** (ii) Zinc (iii) Distance between Mg and Cu further than Zn and Cu in the electrochemical series	1 1 1
	(e)	Intensity of blue colour decreases Concentration of Cu^{2+} ion in the solution in both cell decreases	1 1

ELECTROCHEMISTRY/(BAHAGIAN B)

3	(a)	Electrode Q: Type of electrode Carbon electrode : Position of ions in electrochemical series	1 1
	(b)	Ions presents in the electrolytes are Cu^{2+}, H^+, SO_4^{2-} and OH^- SO_4^{2-} and OH^- ions are attracted to anode; Cu^{2+} and H^+ ions are attracted to the cathode Copper(II) ions form at the anode because anode is copper and the electrolyte is copper(II) sulphate// The factor is type of electrode At the cathode, Cu^{2+} ions are selectively discharged because the position of Cu^{2+} is lower than H^+ in electrochemical series At electrode Q (anode), $Cu \rightarrow Cu^{2+} + 2e$ At the cathode, $Cu^{2+} + 2e \rightarrow Cu$	1+1 1+1 1 1 1+1 1 1
	(c)	(i) Gas bubble is released. OH^- is selectively discharged because the position of OH^- is lower than SO_4^2 in electrochemical series to form colourless gas, O_2 (ii) $4OH^- \rightarrow 2H_2O + O_2 + 4e$	1 1
	(d)	(i) Negative terminal: Zinc electrode Reason: The position of zinc is higher than copper in the electrochemical series, zinc is easier to release electrons (ii) Suitable substance is potassium chloride solution The function of salt bridge is to allow the flow of ions and to complete the circuit.	1 1 1 1

ELECTROCHEMISTRY/(BAHAGIAN C)

4	(a)	(i) Cu, Y, X (ii) Negative terminal is Y Because Y is more electropositive than Z/ above Z in electrochemical series Voltage value is 2.00 V	1 1 1 1
	(b)	Material dan apparatus required: Iron spoon, silver plate, silver nitrate solution, sandpaper Procedure: 1. Iron spoon is cleaned with sandpaper. 2. Iron spoon is then connected to the negative terminal of the battery and silver plate is conn positive terminal. 3. Both are immersed into silver nitrate solution. 4. Turn on the switch.	1 1 1 1 1

		Diagram:  Half equation at anode: $Ag \rightarrow Ag^+ + e$ Half equation at cathode: $Ag^+ + e \rightarrow Ag$ Observation: 1. At anode: Silver plate become thinner 2. At cathode: Iron spoon is coated with shiny grey solid	1 1 1 1 1 1 Max10
	(c)	U, T, S More electropositive metal can displace less electropositive metal from its salt solution U is the most electropositive because it can displace T and S U is above T and S in the electrochemical series T is more electropositive than S because T can displace S T is above S in the electrochemical series	1 1 1 1 1 1

MANUFACTURED SUBSTANCE IN INDUSTRY/(BAHAGIAN A)

1(a) (i) Alloy is a mixture of two or more elements with certain fixed composition in which the major component is a metal. 1

(ii) Carbon 1

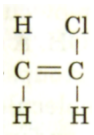
(iii) Steel is harder than pure iron 1

(iv) Carbon atoms disrupts the orderly arrangement of pure iron 1

Reduce layer of iron atom from sliding over one another easily when force is applied 1

(b)(i) Polymerisation 1

(ii)



1

(iii) does not corrode/ rust 1

(c)(i) Boron oxide 1

(ii) Can withstand wide range of temperature changes 1

10

MANUFACTURED SUBSTANCE IN INDUSTRY/(BAHAGIAN C)

1	(a)	1-Relative molecular mass $(NH_4)_2SO_4$: 2[14+4]+32+4(16)//132 2- Relative molecular mass $(NH_2)_2CO$: 2[14+2]+12+16//60 3- % of N in $(NH_4)_2SO_4$: 28/132 x100 //21.2% % of N in: $(NH_2)_2CO$:28/60 x100 //46.7% 4- Urea is a better fertiliser	1 1 1 1	4

	(b)	1- X is tin In pure copper, 2-atoms are of the same size 3-atoms are orderly arranged in layers 4-the layers of atoms can slide over each one another when a force is apply In bronze, 5-atoms of tin and copper are different size 6-the presence of tin atoms disrupt the orderly arrangement of the copper atoms. 7.The layers of copper atoms are reduced from sliding over each other easily.	1 1 1 1 1 1 1	 max 6
	(c)	1- soft water: rain water 2- Hard water : well water 3- 20 cm^3 of the soap is poured into 500 cm^3 of rain water and stired. 4- Oily stain cloth is put 5- The cloth is washed 6- oily stain is removed 7- Experiment is repeated with hard water 8- using same volume of soap and water. 9- oily stain remain 10- soft water is more effectiveness	1 1 1 1 1 1 1 1 1	 10
		Total		**20**

CHEMICAL FOR CONSUMERS/(BAHAGIAN A)

1 (a)	sodium chloride	1
(b)	lower the solubility of soap in water	1
(c)(i)	hydrophilic part	1
(ii)	hydrophilic part is soluble in water , hydrophobic part is soluble in the grease	1
	reduces the surface tension of water	1
(d) Detergent		1
	Hard water contain calcium ion and magnesium ion	1
	Calcium ion/magnesium ion react with soap to form insoluble Precipitate/scum // detergent do not form scum with hard water	1
(e)To remove protein stains such blood		1
	Fragrance	1
		10

1(a)(i)

Analgesic	Antibiotic	Psychotherapeutic
Aspirin Paracetamol Codeine	Penicilin	Chloropromazin Caffeine

Tajuk betul 1

Betul mengikut kelas 1+1+1…4

(ii)

Student	Name of medicine	Type of medicine	Correct usage
Aida	Paracetamol // Aspirin	Analgesic	Proper dosage// Taken after food// Taken with doctor's prescription
Mei Ling	penicilin // streptomycin	Antibiotic	Complete course// Proper dosage// Taken after food// Taken with doctor's prescription

1+1+1+1+1+1…..6

(b) (i)Experiment **I** and **III**

1. Soft water does not contain magnesium, Mg^{2+} ions and calcium ion 1
2. Both cleaning agent X and Y disolve in soft water // o not form scum in in soft water. 1
3. Cleaning action in Experiment I (cleaning agent X) is as effective as cleaning action in Experiment III (cleaning agent Y) in soft water 1

Experiment II and IV

4. Hard water contains magnesium, Mg^{2+} ions and calcium, Ca^{2+} ions. 1
5. Cleaning agent X reacts with the Mg^{2+} ions/ Ca^{2+} ions to form insoluble salts // Cleaning agent X forms scum in hard water. 1
6. Cleaning agent Y react with the Mg^{2+} ions/ Ca^{2+} to form soluble salts // Cleaning agent Y does not form scum in hard water. 1
7. Cleaning action in Experiment II (cleaning agent X) is as less effective than cleaning action in Experiment IV (cleaning agent Y) 1

(ii) Cleaning agent X is soap 1

Cleaning agent Y is detergent 1

Cleaning agent Y is more effective than cleaning agent X 1..10.

1	(a)	(i)	Water	1
		(ii)	H^+	1
		(iii)	Test tube I : HCl exist as molecule / No H^+ ion Test tube II : HCl ionise to produces H^+ ion	1 1
	(b)		Add magnesium // calcium carbonate //[*suitable metal//metal carbonate*] Bubble gas release	1 1
	(c)	(i)	1. Mole of NaOH 2. Mass of NaOH with correct unit Mole NaOH = $\frac{1.0 \times 500}{1000}$ // 0.5 mol Mass NaOH = 0.5 x 40 g // 20.0 g	1 1
		(ii)	1.0 x 500 = M x 750 =0.67mol dm^{-3}	1 1
			TOTAL	**10**

2	(a)	(i)	Substance that ionize / dissociate in water to produce H^+ ion	1
		(ii)	Sodium hydroxide//potassium hydroxide	1
		(iii)	Q	1
		(iv)	1. Concentration of H^+ ion in solution S is higher than solution R 2. The higher the concentration of H^+ ion the lower the pH value	1 1
		(v)	Effervescence // colourless bubble gas released and limewater turn chalky when gas released	1+1
	(b)	(i)	Pink to colourless	1
		(ii)	$H_2SO_4 + 2KOH \rightarrow K_2SO_4 + 2H_2O$	1
		(iii)	1. Mole of H_2SO_4 2. Mole ratio 3. Volume of solution P Mole HNO_3 = $\frac{0.1 \times 20}{1000}$ // 0.002 1 mole H_2SO_4 reacts with 2 mole P 0.002 mole H_2SO_4 reacts with 0.004 mole P Volume P = $\frac{0.004 \times 1000}{0.1}$ // 40 cm^3	1 1 1
		(iv)	40 cm^3	1

ACID AND BASES/(BAHAGIAN B)

3 (a)	1. Vinegar 2. Wasp sting is alkali 3. Vinegar can neutralize wasp sting	1 1 1
(b)	1. Water is present in test tube X but in test tube Y there is no water. 2. Water helps ammonia to ionise // ammonia ionise in water 3. OH^- ion present 4. OH^- ion causes ammonia to show its alkaline properties 5. Without water ammonia exist as molecule // without water OH^- ion does not present 6. When OH^- ion does not present, ammonia cannot show its alkaline properties	1 1 1 1 1 1

(c)	1. Sulphuric acid is a diprotic acid but nitric acid is a monoprotic acid 2. 1 mole of sulphuric acid ionize in water to produce two moles of H^+ ion but 1 mole of nitric acid ionize in water to produce one mole of H^+ ion 3. The concentration of H^+ ion in sulphuric acid is double / higher 4. The higher the concentration of H^+ ion the lower the pH value	1 1 1 1
(d)(i)	1. Mole of KOH 2. Molarity of KOH and correct unit Mole KOH = $\frac{14.0}{56}$ // 0.25 Molarity = $\frac{0.25 \times 1000}{250}$ mol dm^{-3} // 1 mol dm^{-3}	1 1
(ii)	1. Correct formula of reactants 2. Correct formula of products 3. Mole of KOH // Substitution 4. Mole ratio 5. Answer with correct unit HCl + KOH → KCl + H_2O Mole KOH = $\frac{1 \times 25}{1000}$ // 0.025 0.025 mole KOH produce 0.025 mole KCl Mass KCl = 0.025 x 74.5 g // 1.86 g	1 1 1 1 1
	TOTAL	20

ACID AND BASES/(BAHAGIAN C)

4 (a)	1. HCl // HNO_3 2. 1 mole acid ionises in water to produce 1 mole of H^+ ion 3. H_2SO_4 4. 1 mole acid ionises in water to produce 2 moles of H^+ ion	1 1 1 1
(b)	1. Sodium hydroxide is a strong alkali 2. Ammonia is a weak alkali 3. Sodium hydroxide ionises completely in water to produce high concentration of OH^- ion 4. Ammonia ionises partially in water to produce low concentration of OH^- ion 5. Concentration of OH^- ion in sodium hydroxide is higher than in ammonia 6. The higher the concentration of OH^- ion the higher the pH value	1 1 1 1 1 1
(c)	1. Volumetric flask used is 250 cm^3 2. Mass of potassium hydroxide needed = 0.25 X 56 = 14 g 3. Weigh 14 g of KOH in a beaker 4. Add water 5. Stir until all KOH dissolve 6. Pour the solution into volumetric flask 7. Rinse beaker, glass rod and filter funnel. 8. Add water 9. when near the graduation mark, add water drop by drop until meniscus reaches the graduation mark 10. stopper the volumetric flask and shake the solution	1 1 1 1 1 1 1 1 1 1
	TOTAL	20

++END OF MARKING SCHEME++

KEMENTERIAN PENDIDIKAN MALAYSIA

BAHAGIAN PENGURUSAN SEKOLAH BERASRAMA PENUH DAN SEKOLAH KECEMERLANGAN

2014

MODUL X - APLUS KIMIA

http://cikguadura.wordpress.com/

Nama : .....

Sekolah:.....

Kelas :.....

PANEL PENYEDIA DAN PEMURNI:

Pn. Wan Noor Afifah Binti Wan Yusoff (Ketua)	SBPI GOMBAK
Pn. Norini Binti Jaafar	SEKOLAH SULTAN ALAM SHAH
Pn. Aishah Peong Binti Abdullah	SBPI TEMERLOH
En Che Malek Bin Mamat	SBPI BATU RAKIT
Pn. Rossita Binti Radzak	SMS TUANKU MUNAWIR
Pn Noor Raini Binti Sulaiman	SMS TENGKU ABDULLAH
En Ooi Yoong Seang	SMS MUAR
Pn Masodiah Binti Mahfodz	SMS HULU SELANGOR
Cik Nurul Yusma Hanim Binti Ahmad	SMSTSSS, BUKIT MERTAJAM

BAHAGIAN B

1 (a) Your brother's hand is stung by wasp.
What should you apply to his hand to relieve the pain without causing further injury? Explain why.
Tangan adik anda disengat oleh tebuan.
Apakah yang harus anda sapu pada tangannya untuk mengurangkan kesakitan tanpa menyebabkan kecederaan lebih teruk?Terangkan mengapa.

[3 *marks*]

(b) A student carried out an experiment to investigate the properties of two solutions. Diagram 1.1 shows the results of the experiments
Seorang pelajar menjalankan eksperimen untuk mengkaji sifat-sifat bagi dua larutan.Rajah 1.1 *menunjukkan keputusan eksperimen itu.*

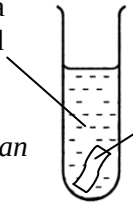
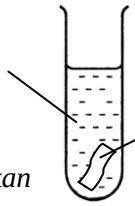
Test tube ***Tabung uji***	**X**	**Y**
Apparatus set-up *Susunan radas*	Dry ammonia gas dissolved in water *Gas ammonia kering dilarutkan dalam air*  Red litmus Paper *Kertas litmus merah*	Dry ammonia gas dissolved in propanone *Gas ammonia kering dilarutkan dalam propanon*  Red litmus Paper *Kertas litmus*
Observation *Pemerhatian*	The red litmus paper turned blue. *Kertas litmus merah bertukar biru*	No change *Tiada perubahan*

Diagram / *Rajah* 1.1

Explain the difference in observation between test tube X and test tube Y.
Terangkam perbezaan pemerhatian antara tabung uji X *dan tabung uji* Y.

[6 *marks*]

(c) Table 1 shows the concentration and pH value of sulphuric acid and nitric acid.
Jadual 1 menunjukkan kepekatan dan nilai pH bagi asid sulfurik dan asid nitrik.

Acid ***Asid***	**Concentration / mol dm^{-3}** ***Kepekatan* / mol dm^{-3}**	**pH value Nilai pH**
Sulphuric acid *Asid sulfurik*	0.005	2.0
Nitric acid *Asid nitrik*	0.005	2.3

Table / *Jadual* 1

Compare the pH value between sulphuric acid and nitric acid. Explain why.
Bandingkan nilai pH *antara asid sulfurik dan asid nitrik. Terangkan mengapa.*

[4 *marks*]

(d) Diagram 1.2 shows the steps in preparation of potassium chloride salt.
Rajah 1.2 *menunjukkan langkah-langkah dalam penyediaan garam kalium klorida.*

STEP 1 /*LANGKAH* 1
Preparation of potassium hydroxide solution
14.0 g solid potassium hydroxide is dissolve in water to produce 250 cm^3solution

Penyediaan larutan kalium hidroksida
14.0 g *pepejal kalium hidroksida dilarutkan dalam air untuk menghasilkan* 250 cm^3*larutan.*

STEP 2 / *LANGKAH* 2
Preparation of potassium chloride salt
25.0 cm^3 of potassium hydroxide solution neutralised 24.50 cm^3 of the hydrochloric acid.

Penyediaan garam kalium klorida
25.0 cm^3*larutan kalium hidroksida meneutralkan* 24.50 cm^3*asid hidrochlorik*

Diagram / *Rajah 1.2*

Based on the information in Diagram 1.2 calculate
[Relative atomic mass: H=1, O=16, K=39, Cl=35.5]
Berdasarkan maklumat dalam Rajah 7.2 *hitungkan*
[*Jisim atom relatif*: H=1, O=16, K=39, Cl=35.5]

(i) the concentration of potassium hydroxide solution in mol dm^{-3}.
kepekatan larutan kalium hidroksidadalam mol dm^{-3}.

[2 *marks*]

(ii) the mass of potassium chloride obtained.
jisim kalium klorida yang diperolehi.

[5 *marks]*

BAHAGIAN C

2 (a) Diagram 2.1 shows the information of acids HX and H_2X
Rajah 2.1 *menunjukkan maklumat bagi asid* HX *dan* H_2X

- Acid HX is a monoprotic acid while H_2X is a diprotic acid.
- Both acid HX and H_2X are strong acids.

- *Asid* HX *adalah asid monoprotik manakala asid* H_2X *adalah asid diprotik*
- *Kedua-dua asid* HX *dan* H_2X *adalah asid kuat*

Diagram 2.1 / *Rajah* 2.1

Referring to the information in Diagram 2.1,
Merujuk kepada maklumat dalam Rajah 2.1,

(i) suggest suitable examples of /*cadangkan contoh yang sesuai bagi*
- diprotic acid */ asid diprotik*
- monoprotic acid /*asid monoprotik*

(ii) based on your answer in (a)(i), explain what is meant by
berdasarkan jawapan anda di (a)(i), *terangkan apakah yang dimaksudkan dengan*

- diprotic acid / *asid diprotik*
- monoprotic acid / *asid monoprotik*

[4 *marks*]

(b) Table 2.1 shows the pH value of sodium hydroxide solution and ammonia aqueous solution of the same concentration
Jadual 2.1 *menunjukkan nilai* pH *bagi larutan natrium hidroksida dan larutan berair ammonia yang berkepekatan sama.*

Alkali	Concentration / mol dm^{-3} *Kepekatan* / mol dm^{-3}	pH value nilai pH
Sodium hydroxide solution *Larutan natrium hidroksida*	0.1	13
Ammonia aqueous solution *Larutan berair ammonia*	0.1	10

Table 2.1 / *Jadual*2.1

Explain why sodium hydroxide solution and ammonia aqueous solution of the same concentration have different pH value.
Terangkan mengapa larutan natrium hidroksida dan larutan berair ammonia yang berkepekatan sama mempunyai nilai pH *berbeza.*

[6 *marks*]

(c) Describe how to prepare 250 cm^3 of 1.0 mol dm^{-3} potassium hydroxide starting from solid potassium hydroxide. State the size of volumetric flask used and calculate the mass of potassium hydroxide needed.
Huraikan bagaimana menyediakan 250 cm^3 larutan kalium hidroksida 1.0 mol dm^{-3} bermula dengan pepejl kalium hidroksida. Nyatakan saiz kelalang volmetrik yang digunakan dan hitungkan jisim kalsium hidroksida yang diperlukan
[Relative atomic mass: H, 1; O, 16; K, 39] /[*Jisim atom relatif* : H, 1; O, 16; K, 39]

[10 *marks*]

SALTS

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BAHAGIAN A

1 Diagram 1.1 shows the steps of preparation of salt G. Excess lead(II) oxide powder is dissolved in 50 cm^3 of 1.0 mol dm^{-3} nitric acid.
Rajah 1.1 *menunjukkan langkah-langkah bagi penyediaaan garam* G. *Serbuk plumbum*(II) *oksida berlebihan dilarutkan dalam* 50 cm^3 *asid nitrik* 1.0 mol dm^{-3}.

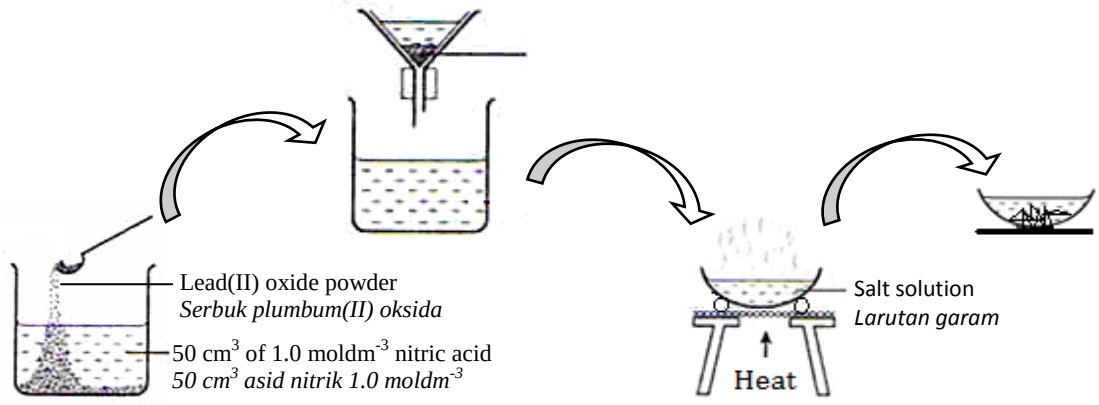


Diagram 1.1 / *Rajah1.1*

(a) What is the meaning of salt?
Apakah maksud bagi garam?

……

[1 *mark*]

(b) Write the chemical formula of salt G formed.
Tuliskan formula kimia bagi garam G *yang terbentuk.*

……..……..

[1 *mark*]

(c) Why is excess lead(II) oxide powder added to nitric acid?
Mengapakah serbuk plumbum(II) *oksida berlebihan ditambahkan kepada asid nitrik*?

……..……..

[1 *mark*]

(d) (i) Write the ionic equation for the reaction between lead(II) oxide and nitric acid.
Tuliskan persamaan ion bagi tindak balas antara plumbum(II) *oksida dan asid nitrik.*

……

[2 *marks*]

(ii) Calculate the mass of salt G formed.
[Molar mass of salt G = 331gmol^{-1}]
Hitungkan jisim bagi garam G *yang terbentuk.*
[*Jisim molar* garam G = 331gmol^{-1}]

[3 *marks*]

(e) Salt G formed contains nitrate ion. Describe a chemical test to verify the ion.
Garam G *yang terbentuk mengandungi ion nitrat.*
Huraikan satu ujian kimia untuk mengesahkan ion itu.

……..……..……

……..……..……

……..……..…

[2 *marks*]

2 Diagram 2 shows a flow chart for the qualitative analysis of salt W. The green colour of carbonate salt W is heated strongly to produce black colour of solid X and colourless gas Z.
Rajah 2 *menunjukkan carta alir analisis kualitatif bagi garam* W. *Garamkarbonat* W *yang berwarna hijau dipanaskan dengan kuat menghasilkan pepejal* X *berwarna hitam dan gas tak berwarna Z* .

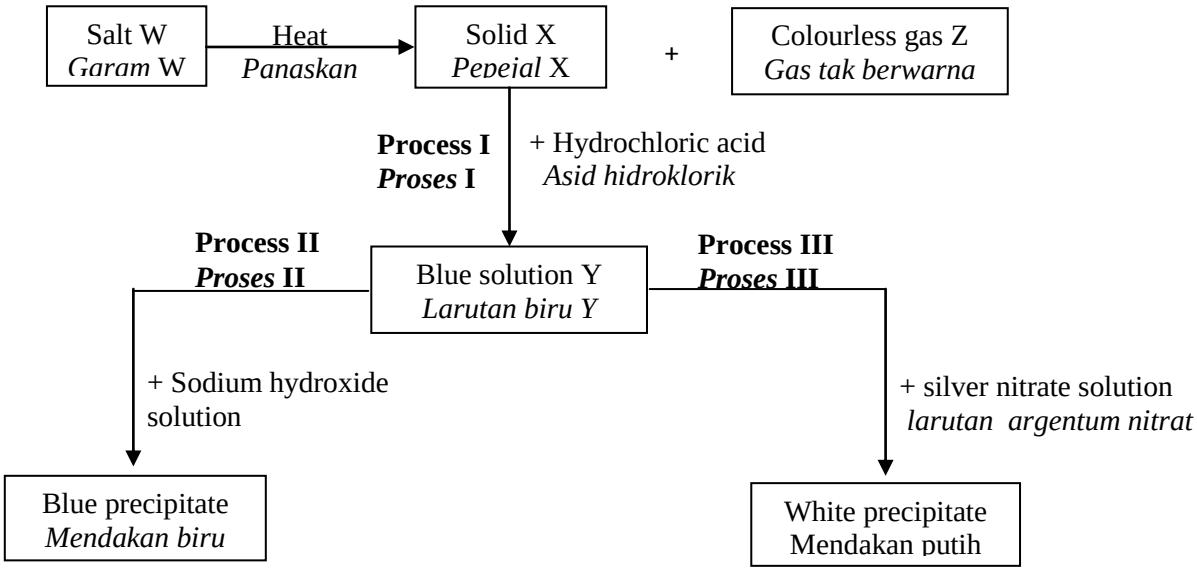


Diagram 2/*Rajah* 2

(a) Based on Diagram 5,
Berdasarkan Rajah 5,

(i) State the name of salt W and solid X.
Nyatakan nama bagi garam W *dan pepejal* X.
Salt W
Garam W:.....

Solid X
Pepejal X :.....

[2 *marks*]

(ii) Describe a chemical test to identify gas Z.
Huraikan satu ujian kimia untuk mengenal pasti gas Z.

.....

.....

[2 *marks*]

(iii) What is the name of reaction in Process I?
Apakah nama tindak balas dalam Proses I?

.....

[1 *mark*]

(iv) Write a balanced chemical equation for the reaction in Process I.
Tuliskan persamaan kimia yang seimbang bagi tindak balas dalam Proses I.

.....

[2 *marks*]

(b) Based on the observation in Process II and Process III, state the cation and anion present in solution Y.
Berdasarkan pemerhatian dalam Proses II dan Proses III, nyatakan kation dan anion yang hadir dalam larutan Y.

Cation :.....
Kation

Anion :.....
Anion

[2 *marks*]

(c) (i) Write the ionic equation for the reaction occur in Process III.
Tuliskan persamaan ion bagi tindak balas yang berlaku dalam Proses III.

.....

[1 *mark*]

(ii) What is the name of reaction occur in Process III?
Apakah nama tindak balas yang berlaku dalam Proses III*?*

.....

[1 *mark*]

BAHAGIAN B

3 (a) Diagram 3.1 shows the names for two type of salts.
Rajah 3.1 *menunjukkan nama bagi dua jenis garam.*

- Copper(II) chloride
  Kuprum(II) *klorida*
- Lead(II) chloride
  Plumbum(II) *klorida*

Diagram 3.1/*Rajah* 3.1

(i) Based on the salt given in Diagram 3.1, write the formula of an insoluble salt.
State the name of reaction to prepare insoluble salt.
Berdasarkan garam yang diberikan dalam Rajah 3.1, *tuliskan formula garam yang tak terlarutkan.*
Nyatakan nama bagi tindak balas menyediakan garam tak terlarutkan.

[2 *marks*]

(ii) State the suitable chemicals required to produce copper(II) chloride and lead(II) chloride salts.
Nyatakan bahan-bahan kimia yang sesui untuk menyediakan garam kuprum(II) *klorida dan plumbum*(II) *klorida.*

[4 *marks*]

(b) Diagram 3.2 shows reactions involving solid S. When heated, solid S decomposes to solid T, brown gas U and colourless gas W. Gas U relights glowing wooden splinter.
*Rajah*3.2 *menunjukkan tindak balas yang melibatkan pepejal* S. *Bila dipanaskan, pepejal* S *terurai kepada pepejal* T, *gas perang* U dan *gas tak berwarna* U. *Gas* W *menyalakan semula kayu uji berbara.*

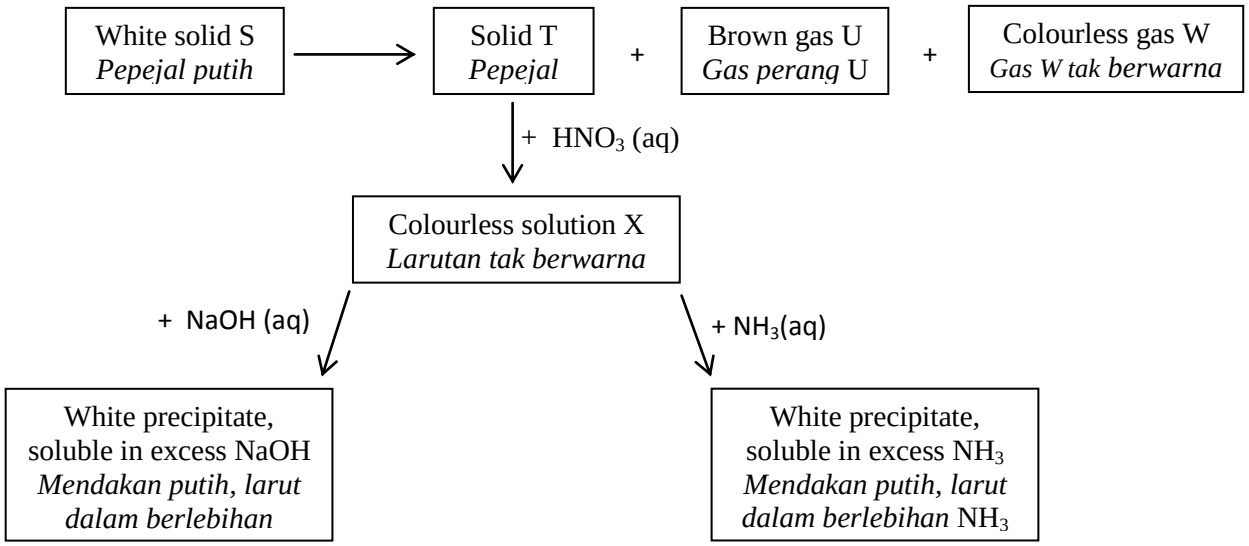


Diagram 3.2/ *Rajah*3.2

(i) Identify solid S, solid T, gas U and gas W.
Kenal pasti pepejal S, *pepejal* T, *gas* U *dan gas* W

[4*marks*]

(ii) Write the chemical equation for the heating of solid S.
Tuliskan persamaan kimia untuk pemanasan pepejal S.

[2 *marks*]

(c) A student carried out an experiment to construct an ionic equation for the formation of barium sulphate. Table 3.3 shows the height of precipitate formed when 5.0 cm^3 of 0.5 mol dm^{-3} potassium sulphate solution is added with 1.0 cm^3, 2.0 cm^3, 3.0 cm^3, 4.0 cm^3, 5.0 cm^3, 6.0 cm^3, 7.0 cm^3 and 8.0 cm^3 of 0.5 mol dm^{-3} barium chloride solution respectively in eight test tubes.
Seorang pelajar telah menjalankan satu eksperimen untuk membina persamaan ion bagi pembentukan barium sulfat. Jadual 3.3 *menunjukkan tinggi mendakan yang terbentuk apabila* 5.0cm^3*larutan kalium sulfat*0.5 mol dm^{-3}*ditambahkan dengan masing-masing* 1.0 cm^3, 2.0 cm^3, 3.0 cm^3, 4.0 cm^3, 5.0 cm^3, 6.0 cm^3, 7.0 cm^3*dan* 8.0 cm^3*larutan barium klorida dalam lapan tabung uji*.

Test tube *Tabung uji*	1	2	3	4	5	6	7	8
Volume of 0.5 mol dm^{-3} potassium sulphate solution / cm^3 *Isipadu larutan kalium sulfat* 0.5 mol dm^{-3} / cm^3	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Volume of 0.5 mol dm^{-3} barium chloride solution / cm^3 *Isipadu larutan barium klorida* 0.5 mol dm^{-3} / cm^3	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0
Height of precipitate/ cm *Tinggi mendakan*/cm	1.2	1.4	1.6	1.8	2.0	2.0	2.0	2.0

Table 3.3 / *Jadual* 3.3

(i) Based on Table 3.3, draw a graph of the height of the precipitate against volume of 1.0 mol dm^{-3} barium chloride solution.
Berdasarkan Jadual 3.3, *lukiskan graf tinggi mendakan melawan isi padu larutan barium klorida* 1 mol dm^{-3} .

[3 *marks*]

(ii) On the graph that you have drawn in a(i) , mark the minimum volume of 1.0 mol dm^{-3} barium chloride solution needed to react completely with 5.0 cm^3 of 1.0 mol dm^{-3} potassium sulphate solution.
Pada kertas graf yang telah anda lukiskan di (a) (i), *tandakan isi padu minimum larutan barium klorida* 1.0 mol dm^{-3} *yang diperlukan untuk bertindak balas lengkap dengan*5.0 cm^3*larutan kalium sulfat* 1.0 mol dm^{-3}.[1 *mark*]

(iii) Calculate the number of mole of barium ions and number of moles of sulphate ions required for the formation of barium sulphate. Then calculate the number of moles of sulphate ions that react with 1 mole of barium ion.
Hitungkan bilangan mol ion barium dan bilangan mol ion sulfat yang diperlukan untuk pembentukan barium sulfat. Kemudian hitungkan bilangan mol ion sulfat yang bertindak balas dengan 1 mol *ion barium*

[3 *marks*]

(iv) Write the ionic equation for the formation of barium sulphate
Tuliskan persamaan ion untuk pembentukan barium klorida

[1 *mark*]

BAHAGIAN C

4 (a) A farmer discovers that his vegetables are not growing well due to soil problems. By using your chemistry knowledge, state two possible causes and ways to overcome the problems by naming the chemical used.
Seorang petani mendapati sayuran yang ditanamnya tidak subur disebabkan masalah tanah. Dengan menggunakan pengetahuan kimia anda, nyatakan dua penyebab yang mungkin dan cara untuk mengatasi masalah ini dengan menamakan bahan kimia yang digunakan.

[4 *marks*]

(b) Table4 shows the information on action of heat for two lead salts, P and Q.
Jadual4menunjukkan maklumat bagi tindakan haba ke atas dua garam plumbum P dan Q,

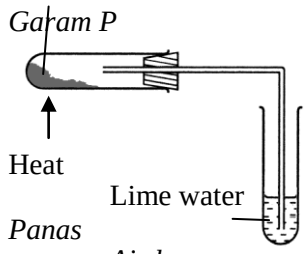
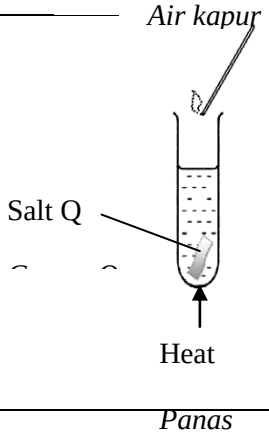
Experiment *Eksperimen*	Products *Hasil*	Observation *Pemerhatian*
Salt P *Garam P*  	Residue R *Baki R*	Brown solid when hot, yellow when cold *Pepejal perang bila panas, kuning bila sejuk*
	Gas A *Gas A*	Lime water become chalky *Air kapur menjadi keruh*
 	Residue R *Baki R*	Brown solid when hot, yellow when cold *Pepejal perang bila panas, kuning bila sejuk*
	Gas B *Gas B*	Brown gas *Gas perang*
	Gas C *Gas C*	Rekindles glowing splinder *Menyalakan kayu uji berbara*

Table 4/ *Jadual 4*

Based on Table 4, identify residue R, gas A, gas B and gas C.
Write the chemical formulae for salt P and Q.
Berdasarkan Jadual 4, kenal pasti baki R, gas A, gas B dan gas C.
Tuliska formula kimia bagi garam P dan garam Q.

[6*marks*]

(b) By using all the chemical substances given below and suitable apparatus, describe a laboratory experiment to prepare dry zinc sulphate salt.
Dengan menggunakan bahan kimia yang diberikan di bawah dan alat radas yang sesuai, huraikan satu eksperimen di makmal untuk menyediakan garam zink sulfat kering.

- zinc nitrate solution
- dilute sulphuric acid
- sodium carbonate solution
- *Larutan zink nitrat*
- *Asid sulfurik cair*
- *Larutan natrium karbonat*

bCXv aabfvcvv sabsmvvnnjkk bxxxvzbIn your description, include chemical equations involved.
Dalam huraian anda sertakan persamaan kimia yang terlibat.

[12 *marks*]

BAHAGIAN A

1 Ahmad takes part in Young Scientist Competition during Science Week at school. He carries out an experiment to investigate rate of reaction between eggs shell and ethanoic acid. The eggs shell contains calcium carbonate and chemical equation below shows the chemical reaction that occurred.

$$CaCO_3\,(s) + 2CH_3COOH\,(aq) \rightarrow (CH_3COO)_2Ca\,(aq) + CO_2\,(g) + H_2O\,(l)$$

Ahmad mengambil bahagian dalam Pertandingan Saintis Muda semasa Minggu Sains di sekolah.Dia menjalankan satu eksperimen untuk mengkaji kadar tindak balas antara kulit telur dengan asid etanoik. Kulit telur mengandungi kalsium karbonat dan persamaan kimia di bawah menunjukkan tindak balas kimia yang berlaku.

$$CaCO_3\,(p) + 2CH_3COOH\,(ak) \rightarrow (CH_3COO)_2Ca\,(ak) + CO_2\,(g) + H_2O\,(c)$$

Table 1 shows the volume of carbon dioxide gas collected at 30 second interval.
Jadual 1 menunjukkan isi padu gas kabon dioksida yang dikumpulkan pada sela masa 30 saat.

Time / s *Masa* /s	0	30	60	90	120	150	180	210
Total volume of CO_2 gas collected / cm^3 *Jumlah isipadu* gas CO_2 *dikumpul* / cm^3	0	16.00	30.00	39.00	42.50	44.00	44.00	44.00

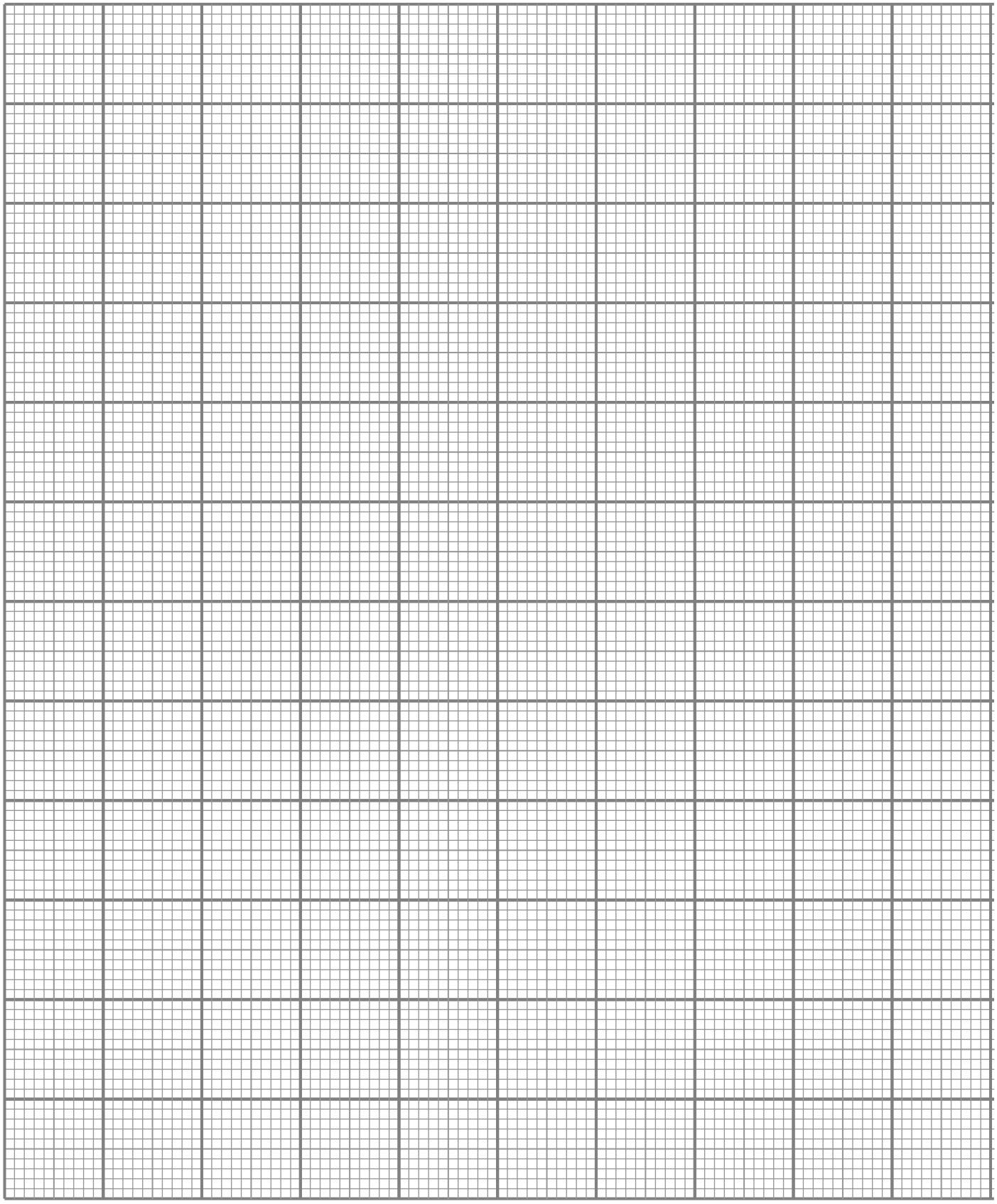
Table 1 / *Jadual* 1

(a) Draw a labelled diagram to show the apparatus set-up and materials used by Ahmad to carry out the experiment.
Lukis satu gambar rajah berlabel untuk menunjukkan susunan radas dan bahan-bahan yang digunakan oleh Ahmad untuk menjalankan experiment itu.

[2 marks]

(b) Draw a graph of volume of carbon dioxide gas collected against time.
Lukis satu graf isi padu gas karbon dioksida dikumpul melawan masa.

[4 marks]



(c) (i) Determine the rate of reaction at 90 seconds.
Tentukan kadar tindak balas pada 90 *saat.*

[2 marks]

(ii) Calculate the rate of reaction in second minutes.
Hitung kadar tindak balas dalam minit kedua.

[1 mark]

(iii) What is the overall average rate of reaction?
Apakah kadar tindak balas keseluruhan?

[1mark]

2 A student carried out three sets of experiment to investigate factors affecting the rate of reaction. Table 2 shows the information and the result of the experiment.
Seorang pelajar menjalankan tiga set eksperimen untuk mengkaji faktor-faktor yang mempengaruhi kadar tindak balas. Jadual 2 menunjukkan maklumat dan keputusan eksperimen itu.

Set	Reactants *Bahan tindak balas*	Time taken for all the magnesium to dissolve/ s *Masa yang diambil untuk semua magnesium larut*/ s
I	0.3g magnesiumribbon and 50 cm^3 of 1 $moldm^{-3}$ hydrochloric acid 0.3g *pita magnesium dan* 50 cm^3 *asid hdroklorik* 1 $moldm^{-3}$	100
II	0.3g magnesium powder and 50 cm^3 of 1 $moldm^{-3}$ hydrochloric acid 0.3g *serbuk magnesium dan* 50 cm^3 *asid hidroklorik* 1 $moldm^{-3}$	60
III	0.3g magnesium ribbon and 50 cm^3 of 1 $moldm^{-3}$ hydrochloric acid and copper(II) sulphate solution 0.3g *pita magnesium dan* 50 cm^3 *asid hidroklorik* 1 $moldm^{-3}$*dan larutan kuprum(II) sulfat*	45

Table 2 / *Jadual 2*

(a) Write a chemical equation to show the reaction between magnesium and hydrochloric acid.
Tuliskan persamaan kimia untuk menunjukkan tindak balas antara magnesium dan asid hidroklorik.

……..……

[2 marks]

(b) Calculate the number of mole of
Hitung bilangan mol bagi

(i) Magnesium
[Relative atomic mass of Mg = 24]
[*Jisim atom relatif Mg* = 24]

[1 mark]

(ii) Hydrochloric acid
Asid hidroklorik

[1 mark]

(c) Calculate the maximum volume of hydrogen gas produce at room condition.
[1 mole of gas occupies the volume of 24 dm^3 at room condition]
Hitung isi padu maksimum gas hidrogen yang dihasilkan pada keadaan bilik
[1 *mol gas menempati isi padu* 24 dm^3 *pada keadaan bilik*]

[2 marks]

(d) What is the average rate of reaction for
Apakah kadar tindak balas purata bagi

(i) Set I

[1 mark]

(ii) Set II.

[1 mark]

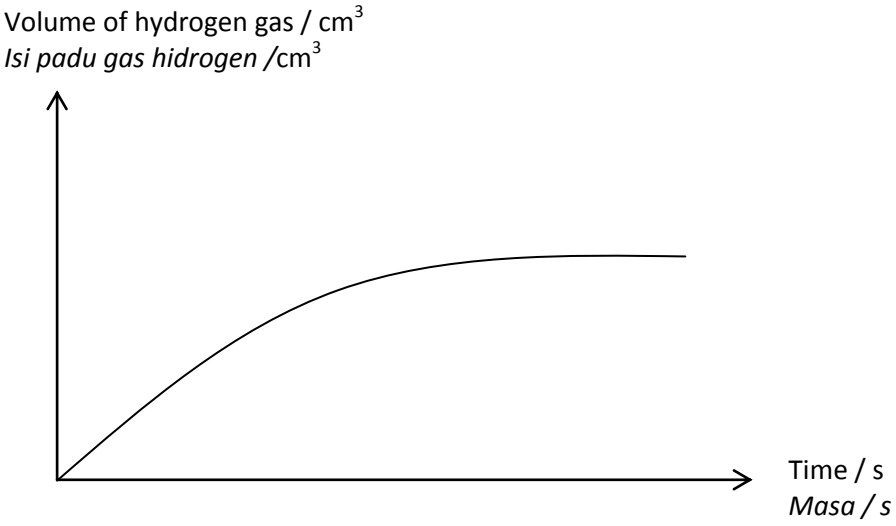
(e) State two factors that affect the rate reaction in this experiment.
Nyatakan dua faktor yang mempengaruhi kadar tindak balas dalam eksperimen itu.

……..……

……..……

[2 marks]

(f) (i) Diagram below shows the curve obtained for set I when the volume hydrogen gas liberated against time is plotted.
On the same axes, sketch the curve that you would expect to obtain if the experiment is repeated using 0.3g magnesium ribbon and 50 cm^3 of 2 $moldm^{-3}$ hydrochloric acid
Rajah di bawah menunjukkan lengkung yang diperolehi bagi Set I *apabila isi padu gas hidrogen yang di bebaskan melawan masa diplotkan.*
Pada paksi yang sama, lakarkan lengkung yang anda jangka diperolehi sekiranya eksperimen diulangi menggunakan 0.3g *pita magnesium dan* 50 cm^3 *asid hidroklorik* 2 $moldm^{-3}$



[1 mark]

(ii) Explain how you obtain the curve in (f)(i)
Terangkan bagaimana anda memperolehi lengkung di (f)(i)

……

……

……

……

[3 marks]

BAHAGIAN B

3 (a) Each year, more than 140 million tonnes of ammonia is produced around the world. Ammonia is manufactured in industries through Haber Process.
State three ways how to get the production of ammonia in a shorter time.
Setiap tahun lebih daripada 140 juta tan ammonia dihasilkan di seluruh dunia. Ammonia ini di perbuat dalam industri melalui Proses Haber.
Nyatakan tiga cara untuk mendapatkan penghasilan ammonia dalam masa yang lebih singkat.

[3 marks]

(b) Hydrogen peroxide is harmful and must be removed as soon as it is produce in the cell. Cells make the enzyme catalase to remove hydrogen peroxide. Enzyme catalase in liver can alter the decomposition of hydogen peroxide. Diagram 3 shows the apparatus set up and observation of the experiment to investigate the decomposition of hydrogen peroxide.
Hidrogen peroksida adalah merbahaya dan mesti disingkirkan sebaik sahaja ianya dihasilkan dalam sel. Sel-sel membuatkan enzim katalase menyingkirkan hidrogen peroksida. Rajah 3 menunjukkan susunan radas dan pemerhatian bagi eksperimen untuk menyiasat penguraian hidrogen peroksida.

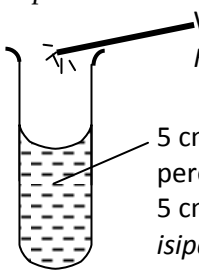
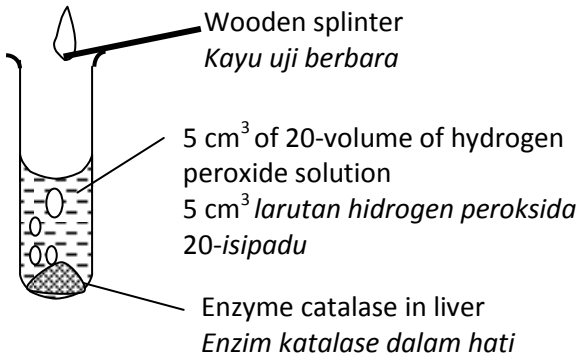
Experiment [*Eksperimen*]	Observation [*Pemerhatian*]
Experiment I *Eksperimen* I  	• The glowing splinter still glows dimly. • No effervescence occurs • *Kayu uji berbara masih berbara malap* • *Tiada pembuakan berlaku.*
Experiment II *Eksperimen II*  	• The glowing splinter relights brightly. • Effervescence occurs. • *Kayu uji berbara menyala dengan terang.* • *Pembuakan berlaku.*

Diagram 3 / *Rajah* 3

(i) Write a chemical equation to represent the decomposition of hydrogen peroxide.
Tuliskan persamaan kimia bagi penguraian hidrogen peroksida.

[1 mark]

(ii) What is the function of enzyme catalase in the experiment? Explain using collision theory how the addition of the enzyme catalase affects the rate of decomposition of hydrogen peroxide.
Apakah fungsi enzim katalase dalam eksperimen. Terangkan dengan menggunakan teori pelanggaran bagaimana penambahan enzim katalase mempengaruhi kadar penguraian hidrogen peroksida.

[5 marks]

(iii) Draw an energy profile diagram for the decomposition of hydrogen peroxide with and without the presence of enzyme catalase.
Lukis gambar rajah profil tenaga untuk penguraian hidrogen peroksida dengan kehadiran enzim katalase dan tanpa kehadiran enzim katalase.

[3 marks]

(c) A group of students carry out two experiments to investigate how a factor affects the rate of a reaction. Table 3 shows the information about the reactants and the temperature used in each experiment.
Sekumpulan pelajar menjalankan dua eksperimen untuk mengkaji faktor yang mempengaruhi kadar suatu tindak balas. Jadual 3 *menerangkan mengenai bahan tindak balas dan suhu yang digunakan dalam setiap eksperimen.*

Experiment *Eksperimen*	Reactants *Bahan tindak balas*	Temperature / ^{o}C *Suhu /*^{o}C
I	Excess zinc granule and 30 cm^3 of 0.5 mol dm^{-3} sulphuric acid *Ketulan zinc berlebihan dan* 30 cm^3*asid sulfurik* 0.5 mol dm^{-3}	30
II	Excess zinc granule and 30 cm^3 of 0.5 mol dm^{-3} sulphuric acid *Ketulan zinc berlebihan dan* 30 cm^3*asid sulfurik* 0.5 mol dm^{-3}	40

Table 3 / *Jadual* 3

(i) Sketch on the same axes, the graph of total volume of gas collected against time for the two experiments.
Lakar di atas paksi yang sama, graf bagi jumlah isi padu gas terkumpul melawan masa untuk kedua-dua eksperimen.

[3 marks]

(ii) Compare the rate of reaction between Experiments I and Eksperimen II. Explain the difference in the rate of reaction with reference to the collision theory.
Bandingkan kadar tindak balas antara Eksperimen I *danEksperimen* II. *Terangkan perbezaan kadar tindak balas ini dengan merujuk kepada teori pelanggaran.*

[5 marks]

BAHAGIAN C

4 A group of students carried out experiments to investigate the factor affecting the rate of reaction between metal P and HX acid. Table 4 shows the information of the reactants and time taken to collect 30 cm^3 of hydrogen gas.
Sekumpulan pelajar telah menjalankan eksperimen untuk mengkaji kesan faktor yang mempengaruhi kadar tindak balas antara logam P *dan asid* HX. *Jadual* 4 *menunjukkan maklumat bagi bahan tindak balas dan masa diambil untuk mengumpul* 30 cm^3 *gas hidrogen.*

Experiment ***Eksperimen***	**Reactants** ***Bahan tindak balas***	**Time taken collect 30 cm^3 of hydrogen gas (s)** ***Masa diambiluntuk mengumpul* 30 cm^3 *gas hidrogen* (s)**
I	Powdered metal P and 50 cm^3 of 1.0 mol dm^{-3} HX acid *Serbuk logam* P *dan* 50 cm^3 *asid* HX1.0 mol dm^{-3}	10
II	Powdered metal P and 100 cm^3 of 0.5 mol dm^{-3} HX acid *Serbuk logam* P *dan* 100 cm^3 *asid* HX 0.5 mol dm^{-3}	20

Table 4 / *Jadual* 4

(a) Suggest the name of metal P and HX acid
By using the named metal P and HX acid, write the chemical equation for the reaction between metal P and HX acid
Cadangkan nama logam P *dan asid* HX. Dengan menggunakan *logam* P *dan asid* HX *yang dinamakan, tulis persamaan kimia bagi tindakbalas antara logam P dan asid* HX..

[4 *marks*]

(b) Calculate the average rate of reaction for Experiment I and Experiment II.
Hitung kadar tindak balas purata bagi Eksperimen I *dan Eksperimen* II.

[2 *marks*]

(c) By using the collision theory, explain the difference in the rate of reaction between Experiment I and Experiment II.
Dengan menggunakan teori perlanggaran, terangkan perbezaan kadar tindak balas antara Eksperimen I *dan Eksperimen* II.

[5*marks*]

(d) Base on the reactants used in Experiment I, describe an experiment how the size of reactant **or** concentration affect the rate of reaction.
Berdasarkan bahan tindak balas yang digunakan dalam Eksperimen I, huraikan satu eksperimen bagaimana saiz bahan tindak ***atau*** *kepekatan mempengaruhi kadar tindak balas*.

[9*marks*]

THERMOCHEMISTRY

http://cikguadura.wordpress.com/

BAHAGIAN A

1. Diagram 1 shows the apparatus set up used in experiment to determine heat of displacement of copper by zinc.
Rajah menunjukkansusunanradas yang digunakandalameksperimenuntukmenentukanhabapenyesarankuprumolehzinc.

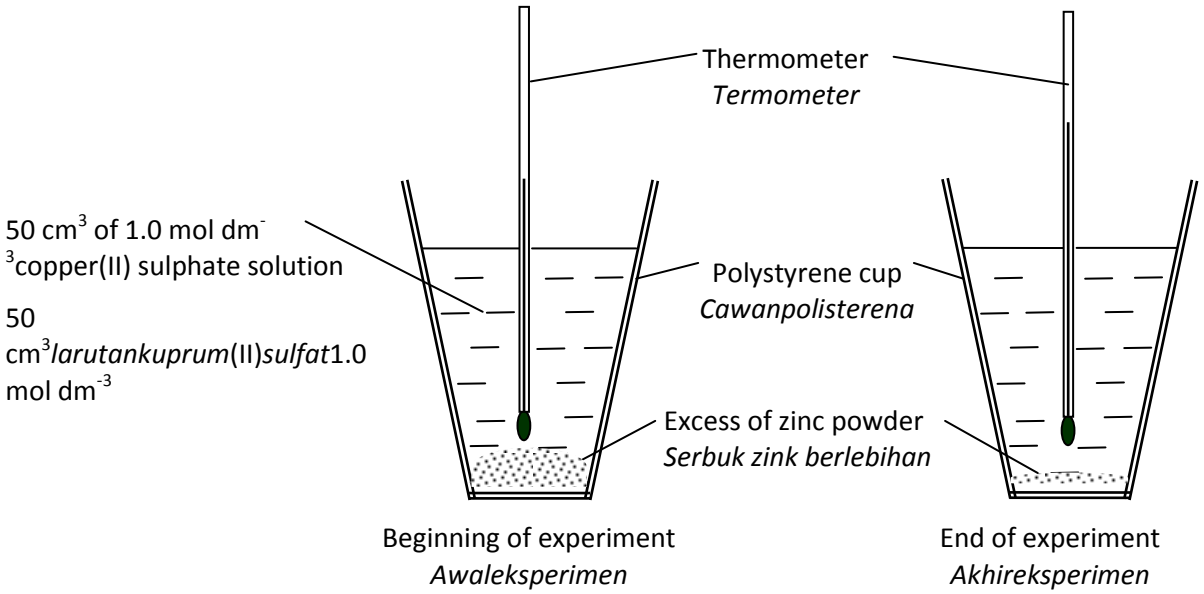


Diagram 1 / *Rajah* 1

Table 1 shows the results of this experiment.
Jadual1menunjukkankeputusaneksperimenini.

Description/*Penerangan*	**Temperature (^oC)/*Suhu*(^oC)**
Initial temperature of copper(II) sulphate solution *Suhu awal larutan kuprum*(II) *sulfat*	29 .0
Highest temperature of mixture *Suhutertinggicampuran*	35.0

Table 1 / *Jadual*1

Based on the experiment,
Berdasarkan eksperimen,

(a) What is the meaning of heat of displacement?
Apakah yang dimaksudkandenganhabapenyesaran?

.....

.....

[1*mark*]

(b) What is the colour change of copper(II) sulphate solution in this reaction ?
Apakahperubahanwarnalarutankuprum(II)*sulfatdalamtindakbalasini ?*

.....

[1*mark*]

(c) Calculate
Hitungkan

(i) The heat released during the reaction
[Specific heat capacity of solution , c = 4.2 J g^{-1o} C^{-1} ; Density of solution = 1 g cm^{-3}]
Haba yang dibebaskansemasatindak balas.
[*Muatan haba tentularutan* ,c = 4.2 J g^{-1o} C^{-1} *; Ketumpatan larutan* = 1 g cm^{-3}]

[1 *mark*]

(ii) The number of moles of copper (II) sulphate solution.
Bilangan mol larutan kuprum(II) *sulfat.*

[1*mark*]

(iii) The heat of displacement of copper by zinc
Habapenyesarankuprumolehzink

[2*marks*]

(d) Draw an energy level diagram for this reaction.
Lukis gambar rajah aras tenaga bagi tindak balas ini.

[3 *marks*]

(e) (i) What is the temperature change if the experiment is repeated using 50 cm^3 of 0.5 $moldm^{-3}$ copper(II) sulphate solution?
*Apakahperubahansuhujikaeksperimendiulangidenganmenggunakan*50 cm^3 *larutankuprum*(II) *sulfat*0.5 mol dm^{-3} ?

…….....
[1*mark*]

(ii) Explain your answer in (e)(i).
Terangkanjawapananda(e)(i).

…….....

……...
[2*marks*]

2 Diagram 2 shows the apparatus set up to determine the heat of precipitation of silver chloride.
Rajah 2 menunjukkansusunanradasuntukmenentukanhabapemendakan argentum klorida.

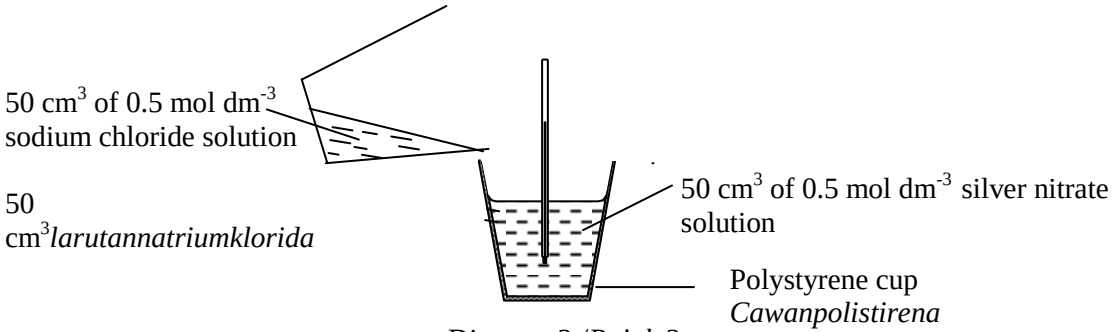


Diagram 2 /*Rajah* 2

Table 2 shows the result of the experiment.
Jadual2menunjukkankeputusaneksperimenini.

Description *Penerangan*	Temperature (^{0}C) *Suhu (^0C)*
Initial temperature of sodium chloride solution *Suhuawallarutannatriumklorida*	27.0
Initial temperature of silver nitrate solution *Suhuawallarutan argentum nitrat*	27.0
Highest temperature of the mixture *Suhumaksimumcampuran*	30.5

Table 2 / *Jadual*2

(a) What is the meaning of heat of precipitation?
Apakahmaksudhabapemendakan?

……..…….

……..…….
[1 *mark*]

(b) Why is polystyrene cup is used in this experiment?
Mengapakahbekaspolisterinadigunakandalameksperimenini?

……..…….
[1 *mark*]

(c) Write the ionic equation for the reaction
Tuliskanpersamaan ion bagitindakbalasini

……..…….

[1 *mark*]

(d) Calculate :
Hitung :

(i) The heat released during the reaction.
[Specific heat capacity of solution, c = 4.2 J $g^{-10}C^{-1}$; Density of solution = 1 gcm^{-3}]
Haba yang dibebaskansemasatindakbalas.
[*Muatanhabatentubagilarutan,* c = 4.2 J $g^{-10}C^{-1}$ *;Ketumpatanlarutan* = 1 gcm^{-3}]

[1 *mark*]

(ii) The number of moles of silver ions, Ag^+ in silver nitrate and chloride ions, Cl^- in sodium chloride solution
Bilanganmol ion argentum, Ag^+*dalamlarutan argentum nitratdan ion klorida* ,Cl^- *dalamlarutannatriumklorida*

[2 *marks*]

(iii) The number of moles of silver chloride, AgCl formed in this experiment
Bilanganmol argentum klorida, AgCl *yang terbentukdalameksperimenini.*

[1 *mark*]

(iv) The heat of precipitation.
Habapemendakan

.

[2 *marks*]

(e) (i) Write a thermochemical equation for the reaction
Tulispersamaantermokimiauntuktindakbalasitu.

……..……

[1 *mark*]

(ii) Draw an energy level diagram for this reaction.
Lukis gambar rajah aras tenaga bagi tindak balas ini.

[3 *marks*]

3 The combustion of an alcohol in air is represented by the equation below:
Pembakaran suatu sebatian alkohol dalam udara diwakili oleh persamaan berikut:

$C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O \quad \Delta H = -1260 \text{ kJ mol}^{-1}$

(a) (i) State the name of the alcohol in the above equation.
Nyatakan nama bagi sebatian alkohol di dalam persamaan di atas.
……..……..……

[1 *mark*]

(ii) What is meant by '$\Delta H = -1260 \text{ kJ mol}^{-1}$' in the above equation?
Apakah yang dimaksudkan dengan '$\Delta H = -1260 \text{ kJ mol}^{-1}$' *dalam persamaan di atas?*

……..……..……

[1 *mark*]

(b) 200 g of water is heated by the combustion of 0.23 g of the alcohol.
200 g air dipanaskanolehpembakaran 0.23 g alkohol tersebut

(i) Calculate the heat released by the alcohol in the reaction.
[Relative Atomic Mass: H=1; C=12 and O=16]
Kirakan haba yang dibebaskan oleh alkohol itu dalam tindak balas.
[*Jisim atom relatif:* H=1*;* C=12 *and* O=16]

[2 *marks*]

(ii) Calculate the temperature change of water in the experiment.
[Specific heat capacity of water: 4.2 J $g^{-1o}C^{-1}$]
Kirakanperubahansuhu air yang dijangkakandalameksperimenitu.
[*Muatanhabatentu air:* 4.2 J $g^{-1o}C^{-1}$]

[2 *marks*]

(c) Why is the value of heat of combustion obtained is always less than the actual value?
Mengapanilaihabapembakaran yang didapatibiasanyalebihrendahdaripadanilai yang sebenar?

……..……..

[1 *mark*]

(d) (i) Draw the energy level diagram for the combustion of the alcohol.
Lukis gambarajah aras tenaga untuk pembakaran alkohol tersebut.

[*3 marks*]

(ii) Draw a labeled diagram showing the apparatus set up to determine heat of combustion of the alcohol inthe laboratory
Lukis gambar rajah berlabelmenunjukkansusunanradasbagimenentukanhaba pembakaran alkohol tersebutdalammakmal

[*2 marks*]

(e) Table 3 below shows the heat of combustion of various alcohols.
*Jadual*3 *di bawahmenunjukkanhabapembakaranbagipelbagaialkohol*.

Number of carbon atoms per molecule of alcohol *Bilangan atom karbon per molekulalkohol*	Molecular formula *Formula molekul*	Name of substances *Namasebatian*	Heat of combustion *Habapembakaran* (kJ / mol^{-1})
1	CH_3OH	Methanol	-728
2	C_2H_5OH		-1376
3	C_3H_7OH	Propanol	-2016
4	C_4H_9OH	Butanol	

Table 3 / *Jadual*3

(i) Predict the heat of combustion of butanol.
Ramalkan haba pembakaran bagi butanol.

.....

[1 *mark*]

(ii) Heat of combustion of propanol is higher than methanol. Explain why.
Habapembakaran propanollebihtinggidarimetanol. Terangkanmengapa.

……...……

……

……

[3 *marks*]

BAHAGIAN B

4 (a) Diagram 4.1 and 4.2 show energy level diagrams.
Rajah 4.1 dan4.2 menunjukkan gambar rajah aras tenaga.

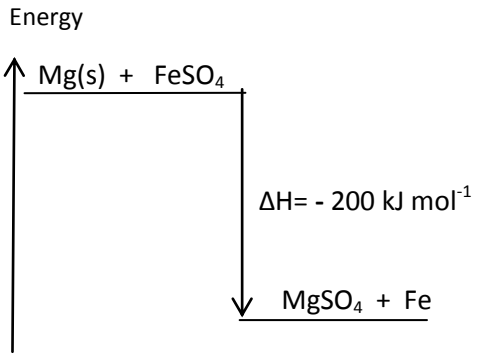


Diagram 4.1 / *Rajah* 4.1

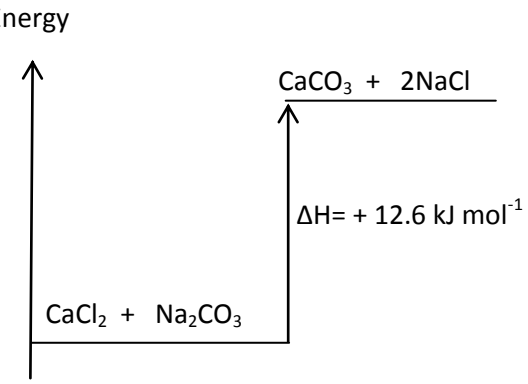


Diagram 4.2 / *Rajah* 4.2

(i) Compare both the energy level diagrams above. Your comparison should include the following
Bandingkan kedua-dua gambar rajah aras tenaga di atas. Perbandingan anda haruslah mengandungi perkara berikut.

- Change in temperature.
Perubahan suhu.

- Type of chemical reaction based on temperature change.
Jenis tindak balas kimia berdasarkan perubanan suhu.

- Total energy content of reactants and products .
Jumlah kandungan tenaga bahan dan hasil tindak balas.

- Amount of heat absorbed /realeased during breaking of bonds in the reactants and formation of bonds in the products
- *Jumlah tenaga yang diserap dan dibebaskan/diserap semasa pemecahan ikatan dalam bahan tindakbalas/hasiltindakbalas*

[6*marks*]

(ii) Based on Diagram 4, calculate the change in temperature of the solution if excess magnesium powder is added to 50 cm^3 of 0.2 mol dm^{-3} iron(II) sulphate solution.
[Specific heat capacity of solution : 4.2 J g^{-1} $^oC^{-1}$]
Berdasarkan Rajah 4, *hitung perubahan suhu larutan jika serbuk magnesium berlebihan ditambah kepada* 50 cm^3 *larutan ferum(II) sulfat 0.2 mol* dm^{-3}.
[Muatan haba tentu larutan : 4.2 J g^{-1} $^oC^{-1}$*]*

[3 *marks*]

(b) Table 4 shows the result of the two experiments to determine heat of precipitation of silver chloride.
Jadual 4 *menunjukan keputusan dua eksperimen untuk menentukan haba pemendakan argentum klorida.*

Experiment *Eksperimen*	Reactants *Bahan tindak balas*	Temperature rise of the reaction mixture/ ^{o}C *Kenaikan suhu tindak balas campuran /* ^{o}C
I	25 cm^3 of 0.5 mol dm^{-3} silver nitrate solution + 25 cm^3 of 0.5 mol dm^{-3}**sodium chloride** solution. 25 cm^3 *larutan argentum nitrat* 0.5mol dm^{-3} +25 cm^3 *larutan* ***natrium klorida***0.5 mol dm^{-3}	3
II	25 cm^3 of 0.5 mol dm^{-3} silver nitrate solution + 25 cm^3 of 0.5 mol dm^{-3}**potassium chloride** solution. 25 cm^3*larutan argentum nitrat* 0.5 mol dm^{-3} + 25 cm^3*larutan kalium klorida*0.5 mol dm^{-3}.	3

Table 4 / *Rajah* 4

Explain why the temperature rise of the reaction mixture in reaction I and II is the same.
Terangkan mengapa kenaikan suhu tindak balas campuran dalam tindak balas I *dan* II *adalah sama.*
[4 *marks*]

(c) A student carried out an experiment to determine the heat of neutralisation for the reaction between 50 cm^3 of 2.0 mol dm^{-3} hydrochloric acid and 50 cm^3 of 2.0 mol dm^{-3} sodium hydroxide solution.
Seorang pelajar telah menjalankan satu eksperimen untuk menentukan haba peneutralan bagi tindak balas antara 50 cm^3 *asid hidroklorik* 2.0 mol dm^{-3} *dengan* 50 cm^3 *larutan natrium hidroksida* 2.0 mol dm^{-3}.

The following data was obtained:
Data berikut telah diperoleh :
Initial temperature of hydrochloric acid = 30.2 ^{o}C
Suhu awal asid hidroklorik
Initial temperature of sodium hydroxide solution = 30.2 ^{o}C
Suhu awal larutan natrium hidroksida
Highest temperature of the mixture of the solutions = 42.2 ^{o}C
Suhu maksimum campuran larutan

(i) Calculate the heat of neutralisation for this reaction.
[Specific heat capacity of solution = 4.2 J g^{-1} $^{o}C^{-1}$]
Hitungkan haba peneutralan bagi tindak balas ini.
[*Muatan haba tentu larutan* = 4.2 J g^{-1} $^{o}C^{-1}$]
[4 *marks*]

(ii) If the experiment is repeated using sulphuric acid to replace hydrochloric acid and all other conditions are the same, predict the temperature change. Explain your answer.
Jika eksperimen diulang dengan menggunakan asid sulfurik untuk menggantikan asid hidroklorik tetapi semua keadaan lain adalah sama, ramalkan perubahan suhu yang dijangkakan.Terangkan jawapan anda.
[4 *marks*]

5 Table 5 shows thermochemical equations of Experiment 1 and Experiment 2.
Jadual 5 *menunjukkan persamaan termokimia bagi Eksperimen* 1 *dan Eksperimen* 2.

Experiment ***Eksperimen***	**Thermochemical Equation** ***Persamaan Termokimia***
1	$NaOH + HCl \rightarrow NaCl + H_2O \quad \Delta H = -57.3\ kJmol^{-1}$
2	$NaOH + CH_3COOH \rightarrow CH_3COONa + H_2O \quad \Delta H = -51.5\ kJmol^{-1}$

Table 5/*Jadual5*

(a) Based on Table 5,*/ Berdasarkan Jadual* 5,

(i) state the type of reaction / *nyatakan jenis tindak balas*

[1 *mark*]

(ii) state the differences between the total energy content of the reactants and the total energy content of products in both reactions.
nyatakan perbezaan di antara jumlah kandungan tenaga bahan tindak balas dan jumlah kandungan tenaga hasil tindak balas dalam kedua-dua tindak balas.

[1 *mark*]

(iii) explain the difference in the heat of neutralization for the reactions.
jelaskan perbezaan haba peneutralan bagi tindak balas–tindak balas.[5 *marks*]

(b) In Experiment 1, 50 cm^3 of 1.0 mol dm^{-3} sodium hydroxide solution is reacted with 50 cm^3 of 1.0 mol dm^{-3}hydrochloric acid.
Di dalam Eksperimen 1, 50 cm^3 *larutan natrium hidroksida 1.0* mol dm^{-3} *ditindakbalaskan dengan* 50 cm^3 *asid hidroklorik*1.0 moldm^{-3}.

(i) Calculate the heat released in the reaction.
Hitung haba yang dibebakans dalam tindak balas itu.

[3 marks]

(ii) What is the temperature change of the reaction mixture?
Apakah perubahan suhu bagi campuran tindak balas?
[Specific heat capacity = 4.2 J $g^{-1}\,{}^0C^{-1}$, density of solution = 1 g cm^{-3}]
[*Muatan haba tentu larutan* = 4.2 J $g^{-1}\,{}^0C^{-1}$, *ketumpatan larutan = 1 g* cm^{-3}]

[3 *marks*]

(iii) The heat of neutralisation obtained in laboratory is less than its theoretical value.
Explain why.
Nilaihabapeneutralan yang diperolehi di makmaladalahlebihrendahdaripadanilaiteorinya.Terangkanmengapa.

[2 *marks*]

(c) Diagram 5 shows two energy level diagrams of different reactions.
Rajah 5 *menunjukkan dua gambar rajah aras tenaga bagi tindak balas berlainan.*

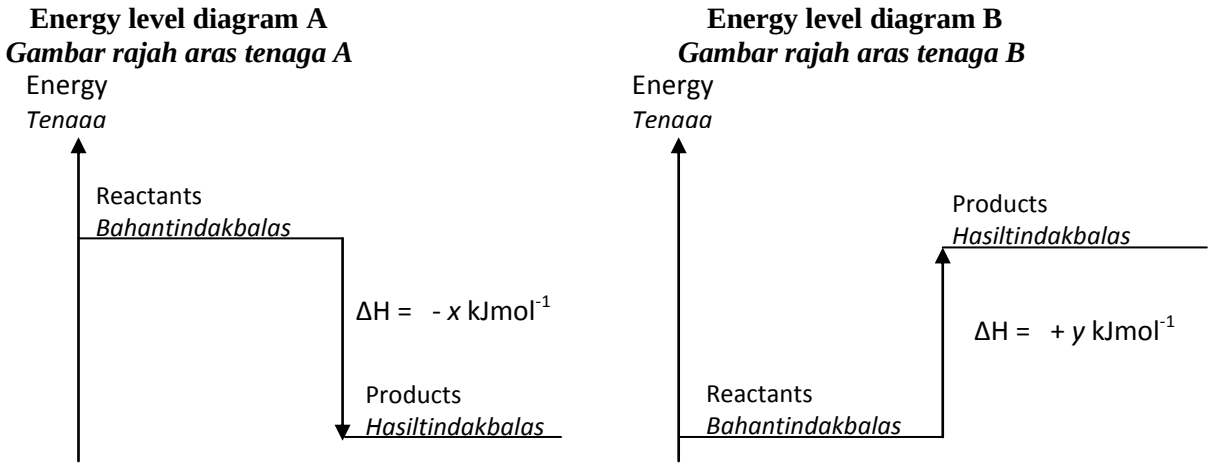


Diagram 5 /*Rajah 5*

Based on Diagram 5, compare the energy level diagram A and energy level diagram B.
Berdasarkan Rajah 5, *bandingkan gambar rajah aras tenaga* A *dan gambar rajah aras tenaga* B.

[5 marks]

BAHAGIAN C

6 (a) The thermochemical equation for the displacement of copper from copper(II) sulphate solution by zinc is bellow
Persamaan termokimia bagi penyesaran kuprum daripada larutan kuprum(II) sulfat oleh zinc adalah seperti berikut :

$$\mathbf{Zn(s) + CuSO_4(aq) \rightarrow ZnSO_4(aq) + Cu(s)} \qquad \Delta H = -152 \text{ kJmol}^{-1}$$

(i) Draw an energy level diagram for the above equation.
Lukiskan gambarajah aras tenaga bagi persamaan di atas.

[2 *marks*]

(ii) Explain the differences in energy content of reactants compare to products.
Terangkan perbezaan kandungan tenaga dalam bahan tindak balas berbanding dengan hasil tindak balas.

[2 *marks*]

(b) 50 cm^3 of 1.0 mol dm^{-3} hydrochloric acid is reacted with 50.0 cm^3 of 1.0 mol dm^{-3}sodium hydroxide solution. The change in temperature of the mixture is 7^oC.
Calculate the heat of neutralization for this reaction.
[Specific heat capacity of solution = 4.2 J $g^{-1o}C^{-1}$; Density of solution = 1 g cm^{-3}]
50 cm^3 *asid hidroklorik* 1.0 mol dm^{-3} *bertindak balas dengan* 50.0 cm^3 *larutan natrium hidroksida* 1.0 mol dm^{-3} . *Perubahan suhu campuran ialah* 7^oC.
Hitungkan haba peneutralan bagi tindak balas ini
[*Muatanhabatentularutan* = 4.2 J $g^{-1O}C^{-1}$; *Ketumpatanlarutan*= 1 g cm^{-3}]

[4 *marks*]

(c) Table 6 shows the molecular formula and the heat of combustion for ethane and propane.
Jadual6menunjukkanformula molekul dan haba pembakaranbagietana dan propana.

Alkane ***Alkana***	**Molecular Formula** ***Formula molekul***	**Heat of combustion/ kJ mol^{-1}** ***HabaPembakaran/* kJ mol^{-1}**
Ethane *Etana*	C_2H_6	-1602
Propane *Propana*	C_3H_8	-2202

Table 6 /*Jadual*6

Based on the information in Table 6, explain why there is a difference in the values of the heat of combustion between ethane and propane.
BerdasarkanmaklumatdalamJadual6, terangkanmengapanilaihabapembakaranbagietana dan propane berbeza.

[3 *marks*]

(d) Describe a laboratory experiment to determine the heat of combustion of a named alcohol with a number of carbon atom per molecule less than four. In your description, include a labeled diagram and the steps involved in the calculation.
[Relative atomic mass: C =12, O =16, H = 1]
[Specific heat capacity of solution = 4.2 J g^{-1}O^{-1}C ; Density of solution = 1 g cm^{-3}]
Terangkaneksperimenmakmaluntukmenentukanhabapembakaranbagialkohol yangdinamakan Denganbilangan atom karbon per molekulkurangdaripadaempat. Dalampeneranganda Sertakangambar rajah berlabeldanlangkahpengiraan yang terlibat.
[*Jisim atom relatif:* C =12, O =16, H = 1]
[*Muatanhabatentularutan* = 4.2 J g^{-1}O^{-1}C^{-1}*;Ketumpatanlarutan = 1 g cm*$^{-3}$]

[10 *marks*]

7 (a) A student is carried out an experiment in the laboratory to determine the heat of precipitation of silver chloride, AgCl using the following chemical substances :
*Seorangpelajartelahmenjalankansatueksperimendalammakmaluntukmenentukanhabapemendakan argentum klorida,*AgCl*menggunakanbahan-bahankimiaberikut :*

- 25 cm^3 of 0.5 moldm^{-3} silver nitrate solution
  25 cm^3 *larutan argentum nitrat* 0.5 mol dm^{-3}
- 25 cm^3 of 0.5 moldm^{-3} sodium chloride solution
  25 cm^3 *larutan larutan natrium klorida*0.5 mol dm^{-3}

Table 7.1 shows the result of the experiment:
Jadual7.1menunjukkankeputusaneksperimentersebut :

Initial temperature of silver nitrate, $AgNO_3$ solution *Suhu awal larutan argentum nitrat,* $AgNO_3$	29.0 ^oC
Initial temperature of sodium chloride, NaCl solution *Suhu awal larutan natrium klorida,* NaCl	29.0 ^oC
Highest temperature of reaction mixture *Suhutertinggicampurantindakbalas*	33.0 ^oC

Table 7.1 / *Jadual* 7.1

(i) Calculate the heat of precipitation of silver chloride
Hitunghabapemendakan argentum klorida.
[Specific heat capacity of solution = 4.2 $Jg^{-1o}C^{-1}$; the density of solution = 1.0 g cm^{-3}]
[*Muatanhabatentularutan*=4.2 $Jg^{-1o}C^{-1}$;*ketumpatanlarutan*= 1.0 g cm^{-3}]

[2*marks*]

(ii) Draw an energy level diagram for the reaction between silver nitrate and sodium chloride.
Lukiskan rajah arastenagabagitindakbalasantara argentum nitratdannatriumklorida.

[2 marks]

(b) Table 7.2 shows the heat released for Experiment I, II and III for different acids that has been reacted with sodium hydroxide solution.
Jadual 7.2*menunjukkanhaba yang dibebaskanbagitindakbalas* I , II *dan*III *menggunakan asidberlainan yang ditindakbalaskandenganlarutannatriumhidroksida.*

Experiment *Eksperimen*	Chemical Equation *Persamaankimia*	Heat of neutralisation *Habapeneutralan*(kJ mol^{-1})
I	$HCl + NaOH \rightarrow NaCl + H_2O$	57
II	$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$	54
III	$H_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O$	57

Table 7.2 / *Jadual* 7.2

Based on Table 7.2, explain the difference in heat released between:
*BerdasarkanJadual*7.2, *terangkanperbezaandalamhabadibebaskanantara*:

(i) Experiment I and Experiment II
Eksperimen I *danEksperimen* II

(ii) Experiment I and Experiment III
Eksperimen I *danEksperimen* III

[6 *marks*]

(c) Describe a laboratory experiment to determine the heat of displacement of metal by a more electropositive metal. In your description, include the following aspects :
Huraikansatueksperimenmakmaluntukmenentukanhabapenyesaranlogamolehlogam yang lebihelektropositif.Dalamhuraiananda, sertakanaspek-aspekberikut:

- Materials and apparatus needed
Bahan-bahandanradas yang diperlukan
- Procedure of experiment
Prosedureksperimen
- A table to collect data
Jadualuntukmengumpul data
- Calculation method
Kaedahpenghitungan

[10 *marks*]

BAHAGIAN A

1 Diagram 1 shows a series of chemical reactions starting from propan-1-ol.
Rajah 1*menunjukkan satu siri tindak balas kimia bermula daripada propan*-1-*ol*

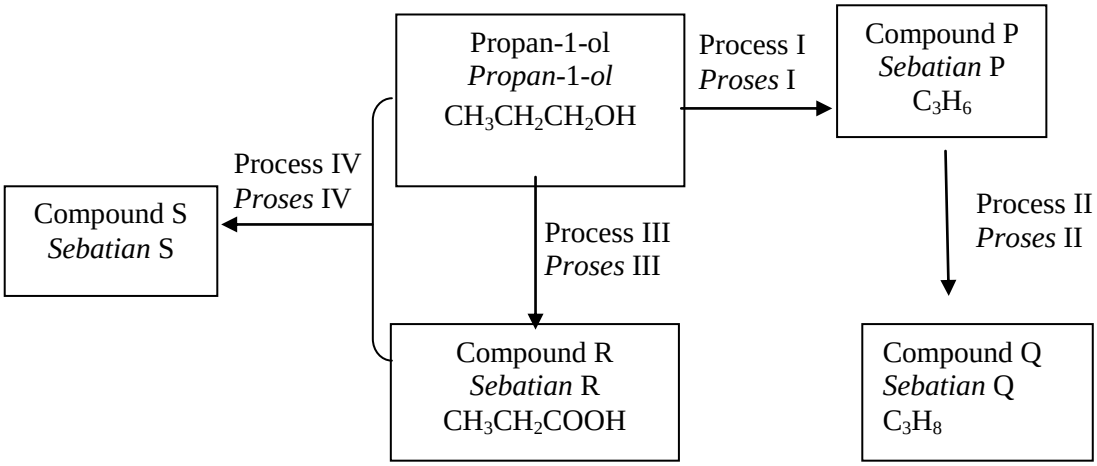


Diagram / *Rajah* 1

(a) State the functional group of propan-1-ol.
Nyatakan kumpulan berfungsi bagi propan-1-*ol.*

……...

[1 *mark*]

(b) (i) State the conditions used in Process II.
Nyatakan keadaan yang digunakan dalam Proses II.

……

……..

[2 *marks*]

(ii) Describe briefly a chemical test to differentiate between compound P and compound Q.
Huraikan secara ringkas satu ujian kimia untuk membezakan sebatian P *dan sebatian* Q.

…….

……

……..

[3 *marks*]

(c) Draw the structural formula of compound R.
Lukiskan formula struktur bagi sebatian R.

[1 *mark*]

(d) In Process IV, propan-1-ol reacts with compound R to produce compound S.
Dalam Proses IV, *propan*-1-*olbertindak balas dengan sebatian R menghasilkan sebatian S.*

(i) State the name of the process that occured.
Nyatakan nama bagi proses yang berlaku.

.....

[1 *mark*]

(ii) Write a chemical equation for the reaction.
Tuliskan persamaan kimia bagi tindak balas itu.

……..

……..

[2 *marks*]

(iii) State the **one** special characteristic of the compound S.
Nyatakan satu sifat istimewa bagi sebatian S *itu*.

……

[1 *mark*]

2 Diagram 2 shows a series of conversions that involves an alcohol, J.
Rajah 2 *menunjukkan siri pertukaran yang melibatkan alkohol* J.

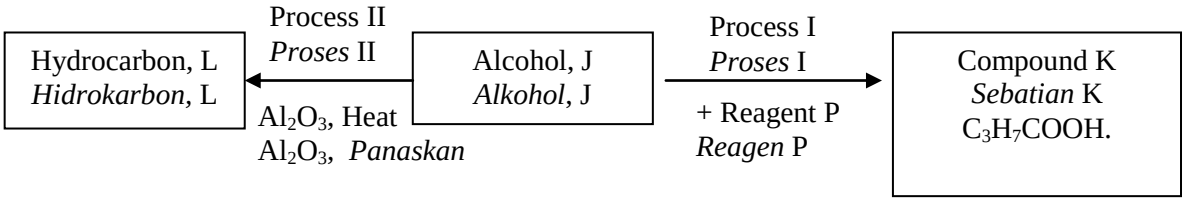


Diagram / *Rajah* 2

(a) The molecular formula of alcohol J is C_4H_9OH.
Formula molekul alkohol J *ialah* C_4H_9OH.

(i) What is the meaning of molecular formula?.
Apakah yang dimaksudkan dengan formula molekul?

…….

[1 *mark*]

(ii) Write the general formula for the homologous series of the compound.
Tuliskan formula am bagi siri homolog sebatian itu.

…….

[1 *mark*]

(b) Alcohol J has four isomers.
Draw the structural formulae of **two** isomers of alcohol J.
Alkohol J *mempunyai empat isomer*.
Lukiskan formula struktur bagi ***dua*** *isomer alcohol* J.

[2 *marks*]

(c) (i) State the name of Process I.
Nyatakan nama bagi Proses I.

……

[1 *mark*]

(ii) Suggest one reagent P that can be used in Process I.
Cadangkan satu reagen P *yang boleh digunakan dalam Proses* I.

……

[1 *mark*]

(iii) State the name of compound K
Nyatakan nama bagi sebatian K.

……

[1 *mark*]

(d) Hydrocarbon L can be produced through dehydration by heating alcohol J with aluminium oxide.
Hidrokarbon J *boleh dihasilkan melalui pendehidratan dengan memanaskan alkohol* J *dengan aluminium oksida.*

(i) Draw a set-up of apparatus for the dehydration reaction.
Lukis susunan radas untuk tindakbalas pendehidratan itu.

[2*marks*]

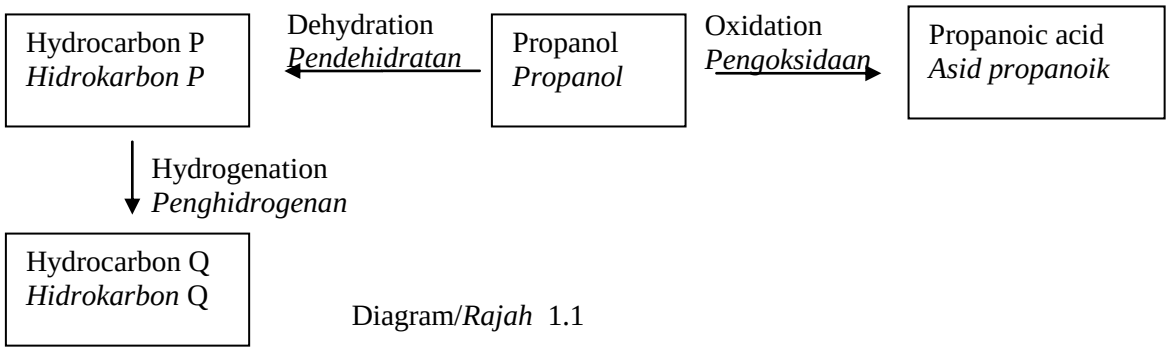
(ii) Write the chemical equation for the reaction .
Tuliskan persamaan kimia bagi tindak balas itu.

……

[1 *mark*]

BAHAGIAN B

1 Diagram 1.1 shows changes of a carbon compound involving a series of reactions.
Rajah 1.1 *menunjukkan penukaran sebatian karbon yang melibatkan beberapa siri tindakbalas*.



Diagram/*Rajah* 1.1

(a) Draw the structural formulae of two isomers for . propanol
State the name of both isomers/*Lukiskan formula struktur bagi dua isomer propanol. Nyatakan nama kedua-dua isomer itu.*

[4*marks*]

(b) The information below is regarding hydrocarbon P./*Berikut ialah maklumat tentang hidrokarbon* P.

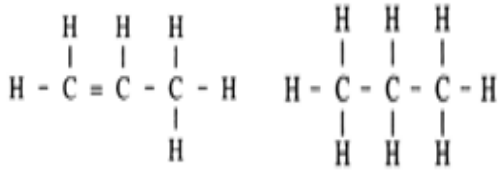
- Carbon 85.7%
  Karbon
- Hydrogen 14.3%
  hidrogen
- Relative molecular mass =42
  Jisim molekul relatif
- Relative atomic mass of H=1 and C=12
  Jisim atom relatif

Based on the information above
Berdasarkan maklumat di atas

(i) Determine the molecular formula/*Tentukan formula molekul*
(ii) State the name /*Nyatakan nama*
(iii) Write the general formula for its homologous series of the hydrocarbon P
Tuliskan formula am bagi siri homolog bagi hidrokarbon P *itu*.
.

[8*marks*]

(c) Diagram 1.2 shows the structural formulae of hydrocarbon P and Q.
Rajah 1.2 menunjukkan formula struktur bagi hidrokarbon P dan Q



Hydrocarbon P
Hidrokarbon P

Hydrocarbon Q
Hidrokarbon Q

Diagram /*Rajah* 1.2

Compare and contrast these two hydrocarbons based on their structures.
Banding dan bezakan kedua-dua hidrokarbon ini berdasarkan strukturnya.

[4*marks*]

(d) Table 1 shows results of latex coagulation.
Jadual 1 *menunjukkan keputusan bagi pengumpalan susu getah.*

Procedure *Prosedur*	Observations *Pemerhatian*
Propanoic acid is added to latex *Asid propanoik ditambah kepada susu getah*	Latex coagulates immediately *Susu getah mengumpal dengan serta merta*
Latex is left under natural conditions *Susu getah dibiarkan pada keadaan semulajadi*	Latex coagulates slowly *Susu getah mengumpal dengan lambat*.

Table / Jadual 1

Explain why there is a difference in the observations.
Terangkan mengapa terdapat perbezaan pemerhatian itu.

[4*marks*]

BAHAGIAN C

1. Diagram 1 shows a flow chart on how to prepare compound Z from alcohol X.
Rajah 1 *menunjukkan carta alir tentang cara menyediakan sebatian Z daripada alcohol* X.

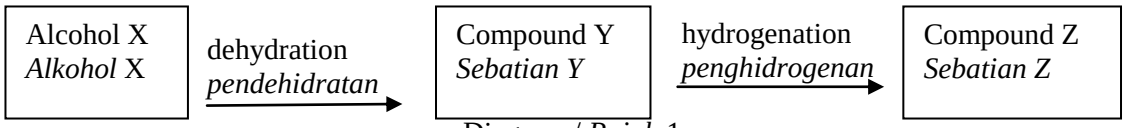


Diagram / *Rajah* 1.

(a) (i) State the name of **one** alcohol that has less than four carbon atoms.
Draw the structural formula of the alcohol.
*Nyatakan nama bagi***satu***alkohol yang mempunyai kurang daripada empat atom karbon.*
Lukiskan formula struktur bagi alkohol itu.

[2 *marks*]

(ii) Based on the answer in 1(a)(i), what is the name of compound Y and compound Z.
Berdasarkan jawapan di 1(a)(i), *apakah nama sebatian* Y *dan sebatian* Z.

[2 *marks*]

(iii) State two chemical properties of compound Y other than hydrogenation and two chemical properties of compound Z.
Describe briefly a chemical test to differentiate between compound Y and compound Z
Nyatakan dua sifat kimia bagi sebatian Y selain daripada penghidrogenan dandua sifat kimia bagi sebatian Z.
Huraikan secara ringkas satu ujian kimia untuk membezakan sebatian Y dan sebatian Z.

[7*marks*]

(b) Alcohol react with carboxylic acids to form esters and water.
By using one named example of an alcohol and one named example of a carboxylic acid, describe the preparation of an ester in the laboratory.
In your description , include the chemical equation for the reaction.
Alcohol bertindak balas dengan asid karboksilik untuk menghasilkan ester dan air.
Dengan menggunakan satu alcohol yang dinamakan dan satu asid karboksilik yang dinamakan,huraikan penyediaan ester di dalam makmal.
Dalam huraian anda, sertakan persamaan kimia bagi tindak balas itu.

[9 *marks*]

BAHAGIAN A

1 (a) Diagram 1.1 shows the apparatus set-up to investigate the transfer of electrons at a distance between potassium iodide solution and acidified potassium manganate(VII) solution.
Rajah 1.1 *menunjukkan susunan radas untuk mengkaji pemindahan elektron pada suatu jarak antara larutan kalium iodida dan larutan kalium manganat* (VII) *berasid*.

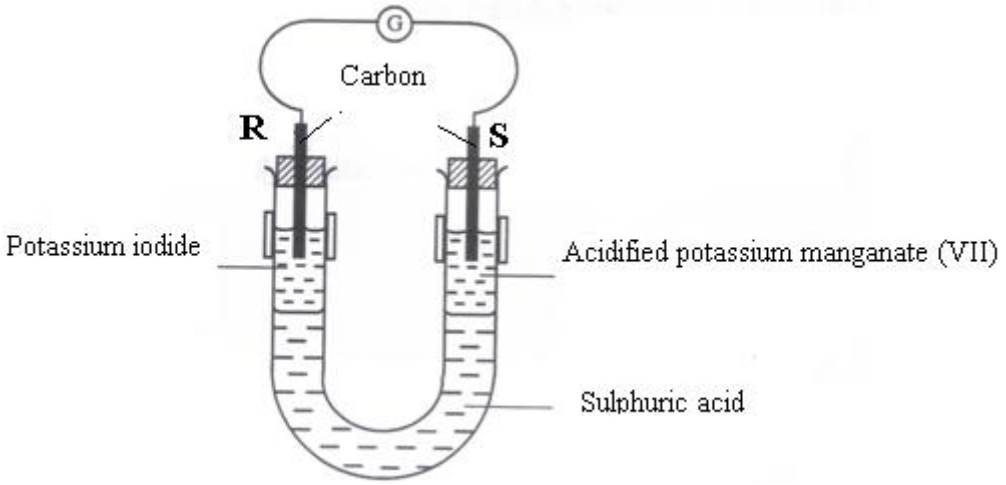


Diagram 1.1/Rajah 1.1

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

.....

[1 *mark*/1 markah]

(ii) Complete the half equation for the reaction at electrode S.
Lengkapkan persamaan setengah bagi tindak balas pada elektrod S.

MnO_4^- + ... H^+ + ... e → Mn^{2+} + ... H_2O

[1 *mark*/1 markah]

(iii) State the change in oxidation number of manganese and name the process that occurs at S.
Nyatakan perubahan nombor pengoksidaan bagi ion mangan dan namakan proses yang berlaku di S.

Change in oxidation number : …….....…….....……...
Perubahan nombor pengoksidaan

Name of process : .....
Nama proses

[2 marks/2 *markah*]

(iv) Suggest a substance that can replace potassium iodide solution in order to obtain the same reaction
Cadangkan bahan yang boleh menggantikan larutan kalium iodida bagi mendapatkan tindak balas yang sama

.....

[1 *mark*/1 markah]

(b) Diagram 1.2 shows the set up of the apparatus to investigate the reactivity of metals J, K and L. The different metals are heated consecutively.
Rajah 1.2 *menunjukkan susunan radas untuk mengkaji kereaktifan logam J, K dan L. logam-logam yang berbeza dipanaskan dengan kuat*.

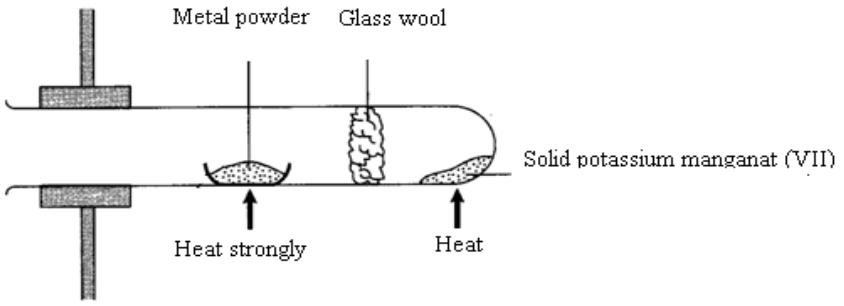


Diagram 1.2/ *Rajah* 1.2

Table 2.2 shows the observation of the experiment.
Jadual 2.2 *menunjukkan pemerhatian bagi tindak balas*.

Metal *Logam*	Observations *Pemerhatian*	Colour of residue *Warna baki*	
		Hot	Cold
J	Burns brightly *Menyala dengan terang*	Yellow *Kuning*	White *Putih*
K	Glows dimly *Berbara dengan malap*	Black *Hitam*	Black *Hitam*
L	Burns with a very bright flame *Menyala dengan nyalaan yang terang*	White *Putih*	White *Putih*

Table 1/*Jadual* 1

(i) State the name of metal J
Namakan logam J

……
[1 mark/1 *markah*]

(ii) Write a chemical equation for the reaction between metal J and oxygen
Tuliskan persamaan kimia bagi tindak balas antara logam J dan oksigen

……
[1 mark/1 *markah*]

(iii) Based on the observations, arrange metals J, K and L in ascending order of the reactivity towards oxygen.
Berdasarkan kepada pemerhatian, susunkan logam-logam J, K and L*mengikut tertib menaik dalam kereaktifan terhadap oksigen.*

……
[1 mark/1 *markah*]

(iv) A mixture of metal J and oxide of metal L is heated strongly.
Predict an observation. Give your reason.
Campuran logam J dan oksida logam L dipanaskan dengan kuat.
Ramalkan pemerhatian.berikan alasan anda.

……
[1 mark/1 *markah*]

2 Diagram 2.1 show the apparatus set up used in two sets of experiment to investigate theredox reaction.
Rajah 2.1 *menunjukkan susunan radas yang digunakan dalam dua set eksperimen untuk mengkajitindak balas redoks.*

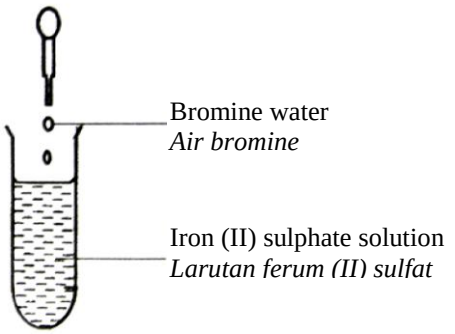
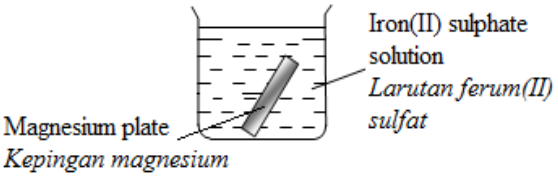
Set 1 ***Set 1***	**Set 2** ***Set 2***
	

Diagram 2.1
Rajah 2.1

(a) What is meant by redox reaction?
Apakah yang dimaksudkan dengan tindak balas redoks?

.....

[1mark/1 *markah*]

(b) Based on Set 1/ *Berdasarkan Set* 1;

(i) State the colour change of iron(II) sulphate solution.
Nyatakan perubahan warna larutan ferum(II) sulfat.

…….....

[1mark/1 *markah*]

(ii) State the type of reaction occur to iron (II) sulphate.
Nyatakan tindak balas yang berlaku kepada ferum (II) *sulfat*

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

(iii) Write half equation for the reaction in (b)(ii).
Tuliskan persamaan setengah bagi tindak balas di(b)(ii).

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

(iv) State the oxidation number of bromine in bromine water.
Nyatakan nombor pengoksidaan bromin dalam air bromin.

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

(c) Based on Set II/ *Berdasarkan Set* 2:

(i) Which substance undergoes oxidation?
Bahan yang manakah mengalami pengoksidaan?

.....

[1mark/1 *markah*]

(ii) Write the ionic equation for the reaction occur.
Tuliskan persamaan ion bagi tindak balas yang berlaku.

.....

[1mark/1 *markah*]

(iii) State the change in oxidation number of iron.
Nyatakan perubahan dalam nombor pengoksidaan bagi ferum.

.....

[1mark/1 *markah*]

(d) Diagram 2.2 shows the picture of iron nails.
Rajah 2.2 *menunjukkan gambar paku besi*.

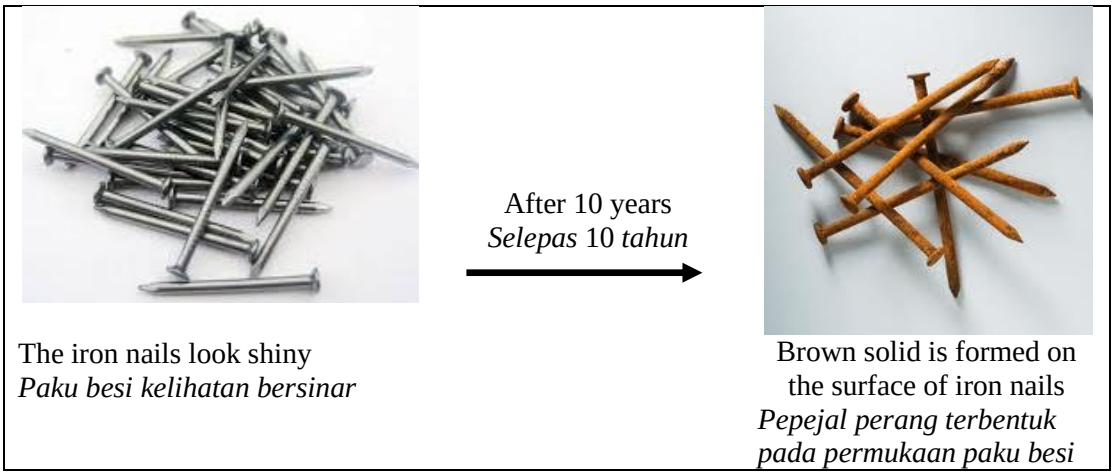


Diagram 2.2
Rajah 2.2

Draw a labelled diagram to show how the conditions for process in Diagram 2.2 to occur, involving the ionisation of iron and the flow of electron.
Lukiskan satu gambar rajah berlabel untuk menunjukkan bagaimana syarat untuk proses di Rajah 2.2 *berlaku, melibatkan pengionan besi dan pengaliran elektron*.

[3mark/3 *markah*]

BAHAGIAN B

1 (a) Diagram 1.2 shows apparatus and observations for two different reactions
Rajah 1.2 *menunjukkan rajahdan pemerhatian bagi dua tindak balas:*

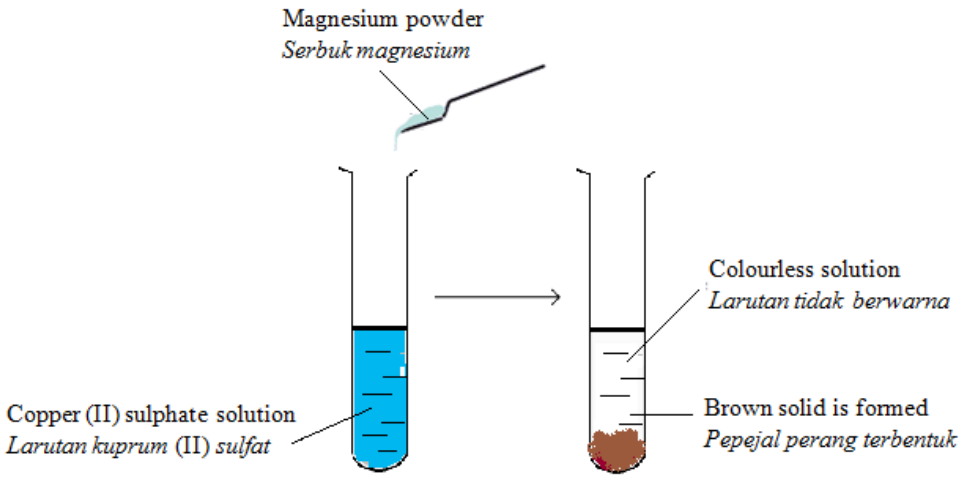
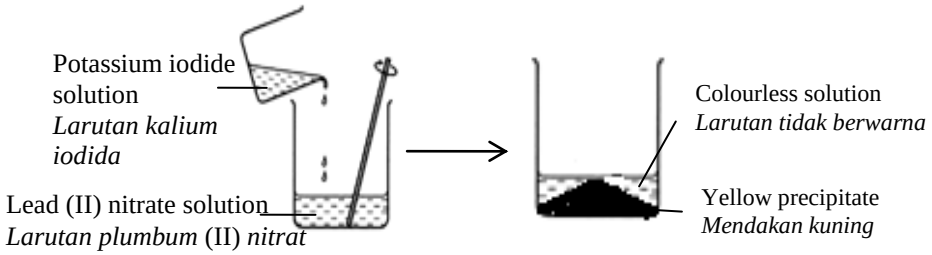
Reaction *Tindak balas*	Chemical Equation *Persamaan Kimia*
I	
II	

Diagram 1.1 / *Rajah* 1.1

(i) Write chemical equation for reaction I and II.
Tulis persamaan kimia bagi tindak balas I dan tindak balas II.

[2marks/2 *markah*]

(ii) Determine whether each of the reactions is a redox reaction or not a redox reaction.
Explain your answer in term of oxidation number.
Tentukan sama ada setiap tindak balas tersebut merupakan tindak balas redoks atau bukan tindak balas redoks. Terangkan jawapan anda dari segi nombor pengoksidaan.

[4marks/4 *markah*]

(b) Table 3.1 shows the formulae for two oxides of copper compounds.
Jadual 3.1 *menunjukkan formula bagi dua sebatian oksida kuprum*.

Compound ***Sebatian***	**Formula** ***Formula***
P	CuO
Q	Cu_2O

Table 3.1/*Jadual* 3.1

State the oxidation number of copper in the both compounds.
Name both of the compounds based on the IUPAC nomenclature system.
Nyatakan nombor pengoksidaan bagi kuprum dalam kedua-dua sebatian tersebut.
Namakan kedua-dua sebatian tersebut berdasarkan sistem tatanama IUPAC

[4mark4 *markah*]

(c) Diagram 1.2 shows the extraction process of iron in a blast furnance.
Rajah 1.2 *menunjukkan proses pengekstrakan besi dalam relau bagas*.

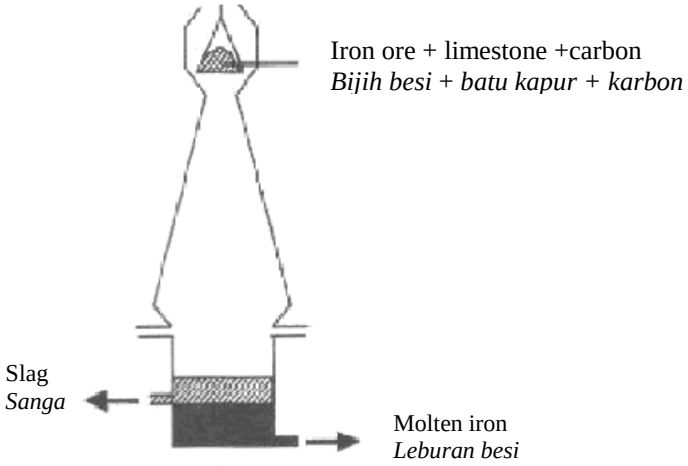


Diagram 1.2/ *Rajah* 1.2

(i) Give two reasons why carbon is usually used for the extraction purpose.
Berikan dua sebab mengapa karbon biasanya digunakan bagi tujuan pengekstrakan.

[2marks/2 *markah*]

(ii) Write chemical equation for the reaction occur.
Tulis persamaan kimia bagi tindak balas yang berlaku.

Based on the equation, determine/*Berdasarkan persamaan, tentukan:*

- the substance that is oxidised/*bahan yang dioksidakan*
- the substance that is reduced/*bahan yang diturunkan*
- the oxidizing agent/*agen pengoksidaan*
- the reducing agent /*agen penurunan*

[6marks/6 *markah*]

(iii) The process in Diagram 1.2 is carried out to extract aluminium from its ore, which is bauxite. Is aluminium successfully extracted? Give your reason.
*Proses pada Rajah*1.2*dijalankan bagi mengekstrak aluminium daripada bijihnya, iaitu bauksit. Adakah aluminium berjaya diektrakkan* ?*Berikan alasan anda.*

[2marks/2 *markah*]

BAHAGIAN C

1 (a) Diagram 1 shows the apparatus set-up to investigate the redox reaction between metal P and copper(II) oxide powder
Rajah 1 *menunjukkan susunan radas untuk mengkaji tindak balas redoks antara logam P dan sebuk kuprum*(II) *oksida.*

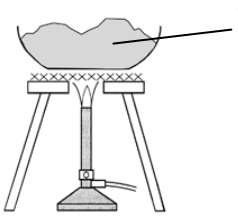


Diagram 1/*Rajah* 1

Suggest metal P.
Based on your answer, explain why the reaction in Diagram 1 is a redox reaction in terms of the change in oxidation number.
Cadangkan logam P .
Berdasarkan jawapan anda , terangkan mengapa tindak balas dalam Rajah 1 merupakan tindak balas redoks dari segi perubahan nombor pengoksidaan.

[4 marks/4 *markah*]

(b) Table 1 shows the result of two experiments to study the effects of metal X dan Y on the rusting of iron.
Jadual 5.1 menunjukkan keputusan bagi dua eksperimen untuk mengkaji kesan logam X dan Y terhadap pengaratan besi.

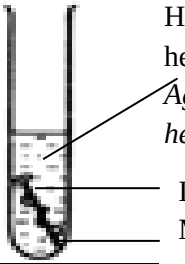
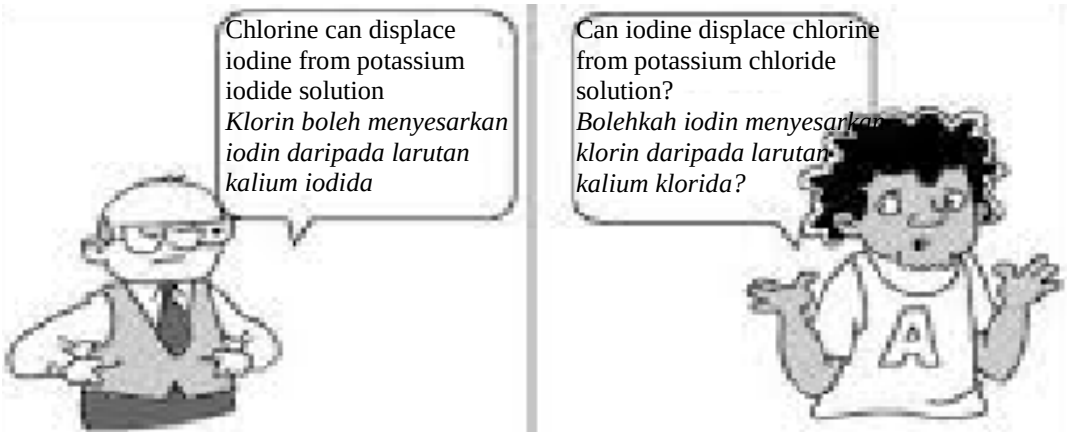
Experiment/ *Eksperimen*	Observation *Pemerhatian*
I  Hot agar solution containing potassium hexacyanoferrate(III) and phenolphthalein *Agar panas mengandungi kalium heksasianoferat(III)dan fenolftalein* Iron nail / *paku besi* Metal X / *logam X*	Blue spots is formed *Tompokan biru terbentuk*
II  Hot agar solution containing kalium hexacyanoferrate(III) and phenolphthalein *Agar panas mengandungi kalium heksasianoferat(III) dan fenolftalein* Iron nail/ *paku besi* Metal Y/ *logam Y*	Pink spot is formed *Tompokan merah jambu terbentuk*

Table 1/ *Jadual* 1

Explain the observation in experiment I and experiment II.
Terangkan pemerhatian dalam eksperimen I *dan eksperiment* II.

[6 marks/6 *markah*]

(c) Diagram 2 shows a conversation of a teacher with his student.
Rajah 2*menunjukkan perbualan seorang guru dengan pelajarnya.*



Teacher
Guru

Diagram 2/*Rajah* 2

Student
Pelaiar

(a) Based on the conversation in Diagram 2, describe an experiment to investigate the displacement reaction of halogens from halide solutions using chemicals below:
Berdasarkan perbualan di Rajah 2, *huraikan eksperimen untuk mengkaji tindak balas penyesaran halogen daripada larutan halidamenggunakakan bahan kimia berikut*:

- potassium chloride solution / *larutan kalium klorida*
- potassium iodide solution/ *larutan kalium iodida*
- chlorine water/ *air klorin*
- iodine water/ *air iodin*
- 1,1,1-trichloroethane / 1,1,1-*trikloroetana*

In your description, include all the followings:
Dalam penerangan anda, masukkan yang berikut:

- procedure / *prosedur*
- confirmatory test / *ujian pengesahan*
- explanation on oxidation and reduction processes that occur/ *penerangan mengenai proses pengoksidaan dan penurunan yang berlaku*
- ionic equation / *persamaan ion*

[10marks/10 *markah*]

BAHAGIAN B

1 (a)	1. Vinegar 2. Wasp sting is alkali 3. Vinegar can neutralize wasp sting	1 1 1
(b)	1. Water is present in test tube X but in test tube Y there is no water. 2. Water helps ammonia to ionise // ammonia ionise in water 3. OH^- ion present 4. OH^- ion causes ammonia to show its alkaline properties 5. Without water ammonia exist as molecule // without water OH^- ion does not present 6. When OH^- ion does not present, ammonia cannot show its alkaline properties	1 1 1 1 1 1
(c)	1. Sulphuric acid is a diprotic acid but nitric acid is a monoprotic acid 2. 1 mole of sulphuric acid ionize in water to produce two moles of H^+ ion but 1 mole of nitric acid ionize in water to produce one mole of H^+ ion 3. The concentration of H^+ ion in sulphuric acid is double / higher 4. The higher the concentration of H^+ ion the lower the pH value	1 1 1 1
(d)(i)	1. Mole of KOH 2. Molarity of KOH and correct unit Mole KOH = $\frac{14.0}{56}$ // 0.25 Molarity = $\frac{0.25 \times 1000}{250}$ mol dm^{-3} // 1 mol dm^{-3}	1 1
(ii)	1. Correct formula of reactants 2. Correct formula of products 3. Mole of KOH // Substitution 4. Mole ratio 5. Answer with correct unit $HCl + KOH \rightarrow KCl + H_2O$ Mole KOH = $\frac{1 \times 25}{1000}$ // 0.025 0.025 mole KOH produce 0.025 mole KCl Mass KCl = 0.025 x 74.5 g // 1.86 g	1 1 1 1 1
TOTAL		20

BAHAGIAN C

2 (a)	1. HCl // HNO_3 2. 1 mole acid ionises in water to produce 1 mole of H^+ ion 3. H_2SO_4 4. 1 mole acid ionises in water to produce 2 moles of H^+ ion	1 1 1 1
(b)	1. Sodium hydroxide is a strong alkali 2. Ammonia is a weak alkali 3. Sodium hydroxide ionises completely in water to produce high concentration of OH^- ion 4. Ammonia ionises partially in water to produce low concentration of OH^- ion 5. Concentration of OH^- ion in sodium hydroxide is higher than in ammonia 6. The higher the concentration of OH^- ion the higher the pH value	1 1 1 1 1 1
(c)	1. Volumetric flask used is 250 cm^3 2. Mass of potassium hydroxide needed = 0.25 X 56 = 14 g 3. Weigh 14 g of KOH in a beaker 4. Add water 5. Stir until all KOH dissolve 6. Pour the solution into volumetric flask 7. Rinse beaker, glass rod and filter funnel. 8. Add water 9. when near the graduation mark, add water drop by drop until meniscus reaches the graduation mark 10. stopper the volumetric flask and shake the solution	1 1 1 1 1 1 1 1 1 1
	TOTAL	20

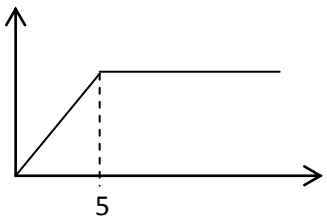
SALTS http://cikguadura.wordpress.com/

BAHAGIAN A

1 (a)	Ionic compound formed when H^+ ion from an acid is replaced by a metal ion or ammonium ion	1
(b)	$Pb(NO_3)_2$	1
(c)	To ensure all the nitric acid reacts completely	1
(d)(i)	1. Correct formula of reactants and products 2. Balanced equation $2H^+ + PbO \rightarrow Pb^{2+} + H_2O$	1 1
(ii)	1. Mole of acid 2. Mole ratio 3. Answer with correct unit Mole $HNO_3 = \frac{1.0 \times 50}{1000}$ // 0.05 0.05 moles HNO_3 produce 0.025 moles salt G Mass of salt G = 0.025 x 331 g // 8.275 g	1 1 1
(e)	1. Add 1 cm^3 dilute sulphuric acid followed by 1 cm^3 of Iron(II) sulphate solution Slowly add concentrated sulphuric acid by slanted the test tube. 2. Brown ring is formed.	1 1
	TOTAL	

2 (a)(i)	Salt W : Copper(II) carbonate Solid X : Copper(II) oxide	1 1
(ii)	1. Flow gas into lime water 2. Lime water turns cloudy / chalky	1 1
(iii)	Neutralisation	1
(iv)	1. Correct formula of reactants and products 2. Balanced equation $CuO + 2HCl \rightarrow CuCl_2 + H_2O$	1 1
(b)	Cation : Cu^{2+} ion // copper(II) ion Anion : Cl^- ion // chloride ion	1 1
(c)(i)	$Ag^+ + Cl^- \rightarrow AgCl$	1
(ii)	Double decomposition reaction	1

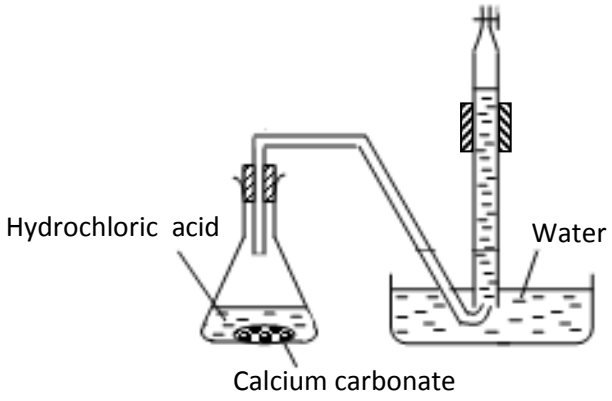
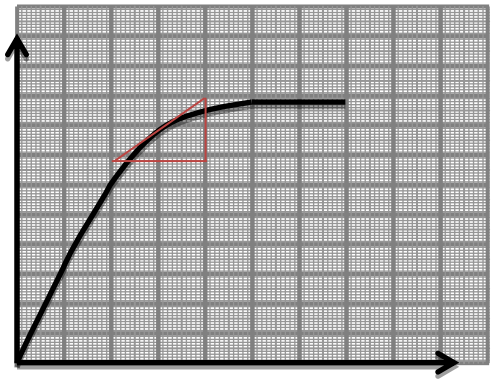
BAHAGIAN B

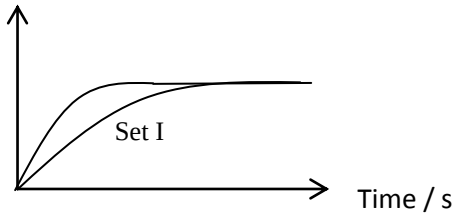
3 (a)(i)	1. $PbCl_2$ 2. Double decomposition reaction	1 1
(ii)	<u>Copper (II) chloride :</u> Copper(II) oxide / copper(II) carbonate , Hydrochloric acid <u>Lead (II) chloride :</u> Lead (II) nitrate solution , sodium chloride solution (any solution that contains Cl^- ion)	 1 + 1 1 + 1
(b)(i)	1. S = zinc nitrate 2. T = zinc oxide 3. U = nitrogen dioxide 4. W = oxygen	1 1 1 1
(ii)	$2Zn(NO_3)_2 \rightarrow 2ZnO + 4NO_2 + O_2$	1+1
(c)(i)	1. Both axes are label and have correct unit 2. Consistent scale and size of graph is more than half of graph paper 3. All points are transferred correctly	1 1 1
(ii)	 	1
(iii)	Mole Ba^{2+} ion = $\frac{0.5 \times 5}{1000}$ // 0.0025 Mole SO_4^{2-} ion = $\frac{0.5 \times 5}{1000}$ // 0.0025 Ba^{2+} ion : SO_4^{2-} ion 0.0025 : 0.0025 // 1 : 1	1 1 1
(iv)	$Ba^{2+} + SO_4^{2-} \rightarrow BaSO_4$	1
	TOTAL	20

BAHAGIAN C

<table>
<tr><td>**4** (a)(i)</td><td>
<table>
<tr><td>Possible causes</td><td>Ways to overcome</td></tr>
<tr><td>Soil too acidic</td><td>Add powdered lime or limestones to neutralise acidity in soil</td></tr>
<tr><td>Soil too alkaline</td><td>Add a composit of rotting vegetables or leaves to treat basic soil</td></tr>
<tr><td>Soil not fertile</td><td>Add chemical fertilisers such as ammonium nitrate and urea</td></tr>
</table>
</td><td>1+1
1+1</td></tr>
<tr><td>(ii)</td><td>R is lead(II) oxide
Gas A is carbon dioxide
Gas B is nitrogen dioxide
Gas C is oxygen
The chemical formula for P is $PbCO_3$
The chemical formula for Q is $Pb(NO_3)_2$</td><td>1
1
1
1
1
1</td></tr>
<tr><td>(b)</td><td>1. Measure and pour [20-100 cm^3] of [0.1-2.0 mol dm^{-3}]zinc nitrate solution into a beaker
2. Add [20-100 cm^3] of [0.1-2.0 mol dm^{-3}]sodium carbonate solution
3. Stir the mixture and filter
4. Rinse the residue with distilled water
5. $Zn(NO_3)_2 + Na_2CO_3 \rightarrow ZnCO_3 + 2NaNO_3$
6. Measure and pour [20-100cm^3]of [0.1-1.0mol dm^{-3}]sulphuric acid into a beaker
7. Add the residue/ zinc carbonate into the acid until in excess
8. Stir the mixture and filter
9. Heat the filtrate until saturated / 1/3 of original volume
10. Cool the solution and filter
11. Dry the crystal by pressing between two filter papers
12. $ZnCO_3 + H_2SO_4 \rightarrow ZnSO_4 + H_2O + CO_2$</td><td>1
1
1
1
1
1
1
1
1
1
1
1
1</td></tr>
<tr><td colspan="2">TOTAL</td><td>20</td></tr>
</table>

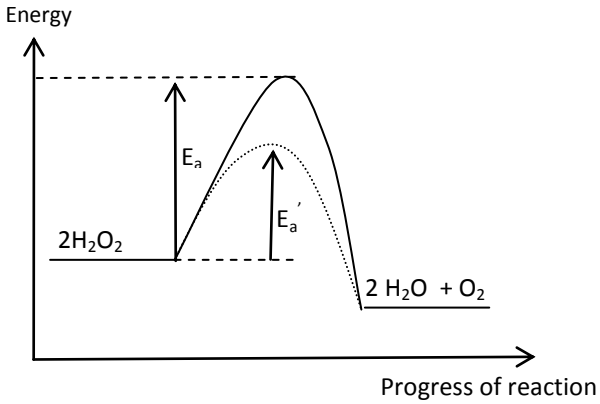
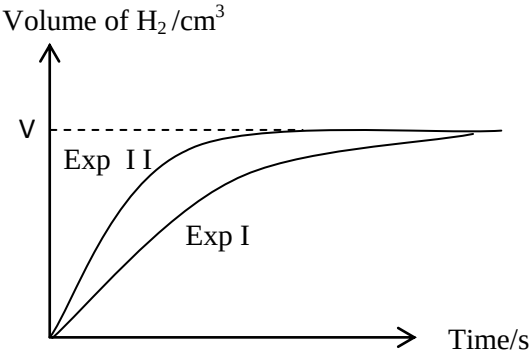
BAHAGIAN A

1 (a)		*Able to draw a complete, functional and label the apparatus set-up*  <u>1. Functional of apparatus:</u> Clamp the burette, dotted line for water and hydrochloric acid, end of delivery tube below water level in the basin. <u>2. Label:</u> Hydrochloric acid/ HCl, calcium carbonate/ $CaCO_3$, water	1 1	2
(b)		*Able to draw the graph with these criteria:* 1. Labelled axis with correct unit 2. Uniform scale for X and Y axis & size of the graph is at least half of the graph paper 3. All points are marked 4. Correct shape, Curve is smooth and start from origin point	1 1 1 1	4
(c)	(i)	*Able to draw the tangent and show the working and correct unit* 1 Correct tangent at 90 second on the graph 2 Show calculation of the tangent with correct answer and unit Range (0.155 – 0.195) cm^3s^{-1} 	1 1	2
	(ii)	Lower // accept one value than answer in c (i)	1	1
	(iii)	The concentration of the acid decreases	1	1
		Total		10

2 (a)		$Mg + 2HCl \rightarrow MgCl_2 + H_2$	1+1	2
(b)	(i)	Mol Mg = $\frac{0.3}{24}$ = 0.0125 mol	1	1
	(ii)	Mol HCl = $\frac{1\ X\ 50}{1000}$ = 0.05 mol	1	1
(c)		1 mol of magnesium produce 1 mol hydrogen // 0.0125 mol Mg produce 0.0125 mol hydrogen Volume of hydrogen = 0.0125 x 24 dm^3 = 0.3 dm^3 / 300 cm^3	1 1 1	2
(d)		Set I Rate of reaction = $\frac{0.3}{100}$ = 0.003 dm^3s^{-1} // $\frac{300}{100}$ = 3 dm^3s^{-1} Set II Rate of reaction = $\frac{0.3}{60}$ = 0.005 dm^3s^{-1} // $\frac{300}{60}$ = 5 dm^3s^{-1}	1 1	2
(e)		1. Size of reactant 2. catalyst	1 1	2
(f)	(i)	Volume of hydrogen gas / cm^3  	1	1
	(ii)	1. Initial rate of is higher because the concentration of HCl is higher 2. Magnesium is the limiting factor // Hydrochloric is excess 3. Maximum volume of hydrogen gas collected is the same because the number of mole of magnesium is the same	1 1 1	3
		Total		14

BAHAGIAN B

3 (a)		Use catalyst // Add iron Increase temperature // Carry out Haber Process at 450 – 550 ˚ C Increase pressure // Carry out Haber Process at 200 – 300 atm	1 1 1	3
(b)	(i)	$2H_2O_2 \rightarrow 2H_2O + O_2$	1	1
	(ii)	1. Function as catalyst 2. Catalyst provide an alternative path with a lower activation energy 3. More colliding particle can achieve the lower activation energy 4. Frequency of effective collision between hydrogen peroxide molecules increases 5. Rate of reaction increase	1 1 1 1 1	5

	(iii)	1. Axis 2. Curve without catalyst, E_a 3. Curve with catalyst , E_a'  	1 1 1	3
(c)	(i)	1. Labeled axis with unit 2. Correct curves for both experiments 3. Correct maximum volume  	1 1 1	3
	(ii)	1. The rate of reaction in experiment II is higher than experiment I 2. The temperature in experiment II is higher than experiment I 3. Kinetic energy of particles in experiment II is higher than experiment I // Particles in experiment II move faster 4. The frequency of collision between zinc atoms and hydrogen ions in experiment II higher than experiment I 5. The frequency of effective collision in experiment II higher than experiment I		
		TOTAL		20

BAHAGIAN C

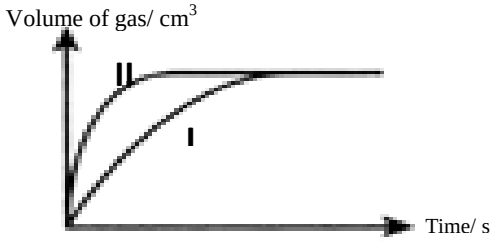
4 (a)		P : [*any metal situated above Cu in the ECS*] *Example* : Magnesium / Zinc / Aluminium [r : Potassium / sodium] HX : [Any monoprotic acid] *Example* : Hydrochloric acid / Nitric acid [a : weak acid] [*Chemical equations*] 1. Correct formula of reactant and product 2. Balance chemical equations *Sample answer* : $Mg + 2HCl \rightarrow MgCl_2 + H_2$	1 1 1 1	4
(b)		Experiment I : Rate of reaction = $\frac{30}{10}$ // $3\ cm^3\ s^{-1}$ Experiment II : Rate of reaction = $\frac{30}{20}$ // $1.5\ cm^3\ s^{-1}$ [*Unit must be correct*]	1 1 	2
(c)		1. Rate of reaction in experiment I is higher than Experiment II. 2. The concentration of acid in Experiment I is higher than in Experiment II 3. Number of hydrogen ions perunit volume in Experiment I is higher than in Experiment II. 4. Frequency of collision between hydrogen ion and metal P in Experiment I is higher than in Experiment II. 5. Frequency of effective collision between particles in Experiment I is higher than in Experiment II.	1 1 1 1 1	5
(d)		*Factor : Size of Reactant* 1. Pour [20-100] cm^3 of [0.1 - 2.0 mol dm^{-3}] HX acid/ HCl/ HNO_3 into a conical flask. 2. Filled a burette with water and inverted it over a basin of water. 3. Initial burette reading is recorded. 4. Granulated / pieces of metal P/ Mg / Zn is added into a conical. 5. The conical flask is closed immediately with stopper and start the stopwatch. 6. The volume of gas collected is recorded at 30 seconds intervals. 7. Step 1 to 8 is repeated by using a powder of metal P/ Mg/ Zn. 8. *Results* : Exp .1 : Using a large piece of metal P/ Mg / Zn	1 1 1 1 1 1 1 1	

Time(s)	0	30	60	90			
Volume of gas $(cm)^3$							

Exp. II :Using a powder of metal P /Mg/ Zn

Time (s)	0	30	60	90			
Volume of gas ($cm^{3)}$)							

9. Sketch the graph of volume of gas against time for both experiments at same axes. 1



10. The smaller the size of reactant the higher the rate of reaction

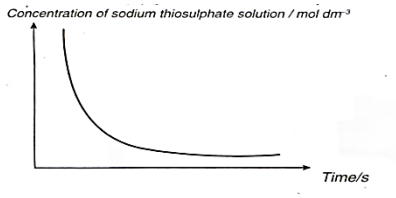
OR 1 *Max* **9**

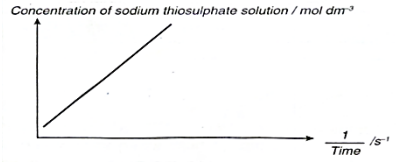
Factor : Concentration

1. Pour 50 cm^3 of 0.2 $moldm^{-3}$ sodium thiosulphate solution into a conical flask.
2. The conical flask is placed on top of a piece of paper with a mark 'X' .
3. 5 cm^3 of 1 mol dm^{-3} sulphuric acid is poured into the conical flask.
4. Swirl the conical flask at the same time start the stop watch. 1
5. The stop watch is stopped immediately when the mark 'X'is no longer visible. 1
6. The time taken for the mark 'X' is no longer visible is recorded. 1
7. Steps 1 to 6 are repeated using different volume of sodium thiosulphate solution with different volumes distilled water as shown in the table. 1 1
8. Result 1 1

Volume of Na_3Si0_3 / cm^3	50	40	30	20	10
Volume of water/ cm^3	0	10	20	30	40
Concentration of Na_2S_203 solution / mol dm^{-3}					
Time taken for'X' to disappear from sight /s					
1/time / s^{-1}					

9. Graphs of concentration of sodium thiosulphate against time and concentration of sodium thiosulphate against 1/t are plotted. 1

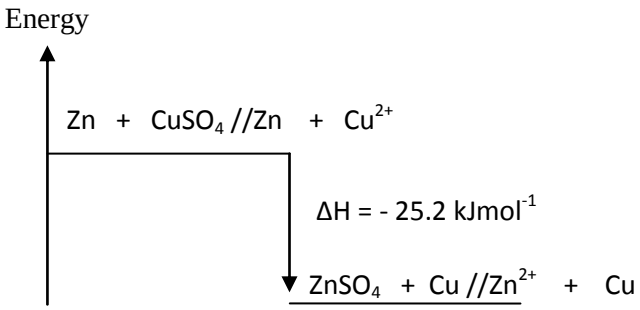




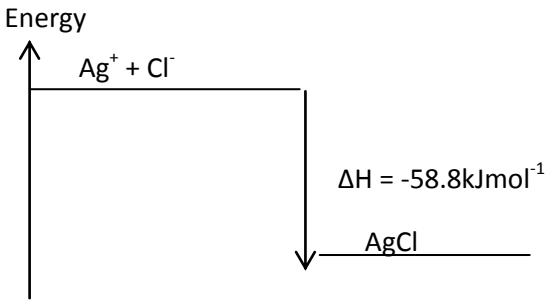
10. The higher the concentration the higher the rate of reaction 1 *Max* **9**

		TOTAL		20

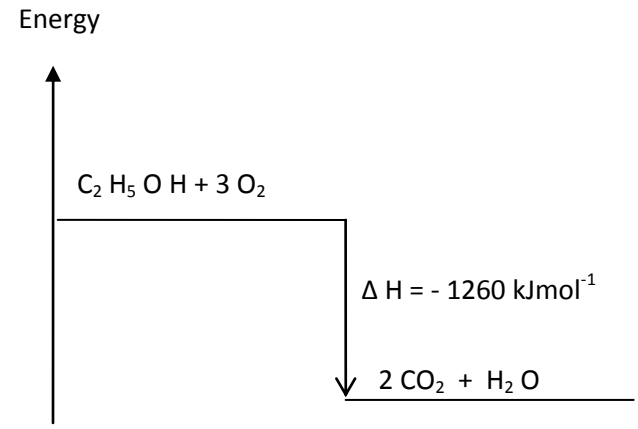
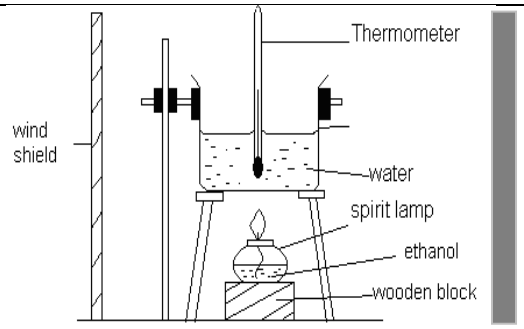
BAHAGIAN A

1	(a)		Heat change /released when 1 mol copper is displaced from copper (II) sulphate solution by zinc	1
	(b)		Blue to colourless	1
	(c)	(i)	50 X 4.2 X 6 J // 1260 J	1
		(ii)	$\frac{1.0 \text{ X } 50}{1000}$ // 0.05	1
		(iii)	$\frac{1260}{0.05}$ J // 25200 J mol^{-1} ΔH = - 25.2 kJ mol^{-1}	1 1
	(d)		1. *Correct reactant and product* 2. *Correct two energy level for exothermic reaction* 3. *Correct value heat of displacement and unit* <u>Sample answer</u>  	1 1 1
	(e)	(i)	3°C	1
		(ii)	Number of mole copper displaced is half Heat released is half / $\frac{1260}{2}$ J // 630 J	1 1
			TOTAL	**12**

Question No			**Mark scheme**	**Mark**
2	(a)		Heat of precipitation is the heat change when one mole of a precipitate is formed from its solution.	1
	(b)		To reduce heat loss to the surrounding. Reject : prevent	1
	(c)		$Ag^+ + Cl^- \rightarrow AgCl$	1
	(d)	(i)	Heat released = (50 + 50) x 4.2 x 3.5 = 1470 J	1
		(ii)	Number of moles of $Ag^+ = \frac{0.5 \text{ X } 50}{1000}$ = 0.025 mol Number of moles of $Cl^- = \frac{0.5 \text{ X } 50}{1000}$ = 0.025 mol	1 1

		(iii)	0.025 mole Ag^+ reacts with 0.025 mole Cl^- to form 0.025 mole AgCl Number of moles of AgCl = 0.025 mol	1
		(iv)	$\Delta H = \frac{1}{0.025}$ x 1470 J = 58 800 J Heat of precipitation of AgCl = -58.8 kJ mol^{-1}	1 1
	(e)	(i)	$Ag^+ + Cl^- \rightarrow AgCl \quad \Delta H = -58.8 kJmol^{-1}$ // $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3 \quad \Delta H = -58.8 kJmol^{-1}$	1
		(ii)	 1. Label axes 2. Energy levels of reactants and products correct with formula of reactants and products 3. Heat of precipitation written	 1 1 1
			Total	

Question No			**Mark scheme**	**Mark**
3.	(a)	(i)	Ethanol	1
		(ii)	1260 kJ of heat energy is released when one mole of ethanol is burnt completely in excess oxygen	1
	(b)	(i)	No of moles of alcohol = 0.23 / 46 = 0.005 mol 1 mol of alcohol burnt released 1260 kJ Thus, 0.005 mol of alcohol burnt released 6.3 kJ	1 1
		(ii)	$mc\theta$ = 6.3 kJ $mc\theta$ = 6.3 x 1000 θ = 6300/ 200 x 4.2 = 7.5 ^{0} C	 1 1
	(c)		Heat is lost to the surrounding // Heat is absorbed by the apparatus or containers // Incomplete combustion of alcohol	1

	(d)	(i)	 1. Label axes 2. Energy levels of reactants and products correct with formula of reactants and products 3. Heat of combustion written	1 1 1
		(ii)	 1. Label 2. Functional	1 1
	(e)	(i)	- 2656 kJmol^{-1} // 2500-2700 kJmol^{-1}	1
		(ii)	1. The molecular size/number of carbon atom per molecule propanol is bigger/higher methanol 2. Combustion of propanol produce more carbon dioxide and water molecules 3. More heat is released during formation of carbon dioxide and water molecules	1 1 1
			Total marks	

BAHAGIAN B

<table>
<tr><th colspan="3">Question No</th><th>Mark scheme</th><th>Mark</th></tr>
<tr><td>4</td><td>(a)</td><td>(i)</td><td>
<table>
<tr><td>Characteristic</td><td>Diagram 4.1</td><td>Diagram 4.2</td></tr>
<tr><td>Change in temperature</td><td>Increase</td><td>Decrease</td></tr>
<tr><td>Type of chemical reaction</td><td>Exothermic reaction</td><td>Endothermic reaction</td></tr>
<tr><td>Energy content of reactants and products</td><td>The total energy content of the reactants more than the energy content of the products</td><td>The total energy content of the reactants less than the energy content of the products</td></tr>
<tr><td>Amount of heat absorbed /realeased during breaking of bonds</td><td>Amount of heat absorbed for the breaking of bond in the reactant is <u>less</u> than heat released during formation of bond in the products</td><td>Amount of heat absorbed for the breaking of bond in the reactant is <u>more</u> than heat released during formation of bond in the products</td></tr>
</table>
</td><td>1
1
1+1
1+1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Number of moles of $FeSO_4$ = $\frac{MV}{1000}$
= $\frac{(0.2)(50)}{1000}$ = 0.01 mol
Heat change = 0.01 x 200 kJ
= 2 kJ // 2000 J
Heat change = mcθ
θ = $\frac{2000}{(50)(4.2)}$
θ = 9.5 ^oC</td><td>1
1
1</td></tr>
<tr><td></td><td>(b)</td><td colspan="2">1. Number of mole of Ag^+ ion in both experiment
= $\frac{25 \times 0.5}{1000}$ // 0.0125 mol
2. Number of mole of Cl^- ion in both experiment
= $\frac{25 \times 0.5}{1000}$ // 0.0125 mol
3. Number of mole of silver chloride formed is the same
4. Na^+ ion and K^+ ion not involved in the reaction // Ag^+ ion and Cl^- involved in the reaction</td><td>1
1
1
1</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>Heat change = mcθ
= (100)(4.2)(42.2 – 30.2)
= 5040 J / 5.04 kJ

Number of moles of HCl / H^+ ion = $\frac{(50)(2}{1000}$ = 0.1 mol
Number of moles of NaOH / OH^- ion = $\frac{(50)(2)}{1000}$ = 0.1 mol
The heat of neutralization = $\frac{5.04}{0.1}$
ΔH = - 50.4 kJ mol^{-1}</td><td>1
1
1
1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Temperature change is 12.0 ^oC // same
Number of moles of sodium hydroxide reacted when hydrochloric acid or sulphuric acid is used is the same // 0.01 mol
Number of mole of water formed when hydrochloric acid or sulphuric acid used is the same // 0.01 mol</td><td>1
1
1</td></tr>
</table>

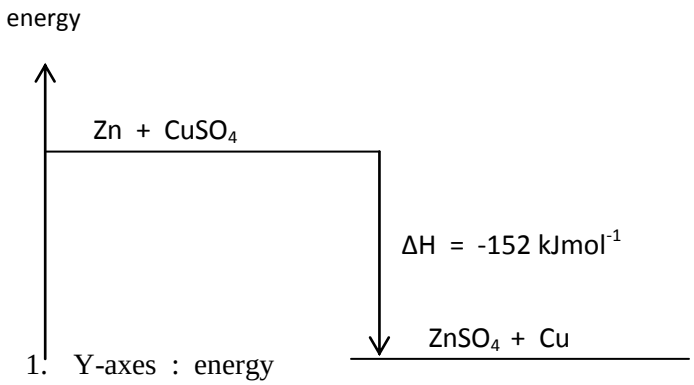
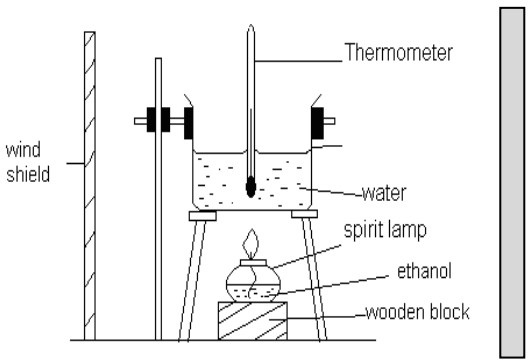
			H^+ ion in excess when sulphuric acid is used	1
			Total marks	20

5	(a)	(i)	Neutralisation//Exothermic reaction	1
		(ii)	Total energy content of reactant is higher than total energy content in product	1
		(iii)	1. The heat of neutralization of Experiment 1 is higher than Experiment 2 2. HCl is strong acid while ethanoic acid is weak acid 3. HCl ionises completely in water to produce high concentration of H^+ ion 4. CH_3COOH ionizes partially in water to produce low concentration of H^+ ion and most of ethanoic acid exist as molecules 5. In Expt 2,Some of heat given out during neutralization reaction is used to dissociate the ethanoic acid molecules completely in water//part of heat that is released is used to break the bonds in the molecules of ethanoic acid that has not been ionised	1 1 1 1 1
	(b)	(i)	No of mol acid/alkali= 50 X 1 /1000= 0.05 Q = Δ H X no of mol = 57.3 X 0.05 = 2.865 kJ // 2865 J	1 1 1
		(ii)	2865 = 100 X 4.2 X 0 θ = 2865 ÷ 420 = 6.8 ^oC (correct unit)	1 1 1
		(iii)	1. Some of heat is lost to the sorrounding 2. Heat is absorbed by polystyrene cup	1 1
	(c)			

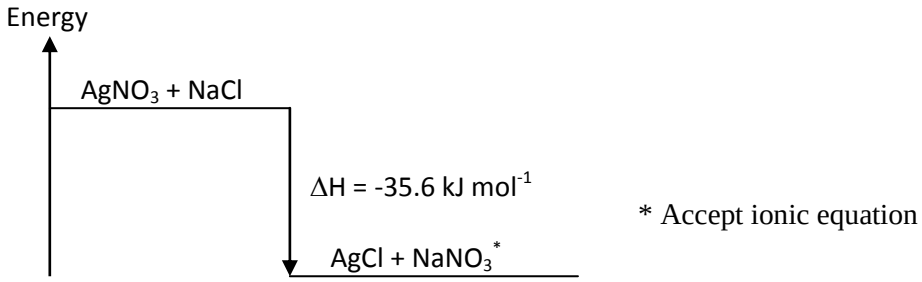
A	B
The reaction is exothermic// Heat is released to the surrounding during the reaction	The reaction is endothermic// Heat is absorbed from the surrounding during the reaction
Heat released is x kJ when 1 mol product is formed	Heat absorbed is y kJ when 1 mol product is formed.
The total energy content in reactant is higher than total energy content in product	The total energy content in reactant is lower than total energy content in product
The temperature increases during the reaction	The temperature decreases during the reaaction
Heat released during the formation of bond in product is higher than heat absorbed during the breaking of bond in reactant	Heat absorbed during the breaking of bond in reactant is higher than heat released during the formation of bond in product

			1 1 1 1 1
		TOTAL	20

BAHAGIAN C

6	(a)	(i)	 1. Y-axes : energy 2. Two different level of energy	1 1
		(ii)	1. reactants have more energy // products have less energy 2.energy is released during the experiment // this is exothermic reaction	1 1
	(b)		No. of mol of H^+ ion/OH^- = 1x50/1000// 0.05 Heat change = 100x 4.2 x7//2940 Joule//2.94 kJ Heat of neutralization= -2940/0.05 = -58800 J mol^{-1}//-58.8 kJ mol^{-1}	1 1 1 1
	(c)		1. Heat of combustion of propane is higher 2. The molecular size/number of carbon atom per molecule propane is bigger/higher 3. Produce more carbon dioxide and water molecules//released more heat energy	1 1 1
			1. Methanol/ethanol/ propanol, Diagram: 2. -labelled diagram 3. -arrangement of apparatus is functional  1. (100-250 cm^3)of water is measured and poured into a copper can and the copper can is placed on a tripod stand 2. the initial temperature of the water is measured and recorded 3. a spirit lamp with ethanol is weighed and its mass is recorded 4. the lamp is then placed under the copper can and the wick of the lamp is lighted up immediately 5. the water in the can is stirred continuously until the temperature of the water increases by about 30°C. 6. the flame is put off and the **highest temperature** reached by the water is recorded 7. The lamp and its content is weighed and the mass is recorded …. 8 max 4	1 1 1..3 ..4

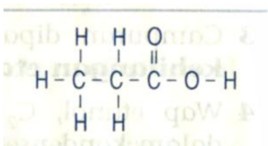
		Data The highest temperature of water = t_2 The initial temperature of water = t_1 Increase in temperature, θ = $t_2 - t_1 = \theta$ Mass of lamp after burning = m_2 Mass of lamp before burning = m_1 Mass of lamp ethanol burnt, m = $m_1 - m_2 = m$ …..1 Calculation : Number of mole of ethanol, C_2H_5OH, n = $\frac{m}{46}$ ……1 The heat energy given out during combustion by ethanol = the heat energy absorbed by water= 100x x c x θ J Heat of combustion of ethanol = $\frac{m\,c\,\theta}{n}$ KJ mol^{-1} = -p kJ/mol …1		..3
			Total marks	20

Question No			Mark scheme	Mark
7	(a)	(i)	Heat change = mcθ = (25+25)(4.2)(33-29) = 445 J Heat of precipitation of AgCl = - 445 / 0.0125 = -35600 J mol^{-1} // 35.6 kJ mol^{-1}  * Accept ionic equation 1. The position and name /formulae of reactants and products are correct. 2. Label for the energy axis and arrow for two levels are shown.	1 1 1 1
	(b)	(i)	1. HCl is a strong acid // CH_3COOH is a weak acid. 2. HCl ionised completely in water to produce higher concentration of H^+ ion. // 3. CH_3COOH ionised partially in water to produce lower concentration of H^+ ion. 4. during neutralisation reaction, some of the heat released are absorbed by CH_3COOH molecules to dissociate further in the molecules.	4Max **3**
		(ii)	1. H_2SO_4 is a diprotic acid// HCl is a monoprotic acid. 2. H_2SO_4 produced two moles of hydrogen ion/H^+ when one mole of the acid ionised in water // 3. HCl produced one mole of hydrogen ion/ H^+ when one mole of the acid ionised in water. 4. When one mole of OH^- reacts with two moles of H^+ will produce one mole of water, the heat of neutralisation is still the same as Experiment I because the definition of heat of neutralisation is based on the formation of one mole of water.	4Max **3**

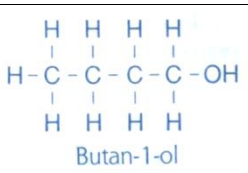
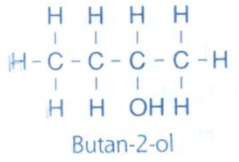
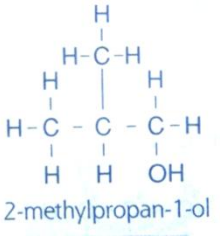
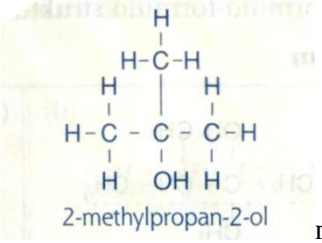
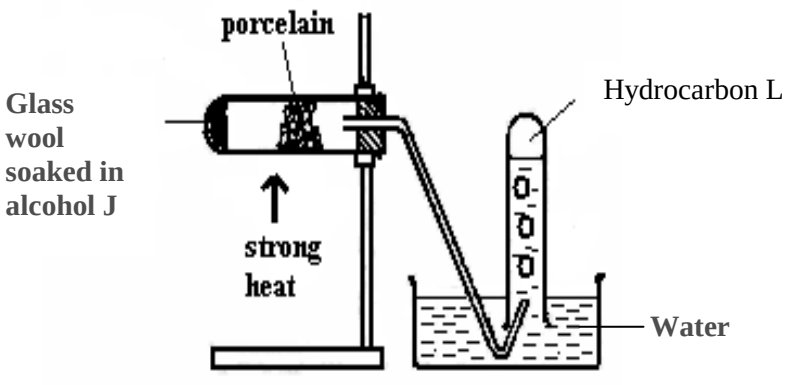
	(c)	- apparatus and material : 2 marks - procedures : 5 marks - Table : 1 mark - Calculation : 2 marks <u>Sample answer:</u> Apparatus : Polystyrene cup, thermometer, measuring cylinder. Materials : Copper (II) sulphate, $CuSO_4$ solution, zinc powder. Procedures : 1. Measure 25 cm^3 of 0.2 mol dm^{-3} copper (II) sulphate, $CuSO_4$ solution and pour it into a polystyrene cup. 2. Put the thermometer in the polystyrene cup and record the initial temperature of the solution. 3. Add half a spatula of zinc powder quickly and carefully into the polystyrene cup. 4. Stir the reaction mixture with the thermometer to mix the reactants. 5. Record the highest temperature reached. Tabulation of data: Initial temperature of $CuSO_4$ solution (^oC) θ_1 Highest temperature of the reaction mixture (^oC) θ_2 Temperature change (^oC) $\theta_2 - \theta_1$ ....1 Calculation : Number of mole of $CuSO_4$ = MV/1000 = (0.2)(25)/1000 = 0.005 mol ……1 Heat change = $mc(\theta_2 - \theta_1)$ = x J Heat of displacement = x / 0.005 kJ mol^{-1} = y kJ mol^{-1} …….1	 1 1 1 1 1 1 1
		TOTAL	20

CARBON COMPOUND

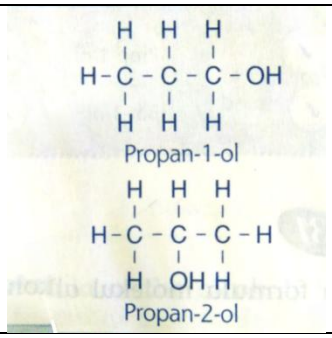
<u>BAHAGIAN A</u>

1 (a)	hydroxyl /-OH	1
(b) (i)	Catalyst: Nickel Temperature : 180^oC	1 1
(ii)	Flow gas P and gas Q into test tube containing bromine water respectively Compound P : no change Compound Q : brown colour of bromine water turn colourless	1 1 1
(c)		1

(d) (i)	esterification	1
(ii)	$C_3H_7OH + C_2H_5COOH \rightarrow C_2H_5COOC_3H_7 + H_2O$	1+1
(iii)	fragrant /sweet smell	1
	TOTAL	11

2 (a)(i)	Formula that show the actual number of atom of element in the compound	1
(ii)	$C_nH_{2n+1}OH$	1
(b)	    mana-mana dua	1+1
(c)(i)	oxidation 1	1
(ii)	acidified potassium manganate(VII) solution	1
(iii)	butanoic acid	1
(d)(i)		1+1
(ii)	$C_4H_9OH \rightarrow C_4H_8 + H_2O$	1
	TOTAL	10

BAHAGIAN B

<table>
<tr><td>1 (a)</td><td> 
</td><td>1</td></tr>
<tr><td>(b)(i)</td><td>C H

85.7 14.3
12 1

1 2

CH_2

(CH2)n = 42 /
14n = 42
n=3
C_3H_6</td><td>1

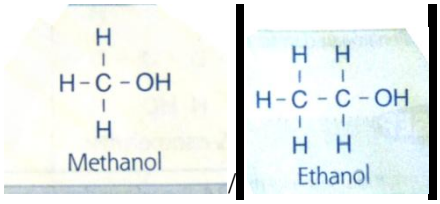
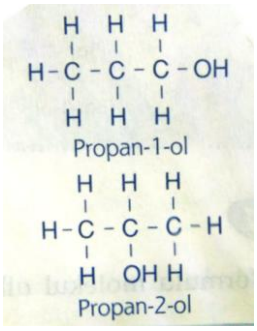
1

1

1

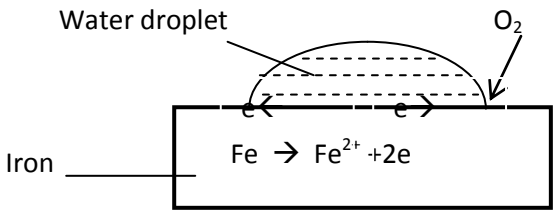
1</td></tr>
<tr><td>(ii)</td><td>propene</td><td>1</td></tr>
<tr><td>(iii)</td><td>C_nH2_n</td><td>1</td></tr>
<tr><td>(c)</td><td><table>
<tr><th></th><th>P</th><th>Q</th></tr>
<tr><td>The number of carbon atom</td><td>2</td><td>2</td></tr>
<tr><td>The number of hydrogen atom</td><td>4</td><td>6</td></tr>
<tr><td></td><td colspan="2">a number of hydrogen atom Q is higher
r P and Q have a different number of H atom</td></tr>
<tr><td>Type of covalent bond between carbon</td><td>Double bond</td><td>Single bond</td></tr>
<tr><td>Type of hydrocarbon // Type of homologous series // General formula // Name of compound // Molecular formula of the compound</td><td>Unsaturated // Alkene // C_nH_{2n} // Ethene // C_2H_4</td><td>Saturated // Alkane // C_nH_{2n+2} // Ethane // C_2H_6</td></tr>
</table></td><td>1
1</td></tr>
<tr><td>(d)</td><td>Propanoic acid contains a lot of hydrogen ions
H^+ ions neutralises the negative charges on the protein membranes
The particles collide and the protein membranes break
Rubber molecules combine with one another
The existent of bacteria in natural conditions
Bacteria produce little hydrogen ions</td><td>1
1
1
1
1
1
Max 4</td></tr>
<tr><td></td><td>TOTAL</td><td>20</td></tr>
</table>

BAHAGIAN C

1(a)(i)	Methanol /Ethanol / Propanol   	1 1…2
(ii)	Compound Y : Ethene / propene Compound Z : Ethane / propane	1 1…2
(iii)	Compound Y Sample answer 1. React with steam / water produce ethanol / propanol 2. React with bromine water to produce 1,2-dibromoethane Compound Z Sample answer 1. Undergoes combustion to produce carbon dioxide and water 2. Undergoes substitution reaction Flow gas Y and gas Z into test tube containing bromine water respectively Compound Z : no change Compound Y : brown colour of bromine water turn colourless	 1 1 1 1 1 1 1…7
	Sample answer 1. Alcohol : methanol 2. Carboxylic acid : ethanoic acid Procedur 1. Pour [2 – 10] cm^3 of glacial ethanoic acid into boiling tube 2. Add [2 – 10] cm^3 of absolute methanol into the acid 3. Add [1 – 2] cm^3 / a few drops of concentrated sulphuric acid to the mixture 4. Heat the mixture Chemical reaction 5. $CH_3COOH + CH_3OH \rightarrow CH_3COOCH_3 + H_2O$ 6. Sweet smell	 1 1 1 1 1 1 1+1 1
	TOTAL	20

BAHAGIAN A

No.			Answer	Mark
1	(a)	(i)	Iodine r: formula/iodide/iodine gas	1
		(ii)	MnO_4^- + **8** H^+ + **5** e → Mn^{2+} + **4** H_2O	1
		(iii)	+7 → +2 reduction	1 1
		(iv)	Potassium bromide // iron(II) sulphate // [any reducing agent]	1
	(b)	(i)	Zinc	1
		(ii)	1. Correct formulae of reactant and product 2. Balanced equation 2 Zn + O_2 → 2 ZnO a: 2 J + O_2 → 2 JO	1 1
		(iii)	K,J, L	1
		(iv)	Predict : no changes **r:** no reaction Reason : L is more reactive than J/zinc **r:** more electropositive	1 1
			TOTAL	11

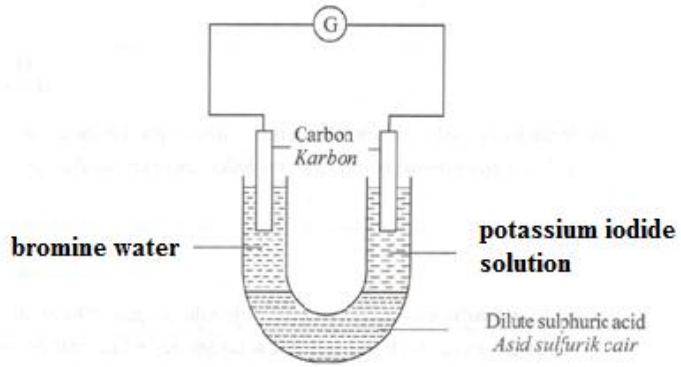
Question No	Mark Scheme		Mark
2(a)	A reaction in which oxidation and reduction occur **simultaneously / at the same time /** *tindak balas yang berlaku di mana pengoksidaan dan penurunan berlaku serentak / pada masa yang sama*		1
2(b)(i)	Green solution turn brown // *larutan hijau bertukar perang*		1
2(b)(ii)	Oxidation // *pengoksidaan*		1
2(b)(iii)	Fe^{2+} → Fe^{3+} + e		1
2(b)(iv)	0 (Note : bromine, Br_2 is diatomic molecule)		1
2(c)(i)	magnesium		1
2(c)(ii)	Mg + Fe^{2+} → Mg^{2+} + Fe		1
2(c)(iii)	From +2 to 0 **(reject: 2 to 0 // 2+ to 0)**		1
2(d)		The answer must include: 1. label for **water, iron** and **oxygen**. 2. ionisation of iron in the water droplet (at anode) 3. flow of electron to the edge of water droplet	1 1 1
		TOTAL	11

BAHAGIAN B

Question No	Mark Scheme	Mark
1(a)(i)	**Reaction I:** $Mg + CuSO_4 \longrightarrow MgSO_4 + Cu$ **Reaction II:** $2KI + Pb(NO_3)_2 \longrightarrow PbI_2 + 2KNO_3$	1 1.....2
1(a)(ii)	**Reaction I** : a **redox** reaction // *tindak balas redoks* **Reaction II** : **not** a redox reaction // *bukan tindak balas redoks* <u>Reaction I</u>: Oxidation number of magnesium changes/increases from **0** to **+2** // Oxidation number of copper changes/decreases from **+2** to **0** *Nombor pengoksidaan magnesium berubah/bertambah dari 0 to +2 // nombor pengoksidaan kuprum berubah/bertambah dari +2 kepada 0* <u>Reaction II</u>: No change in oxidation number // *tiada perubahan nombor pengoksidaan*	1 1 1 1.....4
1(b)	Oxidation number of lead in compound P is + **2** Oxidation number of lead in compound Q is **+4** Compound P : Lead (**II**) oxide Compound Q : Lead (**IV**) oxide	1 1 1 1.....4
1(c)(i)	1.carbon is cheap // karbon adalah murah 2. carbon is easily available // *karbon mudah diperoleh*	1 1.....2
1(c)(ii)	$2Fe_2O_3 + 3C \longrightarrow 4Fe + 3CO_2$ 1. correct formula for reactants and products 2. balanced equation • Substance that is oxidised: carbon // C • Substance that is reduced : iron (III) oxide // Fe_2O_3 • Oxidizing agent : iron (III) oxide // Fe_2O_3 • Reducing agent : carbon // C	 1 1 1 1 1 1....6
1(c)(iii)	No // *Tidak* Aluminium is more reactive than carbon in **reactivity series** // *aluminium lebih reaktif berbanding karbon dalam siri kereaktifan*	1 1.....2
	TOTAL	20

BAHAGIAN C

Question No	Mark Scheme	Mark
1(a)	<u>Procedure:</u> 1. 2 cm^3 of 0.1 mol dm^{-3} of potassium iodide solution is poured into test tube 2. Add 2cm^3 of chlorine water into test tube 3. shake the mixture 4. record the observation 5.repeat step 1 to 4 by using potassium chloride and iodine water to replace potassium iodide and chlorine water <u>Confirmatory test:</u> 1. add 1,1,1-trichloroethane into test tube and shake the mixture 2. purple layer is formed, confirm that iodine is present	 1 1 1 1 1 1 1

	Explanation on oxidation and reduction process: 1. iodide ion is oxidised / undergo oxidation 2. iodide ion lose electrons 3. chlorine molecule is reduced 4. chlorine molecule gain electrons Ionic equation: $Cl_2 + 2I^- \longrightarrow I_2 + 2Cl^-$	 1 1 1 1 1 **Max=10**
1(b)	Material : • Any suitable oxidizing agent (example : acidified potassium manganate(VII) solution,acidified potassium dichromate(VI) solution, chlorine water, bromine water), • Any suitable reducing agent (example : potassium iodide solution, iron(II) sulphate solution) and any suitable electrolyte] Apparatus : U-tube , carbon electrodes , connecting wires and galvanometer Diagram: Example:  1. functional 2. lable Procedure: 1.Sulphuric acid is added into a U-tube until 1/3 full 2.Bromine water is added into one end of the U-tube while potassium iodide solution is added into the other end of the U-tube carefully 3.Two carbon electrodes connected by connecting wires to a galvanometer are dipped into the two solution at the two ends of the U-tube. Observation The colour of bromine water change from brown to colourless// The colour of potassium iodide solution change from colourless to yellow/brown// The needle of the galvanometer is deflected Oxidation reaction : $Br_2 + 2e \rightarrow 2Br^-$ Reduction reaction : $2I^- \rightarrow I_2 + 2e$	1 1 1 1 1 1 1 1 1 1 1 1 **Max = 10**
	TOTAL	**20**

END OF MARKING SCEME