MODUL LATIHAN BERFOKUS
SIJIL PELAJARAN MALAYSIA 2016

ANJURAN
MAJLIS PENGETUA SEKOLAH MALAYSIA
NEGERI PULAU PINANG

SIJIL PELAJARAN MALAYSIA 2016 4541/1
KIMIA
Kertas 1
Ogos
1 ¼ jam **Satu jam lima belas minit**

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

Arahan:

1. *Kertas soalan ini mengandungi* **50** *soalan.*

2. *Jawab* **semua** *soalan.*

3. *Tiap-tiap soalan diikuti oleh empat pilihan jawapan iaitu* **A, B, C** *dan* **D.** *Bagi tiap-tiap soalan, pilih* **satu** *jawapan sahaja.* **Hitamkan** *jawapan anda pada kertas jawapan objektif yang disediakan.*

Kertas soalan ini mengandungi 26 halaman bercetak

1 Diagram 1 shows the change in physical state of ice cubes.

Rajah 1 menunjukkan perubahan keadaan jirim bagi ketulan ais.

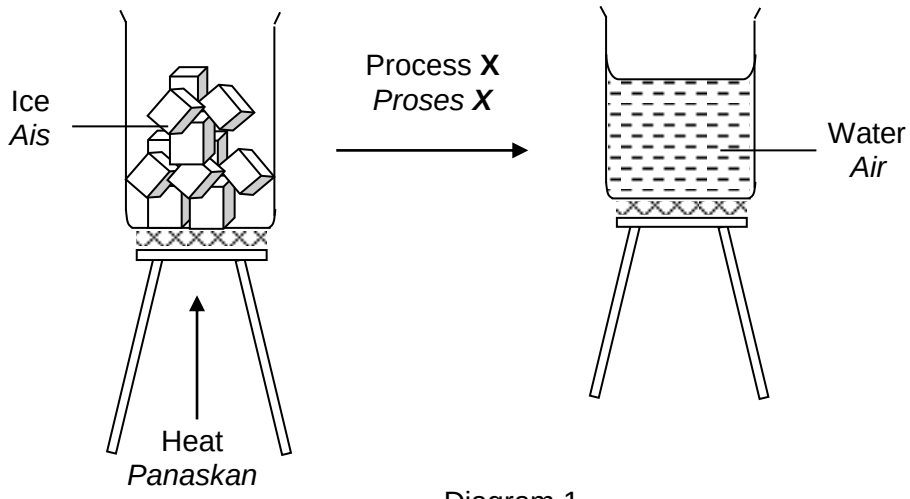


Diagram 1
Rajah 1

What is process X?

Apakah proses X?

A Boiling
Pendidihan

B Melting
Peleburan

C Condensation
Kondensasi

D Freezing
Pembekuan

2 Psychiatric patients are always restless and normally experience difficulties in sleeping. Which medicine is suitable to treat these patients?

Pesakit psikiatrik sentiasa resah dan biasanya mengalami masalah sukar untuk tidur. Ubat yang manakah sesuai digunakan untuk merawat pesakit tersebut?

A Aspirin
Aspirin

B Codeine
Kodeina

C Barbiturate
Barbiturat

D Streptomycin
Streptomisin

3 Which of the following is a soluble sulphate salt?

Antara berikut, yang manakah ialah garam sulfat terlarutkan?

A Lead(II) suphate
Plumbum(II) sulfat

B Calcium sulphate
Kalsium sulfat

C Potassium sulphate
Kalium sulfat

D Barium sulphate
Barium sulfat

4 Diagram 2 shows the apparatus set-up of an experiment to determine the empical formula of copper(II) oxide.

Rajah 2 menunjukkan susunan radas bagi suatu eksperimen untuk menentukan formula empirik kuprum(II) oksida.

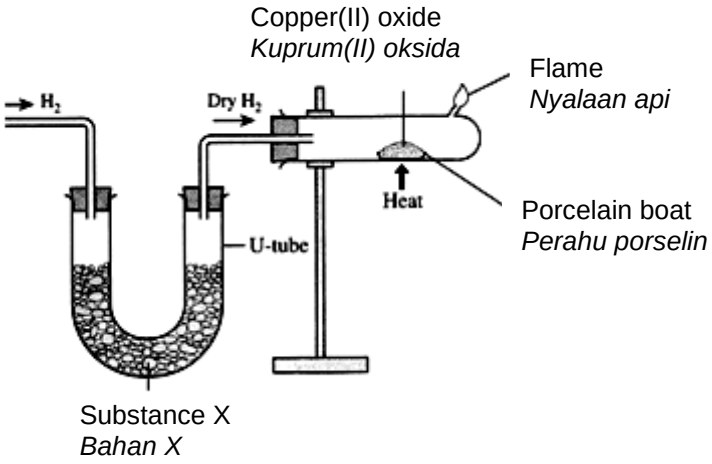


Diagram 2
Rajah 2

What is the function of substance X?

Apakah fungsi bahan X?

A To purify hydrogen gas
Untuk menulenkan gas hidrogen

B To produce oxygen gas
Untuk menghasikan gas oksigen

C To dry hydrogen gas
Untuk mengeringkan gas hidrogen

D Act as catalyst
Bertindak sebagai mangkin

5 Elements X and Y are located in Group 17 in the Periodic Table of Elements.

Unsur X dan Y terletak dalam Kumpulan 17 di dalam Jadual Berkala Unsur.

- Y is more reactive than X
  Y lebih reaktif daripada X
- The melting point of Y is lower than X
  Takat lebur Y lebih rendah daripada X

Which one is the possible pair of elements X and Y?

Pasangan manakah yang mungkin merupakan unsur bagi X dan Y?

	Element X *Unsur X*	Element Y *Unsur Y*
A	Bromine *Bromin*	Chlorine *Klorin*
B	Bromine *Bromin*	Iodine *Iodin*
C	Chlorine *Klorin*	Bromine *Bromin*
D	Fluorin *Florin*	Bromine *Bromin*

6 What happens to the atoms of elements during the formation of covalent bonds?

Apakah yang berlaku kepada atom unsur semasa pembentukan ikatan kovalen?

A Accept electrons
Menerima elektron

B Transfer electrons
Memindah elektron

C Donate electrons
Menderma elektron

D Share electrons
Berkongsi elektron

7 In the electrolysis of concentrated sodium chloride solution, chloride ions are chosen for discharged at the anode instead of hydroxide ions because

Dalam elektrolisis larutan natrium klorida pekat, ion klorida dipilih untuk dinyahcas di anod dan bukannya ion hidroksida kerana

A Chloride ion is more reactive than hydroxide ion
Ion klorida lebih reaktif daripada ion hidroksida

B Concentration of chloride ions is higher than hydroxide ions
Kepekatan ion klorida lebih tinggi daripada ion hidroksida

C Number of chloride ion is lower than hydroxide ion
Bilangan ion klorida kurang daripada ion hidroksida

D Chloride ion is located higher than hydroxide ion in the elctrochemical series
Ion klorida berada di atas ion hidroksida dalam siri elektrokimia

8 Which substance is a base?

Bahan manakah adalah suatu bes?

A Zinc sulphate
Zink sulfat

B Magnesium oxide
Magnesium oksida

C Sodium chloride
Natrium klorida

D Carbon dioxide
Karbon dioksida

9 What is the main element present in brass and bronze?

Apakah unsur utama yang hadir di dalam loyang dan gangsa?

A Iron
Ferum

B Tin
Stanum

C Zinc
Zink

D Copper
Kuprum

10 Which catalyst is used for the decomposition of hydrogen peroxide?

Mangkin manakah yang sesuai digunakan dalam proses penguraian hidrogen peroksida?

A Manganese(IV) oxide
Mangan(IV) oksida

B Copper(II) sulphate
Kuprum(II) sulfat

C Magnesium sulphate
Magnesium sulfat

D Zinc nitrate
Zink nitrat

11 What is the general formula for alcohol?

Apakah formula am bagi alkohol?

A C_nH_{2n}

B C_nH_{2n+2}

C $C_nH_{2n+1}OH$

D $C_nH_{2n+1}COOH$

12 Which substance is an oxidising agent?

Bahan manakah ialah suatu agen pengoksidaan?

A Sulphur dioxide
Sulfur dioksida

B Potassium oxide
Kalium oksida

C Iron (II) sulphate
Ferum (II) sulfat

D Bromine water
Air bromin

13 A cold pack can be placed on the forehead of a patient with high fever to reduce the body temperature. Which of the following reaction can be used in the cold pack?

Pek sejuk boleh diletakkan pada dahi pesakit yang mengalami demam panas untuk mengurangkan suhu badan. Tindak balas manakah boleh digunakan dalam pek sejuk?

A Dissolving solid calcium chloride in water
Melarutkan pepejal kalsium klorida dalam air

B Dissolving magnesium sulphate powder in water
Melarutkan serbuk magnesium sulfat dalam air

C Dissolving sodium hydroxide pellets in water
Melarutkan pelet natrium hidroksida dalam air

D Dissolving ammonium chloride crystals in water
Melarutkan hablur ammonium klorida dalam air

14 Diagram 3 shows part of an apparatus set-up to determine the empirical formula of copper oxide.

Rajah 3 menunjukkan sebahagian daripada susunan radas untuk menentukan formula empirik kuprum oksida.

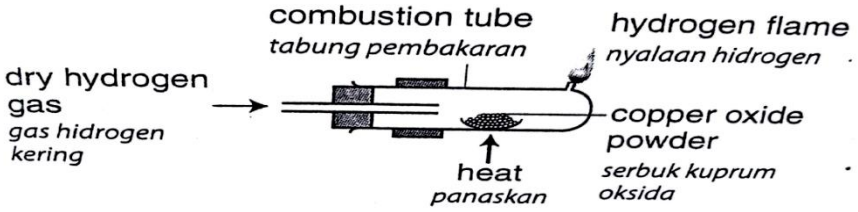


Diagram 3
Rajah 3

What are the precautionary steps that need to be taken when performing this experiment?

Apakah langkah berjaga-jaga yang perlu diambil semasa menjalankan eksperimen ini?

I The combustion tube needs to be slanted slightly towards the tiny opening.
Tabung pembakaran perlu dicondongkan sedikit ke arah lubang kecil.

II Hydrogen, H_2 gas must be flowed through the apparatus for several minutes before heating.
Gas hidrogen, H_2 perlu dialirkan melalui radas itu selama beberapa minit sebelum pemanasan dijalankan.

III Hydrogen, H_2 gas is flowed through the apparatus when cooling the product to room temperature.
Gas hidrogen, H_2 dialirkan melalui radas itu semasa menyejukkan hasil ke suhu bilik

IV During the cooling process, the flow of hydrogen gas must be stopped to prevent explossion.
Semasa proses penyejukan, aliran gas hidrogen mesti dihentikan untuk mengelakkan letupan.

A I and II
I dan II

B II and IV
II dan IV

C I, II and III
I, II dan III

D II, III and IV
II, III dan IV

15 Which of the following items is made from ceramic?

Antara berikut, manakah bahan buatan daripada seramik?

A Claypot
Periuk tanah liat

B Contact lense
Kanta sentuh

C Medal
Pingat

D Stainless steel spoon
Sudu keluli nirkarat

16 Which of the following elements are in Group 18 in the Periodic Table of Elements?

Yang manakah antara unsur-unsur berikut berada dalam Kumpulan 18 dalam Jadual Berkala Unsur?

A Helium and xenon
Helium dan xenon

B Hydrogen and neon
Hidrogen dan neon

C Oxygen and radon
Oksigen dan radon

D Hydrogen and xenon
Hidrogen dan xenon

17 Which statement is **true** about the electrolysis process to electroplate an iron chain with nickel?

*Pernyataan manakah **benar** tentang proses elektrolisis untuk menyadurkan satu rantai besi dengan nikel?*

A Iron chain is used as the anode
Rantai besi dijadikan anod

B *Nickel plate acts as negative electrode*
Kepingan nikel bertindak sebagai elektrod negatif

C *Alternating current is used*
Arus ulang-alik digunakan

D *Nickel(II) sulphate solution is used as electrolyte*
Larutan nikel (II) sulfat dijadikan elektrolit

18 What is meant by melting point?

Apakah yang dimaksudkan dengan takat lebur?

A The temperature when ice turns to water
Suhu di mana ais bertukar kepada air

B The temperature when water turns to steam
Suhu di mana air bertukar kepada stim

C The temperature when water turns to ice
Suhu di mana air bertukar kepada ais

D The temperature when steam turns to water
Suhu di mana stim bertukar kepada air

19 Which compound is saturated hydrocarbon?

Sebatian manakah adalah suatu hidrokarbon tepu?

A Ethane
Etana

B Ethene
Etena

C Ethanol
Etanol

D Ethanoic acid
Asid etanoik

20 Diagram 4 shows the apparatus set-up to determine the empirical formula of magnesium oxide.

Rajah 4 menunjukkan susunan radas untuk menentukan formula empirik bagi magnesium oksida.

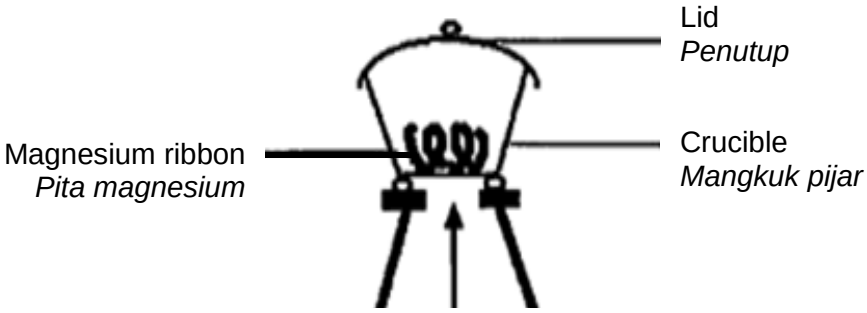


Diagram 4
Rajah 4

Which of the following can be observed from the experiment?

Antara berikut yang manakah boleh diperhatikan dalam eksperimen ini?

A A black solid is formed
Pepejal hitam terbentuk

B Magnesium ribbon burns slowly in the air
Pita magnesium terbakar dengan perlahan di dalam udara

C White fumes can be seen during the reaction
Wasap putih terbentuk semasa tindak balas berlaku

D Water droplets can be found on the crucible lid after the reaction
Titisan air terbentuk pada penutup mangkuk pijar selepas tindak balas

21 Diagram 5 shows part of the Periodic Table of Elements.

Rajah 5 menunjukkan sebahagian daripada Jadual Berkala Unsur.

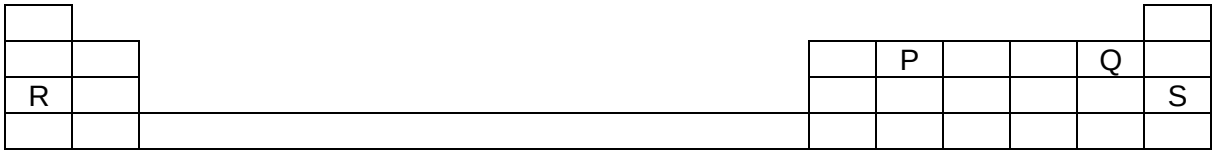


Diagram 5
Rajah 5

Which of the following shows the correct sequence according to the decreasing order in atomic size?

Antar berikut, yang manakah turutan yang betul berdasarkan tertib menurun saiz atom?

A R, S, P, Q

B Q, P, S, R

C P, Q, R, S

D S, R, Q, P

22 Table 1 shows the electron arrangement of atoms P, Q, R and S.

Jadual 1 menunjukkan susunan elektron bagi atom-atom P, Q, R dan S.

Atom *Atom*	P	Q	R	S
Electron arrangement *Susunan elektron*	2.1	2.8.5	2.8.3	2.6

Table 1
Jadual 1

Which of the following pairs of elements can combine to form a covalent compound?

Pasangan unsur yang manakah dapat bergabung membentuk sebatian kovalen?

A P and R
P dan R

B P and S
P dan S

C Q and R
Q dan R

D Q and S
Q dan S

23 Diagram 6 shows the piston is pushed from position A to position B.

Rajah 6 menunjukkan omboh yang ditekan daripada kedudukan A ke kedudukan B.

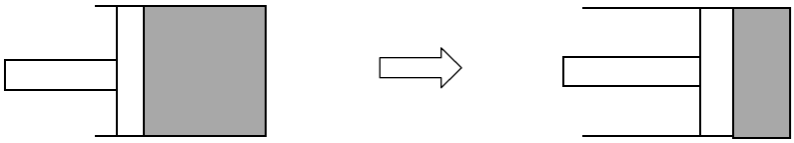


Diagram 6
Rajah 6

Which statement is **true** after the piston is pushed?

*Pernyataan manakah **benar** selepas omboh ditekan?*

A The collision between particles increase
Perlanggaran antara zarah-zarah bertambah

B The number of particles increase
Bilangan zarah-zarah bertambah

C The pressure decreases
Tekanan berkurang

D The size of particles decreases
Saiz zarah berkurang

24 When solid potassium nitrate is added to water, the temperature of the liquid falls. What can be concluded from this observation?

Apabila pepejal kalium nitrat dicampur dengan air, suhu cecair menurun. Apakah kesimpulan yang boleh dibuat daripada pemerhatian ini?

A Some of the solid potassium nitrate dissolves in water
Sebahagian daripada pepejal kalium nitrat larut dalam air

B The potassium nitrate ionizes in water
Kalium nitrate mengion dalam air

C The process releases heat to surroundings
Proses ini membebaskan haba ke persekitaran

D The process is endothermic
Proses ini adalah endotermik

25 Which pair of alcohol and carboxylic acid produces ester with the formula $C_2H_5COOCH_3$?

Pasangan alkohol dan asid karboksilik manakah yang menghasilkan ester berformula $C_2H_5COOCH_3$?

A Methanol and ethanoic acid
Metanol dan asid etanoik

B Methanol and propanoic acid
Metanol dan acid propanoik

C Ethanol and propanoic acid
Etanol dan asid propanoik

D Propanol and methanoic acid
Propanol dan asid metanoik

26 Diagram 7 shows different pairs of metals in different test tubes containing potassium hexacyanoferrate (III) solution.

Rajah 7 menunjukkan pasangan logam berbeza di dalam tabung uji berlainan yang mengandungi larutan kalium heksasianoferat (III).

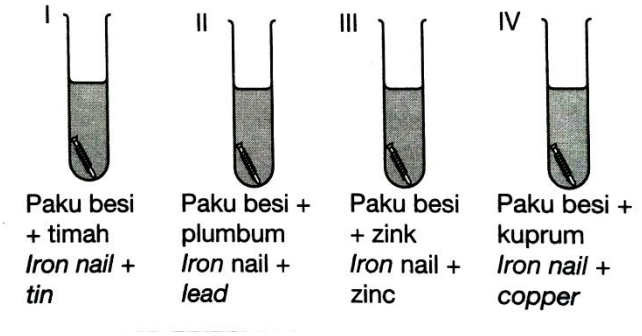


Diagram 7
Rajah 7

After a day, which test tube **does not** form blue spot?

*Selepas satu hari, tabung uji manakah **tidak** membentuk tompok biru?*

A Test tube I
Tabung uji I

B Test tube II
Tabung uji II

C Test tube III
Tabung uji III

D Test tube IV
Tabung uji IV

27 $H_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O$

Sulphuric acid reacts with sodium hydroxide as shown in the above equation.
Which statement is correct about this equation?

Asid sulfurik bertindak balas dengan natrium hidroksida seperti yang ditunjukkan dalam persamaan di atas.
Pernyataan manakah benar mengenai persamaan ini?

A 1 mole sulphuric acid reacts with 2 mole sodium hydroxide
1 mol asid sulfurik bertindak balas dengan 2 mol snatrium hidroksida

B The reaction is a precipitation reaction
Tindak balas adalah tindak balas pemendakan

C Both sulphuric acid and sodium hydroxide are completely reacted
Kedua-dua asid sulfurik dan natrium hidroksida telah lengkap bertindak balas

D A white precipitate is formed
Suatu mendakan putih terbentuk

28 Diagram 8 shows the chemical equations for the reaction between laurate ions, $CH_3(CH_2)_{10}COO^-$ and lauryl sulphate ions, $CH_3(CH_2)_{11}OSO_3^-$ with calcium ions, Ca^{2+} in hard water.

Rajah 8 menunjukkan persamaan kimia bagi tindak balas antara ion laurat, $CH_3(CH_2)_{10}COO^-$ dan ion lauril sulfat, $CH_3(CH_2)_{11}OSO_3^-$ dengan ion kalsium, Ca^{2+} dalam air liat.

$$2CH_3(CH_2)_{10}COO^-_{(aq/ak)} + Ca^{2+}_{(aq/ak)} \rightarrow [CH_3(CH_2)_{10}COO]_2Ca_{(s/p)}$$

$$2CH_3(CH_2)_{11}OSO_3^-_{(aq/ak)} + Ca^{2+}_{(aq/ak)} \rightarrow [CH_3(CH_2)_{11}OSO_3^-]_2Ca^{2+}_{(aq/ak)}$$

Diagram 8
Rajah 8

What is the effect of adding calcium ion on the concentration of laurate ion or lauryl sulphate ion?

Apakah kesan penambahan ion kalsium ke atas kepekatan ion laurat atau ion lauril sulfat?

A The concentration of laurate ion increases
Kepekatan ion laurat bertambah

B The concentration of laurate ion decreases
Kepekatan ion laurat berkurang

C The concentration of lauryl sulphate ion increases
Kepekatan ion lauril sulfat bertambah

D The concentration of lauryl sulphate ion decreases
Kepekatan ion lauril sulfat berkurang

29 Diagram 9 shows the process of producing lead(II) iodide salt.

Rajah 9 menunjukkan proses penghasilan garam plumbum(II) iodida.

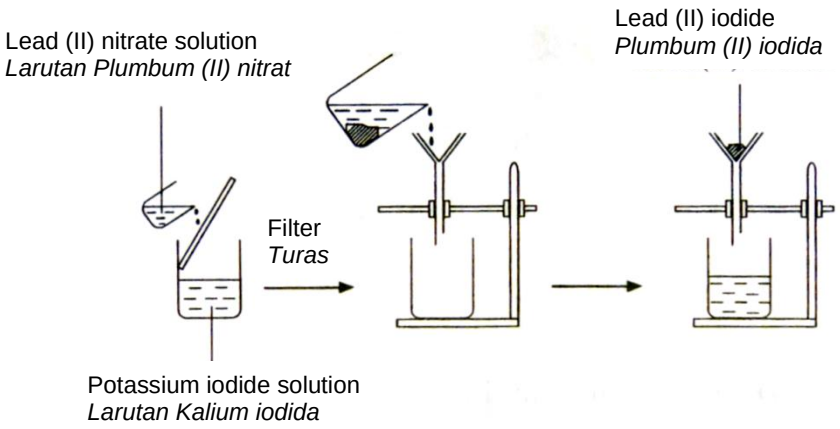


Diagram 9
Rajah 9

What is the process involved in Diagram 9?

Apakah proses yang terlibat dalam Rajah 9?

A Preparation of insoluble salt
Penyediaan garam tak terlarutkan

B Preparation of soluble salt
Penyediaan garam terlarutkan

C Purification of insoluble salt
Penulenan garam tak terlarutkan

D Purification of soluble salt
Penulenan garam terlarutkan

30 Diagram 10 shows the apparatus set-up of a simple chemical cell.

Diagram 10 menunjukkan susunan radas bagi satu sel kimia yang ringkas.

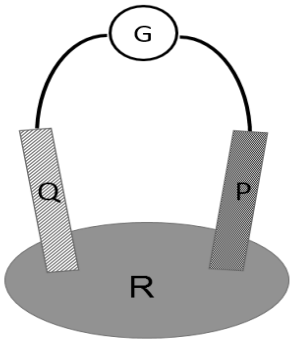


Diagram 10
Rajah 10

Which of the following pairs of P, Q and R, can give the largest deflection of the pointer of the galvanometer?

Antara berikut, pasangan P, Q dan R yang manakah boleh memberikan pesongan jarum galvanometer yang paling besar?

	P	Q	R
A	Iron plate *Kepingan besi*	Copper strips *Kepingan kuprum*	Lime *Limau nipis*
B	Magnesium ribbon *Pita magnesium*	Copper strips *Kepingan kuprum*	potato *ubi kentang*
C	Magnesium ribbon *Pita magnesium*	Copper strips *Kepingan kuprum*	Lime *Limau nipis*
D	Iron plate *Kepingan besi*	Copper strips *Kepingan kuprum*	potato *ubi kentang*

31 Which pair shows the **correct** formula of the named compound?

*Pasangan manakah menunjukkan formula yang **betul** bagi sebatian yang dinamakan?*

	Compound *Sebatian*	Formula *Formula*
A	Copper(II) oxide *Kuprum(II) oksida*	Cu_2O
B	Silver chloride *Argentum klorida*	$AgCl_2$
C	Lead(II) oxide *Plumbum(II) oksida*	PbO_2
D	Barium hydroxide *Barium hidroksida*	$Ba(OH)_2$

32 Diagram 11shows the electron arrangement of ion Z^{2-}.

Rajah 11 menunjukkan susunan elektron bagi ion Z^{2-}.

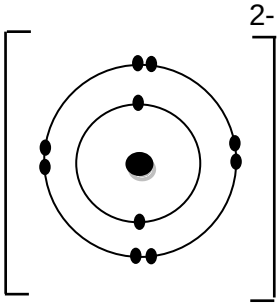


Diagram11
Rajah 11

What is the electron arrangement of atom Z?

Apakah susunan elektron bagi atom Z?

A 2.6

B 2.8

C 2.10

D 2.8.2

33 Diagram 12 shows a polymerisation process.

Rajah 12 menunjukkan proses pempolimeran.

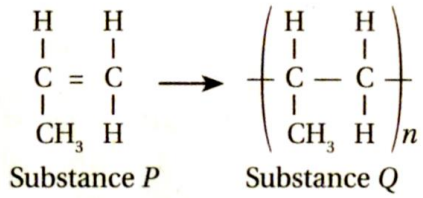


Diagram 12
Rajah 12

Which of the following properties is identical for substances P and Q?

Antara berikut, sifat-sifat yang manakah adalah serupa bagi bahan P dan Q?

A Melting point
Takat lebur

B Density
Ketumpatan

C Composition
Komposisi

D Molecular formula
Formula molekul

34 A redox reaction can be represented by the following equation.

Satu tindak balas redoks boleh diwakili oleh persamaan berikut.

X_2(aq/*ak*) + 2KBr(aq/*ak*) → 2KX(aq/*ak*) + Br_2(aq/*ak*)

Element X is in Group 17 in the Periodic Table of Elements.

What can be observed if element X is replaced with iodine?

Unsur X berada dalam Kumpulan 17 dalam Jadual Berkala Unsur.
Apakah yang dapat diperhatikan jika unsur X digantikan dengan iodin?

A *Brown gas is produced*
Gas perang terhasil

B Colourless solution is produced
Larutan tidak berwarna terhasil

C No change is observed
Tiada perubahan diperhatikan

D Brown colour of the iodine is decolourized
Warna perang larutan iodin dinyahwarnakan

35 The following is a thermochemical equation.

Berikut ialah suatu persamaan termokimia.

$$Zn + CuSO_4 \rightarrow ZnSO_4 + Cu \; ; \quad \Delta H = -190 \text{ kJmol}^{-1}$$

What is the heat change when 4.8 g of copper is formed in this reaction?

Berapakah perubahan haba apabila 4.8 g kuprum terbentuk dalam tindak balas ini?

[Relative atomic mass : Cu= 64]
[Jisim atom relatif : Cu = 64]

A 4750 J

B 9500 J

C 14250 J

D 28500 J

36 Table 2 shows the total volume of hydrogen gas collected at regular intervals for the reaction between magnesium and nitric acid.

Jadual 2 menunjukkan jumlah isipadu gas hidrogen yang dikumpul pada sela masa yang sekata bagi tindak balas antara magnesium dan asid nitrik.

Time/min *Masa/min*	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5
Total volume of hydrogen gas /cm^3 *Jumlah isipadu gas hidrogen/cm^3*	0.00	24.00	45.00	57.00	67.00	74.00	78.00	80.00	80.00	80.00

Table 2
Jadual 2

What is the average rate of reaction in second minute?

Berapakah kadar tindak balas purata dalam minit yang kedua?

A 67.00 cm^3 min^{-1}

B 45.00 cm^3 min^{-1}

C 38.00 cm^3 min^{-1}

D 22.00 cm^3 min^{-1}

37

$$2KClO_3 \longrightarrow 2KCl + 3O_2$$

Potassium chlorate(V) is used in making matches. The equation above represents the decomposition of potassium chlorate(V) when heated. The oxygen released supports the burning of the match stick. Which of the following is produced when 1 mole of potassium chlorate(V) is decomposed completely?

Kalium klorat(V) digunakan dalam pembuatan mancis. Persamaan di atas mewakili penguraian kalium klorat(V) apabila dipanaskan. Oksigen yang dibebaskan membantu pembakaran batang mancis. Yang manakah dihasilkan apabila 1 mol kalium klorat(V) diurai dengan lengkap?

[Relative atomic mass: O = 16, Cl = 35.5, K =39, Avogadro constant = 6.02×10^{23} mol^{-1}, 1 mole of gas occupies a volume of 24 dm^3 at room condition]

[Jisim atom relatif:O = 16, Cl = 35.5, K =39, Pemalar Avogadro = 6.02×10^{23} mol^{-1} , 1 mol gas menempati 24 dm^3pada keadaan bilik]

I 24 dm^3 of oxygen gas
24 dm^3gas oksigen

II 74.5 g of potassium chloride
74.5 g kalium klorida

III *6.02×10^{23} oxygen molecules*
6.02×10^{23} molekul oksigen

IV 48.0 g of oxygen gas
48.0 g gas oksigen

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

38 Diagram 13 shows three test tubes that are left overnight to study the effect of metals P and Q on the rusting of iron and the changes are recorded as below.

Rajah 13 menunjukkan tiga tabung uji yang dibiarkan semalaman untuk mengkaji kesan logam P dan Q ke atas pengaratan besi dan perubahan direkodkan di bawah

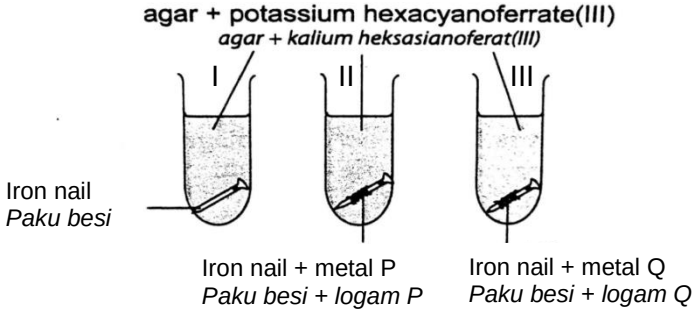


Diagram 13
Rajah 13

Test tube *Tabung uji*	Observation *Pemerhatian*	
	Intensity of blue colour *Keamatan warna biru*	Presence of gas bubbles *Kehadiran gelembung gas*
I	Low *Rendah*	Nil *Tiada*
II	Nil *Tiada*	Plenty *Banyak*
III	High *Tinggi*	Few *Sedikit*

Based on the observation above, which arrangement of metals P, Q and iron according to an ascending order of electropositivity is correct?

Berdasarkan pemerhatian di atas, susunan logam P, Q dan besi yang manakah mengikut susunan keelekropositifan secara menaik dengan betul?

A Fe, P, Q

B P, Fe, Q

C Q, Fe, P

D Q, P, Fe

39 The combustion of an alcohol Q increases the temperature of 300 cm^3 of water by 25 ^oC. Calculate the mass of alcohol Q burnt?

Pembakaran alkohol Q meningkatkan suhu 300 *cm^3 air sebanyak* 25^oC.
Hitung jisim alkohol Q yang terbakar?

[Molar mass of alcohol Q = 32 $gmol^{-1}$; specific heat capacity of water = 4.2 $Jg^{-1o}C^{-1}$; Density of water= 1gcm^{-3}; $\Delta H = -725$ $kJmol^{-1}$]

[Jisim molar alkohol Q = 32 $gmol^{-1}$; Muatan haba tentu air = 4.2 *$Jg^{-1o}C^{-1}$;*
ketumpatan air = 1*gcm^{-3} ; $\Delta H = -$ 725 $kJmol^{-1}$]*

A $\frac{725 \text{ x } 1000 \text{ x } 32}{300 \text{ x } 4.2 \text{ x } 25}$

B $\frac{725 \text{ x } 32}{300 \text{ x } 4.2 \text{ x } 25}$

C $\frac{300 \text{ x } 4.2 \text{ x} 25 \text{ x } 32}{725}$

D $\frac{300 \text{ x } 4.2 \text{ x} 25 \text{ x } 32}{725 \text{ x } 1000}$

40 Esters have many uses in daily lives and industries.Their special properties make them suitable for the preparation of cosmetics and perfumes. Which of these properties suitable for that industries?

Ester mempunyai pelbagai kegunaan dalam kehidupan seharian dan industri. Ciri-cirinya yang istimewa menyebabkan ianya sangat sesuai untuk penyediaan kosmetik dan minyak wangi. Yang manakah antara ciri-ciri berikut sesuai dalam industri berkenaan?

A High molecular mass and low melting point
Jisim molekul yang tinggi dan takat lebur yang rendah

B Sweet fruit smell and with low molecular mass.
Bau wangi dan dengan jisim molekul yang rendah

C Sweet fruit smell and high molecular mass
Bau wangi dan jisim molekul yang tinggi

D Strong smell and with low molecular mass.
Bau tajam dan dengan jisim molekul yang rendah

41 Table 3 shows the information about the reactants used in the reaction in two sets of experiments.

Jadual3 menunjukkan maklumat tentang bahan tindak balas yang digunakan dalam dua set eksperimen.

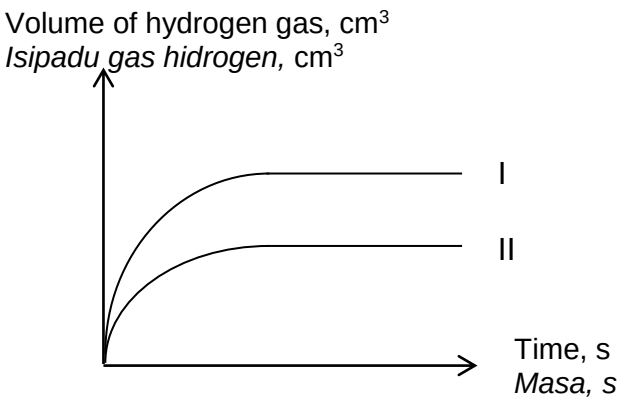
Experiment *Eksperimen*	Reactants *Bahan tindak balas*	Temperature / ^oC Suhu / ^oC
Experiment I *Eksperimen I*	40 cm^3 of 2.0 mol dm^{-3} nitric acid, HNO_3 + magnesium ribbon 40 cm^3 asid nitrik 2.0 mol dm^{-3}, HNO_3 + pita magnesium	30
Experiment II *Eksperimen II*	20 cm^3 of 2.0 mol dm^{-3} nitric acid, HNO_3 + magnesium powder 20 cm^3 asid nitrik 2.0 mol dm^{-3}, HNO_3 + serbuk magnesium	30

Table 3
Jadual 3

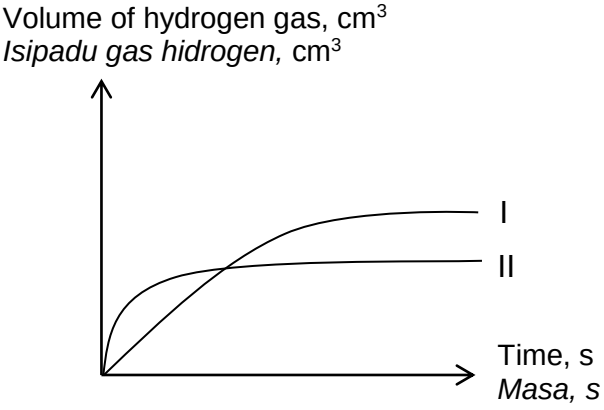
Which graph shows the correct curves for both experiments?

Graf manakah menunjukkan lengkung yang betul bagi kedua-dua eksperimen?

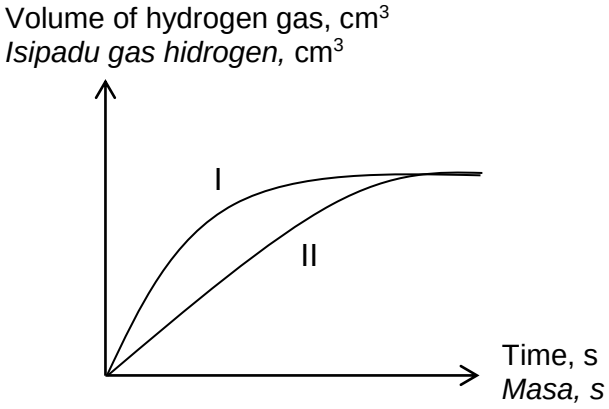
A



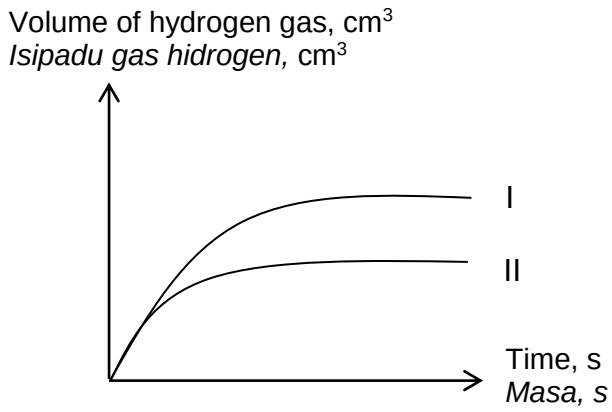
B



C



D



42 The following equation shows the reaction to obtain soluble sulphate salt.

Persamaan berikut menunjukkan tindak balas untuk mendapatkan garam sulfat terlarutkan.

H_2SO_4 + 2KOH → sulphate salt + H_2O
H_2SO_4 + 2KOH → garam sulfat + H_2O

What is the mass of sulphate salt obtained if 25cm^3 1.0 $moldm^{-3}$ $H_2SO_4$is used?

Berapakahjisim garam sulfat yang terhasil jika 25cm^3 1.0 $moldm^{-3}$ H_2SO_4 digunakan?

[Relative atomic mass : K=39, S=32, O=16, H=1]
[Jisim atom relative : K=39, S=32, O=16, H=1]

A 3.38 g

B 4.35 g

C 8.70 g

D 2.45 g

43 In the chemical industry, chlorine and sodium hydroxide is produced through the process of electrolysis. What is the most suitable electrolyte used in this process?

Dalam perindustrian kimia, klorin dan natrium hidroksida dihasilkan melalui proses elektrolisis. Apakah elektrolit yang paling sesuai digunakan dalam proses ini?

A Molten sodium chloride
Leburan natrium klorida

B Dilute sodium chloride solution
Larutan cair natrium klorida

C Concentrated sodium chloride solution
Larutan natrium klorida pekat

D Sodium chloride crystals
Hablur natrium klorida

44 The relative formula mass of hydrated copper (II) sulphate, $CuSO_4.yH_2O$ is 250.
What is the value of y?

Jisim formula relatif kuprum (II) sulfat terhidrat, $CuSO_4.yH_2O$ ialah 250.
Berapakah nilai y?

[Relative atomic mass: H = 1, O = 16, S = 32, Cu = 64]

[Jisim atom relatif: H = 1, O = 16, S = 32, Cu = 64]

A 2

B 3

C 4

D 5

45 The chemical equation shows the reaction between sulphuric acid and potassium hydroxide.

Persamaan tindak balas menunjukkan tindak balas antara asid sulfurik dan kalium hidroksida.

$H_2SO_{4(aq)} + 2KOH_{(aq)} \rightarrow K_2SO_{4(aq)} + 2H_2O_{(l)}$

$H_2SO_{4(aq)} + 2KOH_{(aq)} \rightarrow K_2SO_{4(aq)} + 2H_2O_{(ce)}$

Find the volume of 1.0 mol dm^{-3} potassium hydroxide solution to neutralise 20 cm^3 of 1.0 mol dm^{-3} sulphuric acid.

Tentukan isipadu larutan kalium hidroksida 1.0 mol dm^{-3}untuk meneutralkan asid sulfurik1.0 mol dm^{-3}.

A 40 cm^3

B 30 cm^3

C 20 cm^3

D 10 cm^3

46 The electronarrangement of element M is 2.8.2 and element N is 2.6. The compound formed between M and N has the following properties

Susunan elektron bagi unsur M ialah 2.8.2 dan unsur N ialah 2.6. Sebatian yang terbentuk antara M dan N mempunyai ciri-ciri berikut

I be a covalent compound
merupakan sebatian kovalen

II have a low melting point
mempunyai takat lebur yang rendah

III be solid at room temperature
merupakan pepejal pada suhu bilik

IV conduct electricity in the molten state
mengalirkan arus elektrik dalam keadaan lebur

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 dan III sahaja

D I, II, III and IV
I, II, III dan IV

47 A thermochemical equation for the displacement of iron by magnesium is shown as below.

Suatu persamaan termokimia bagi penyesaran ferum oleh magnesium ditunjukkan seperti di bawah.

$$Mg_{(s/p)} + Fe^{2+}_{(aq/ak)} \rightarrow Mg^{2+}_{(aq/ak)} + Fe_{(s/p)} \quad \Delta H = -200 \text{ kJ mol}^{-1}$$

What is the increase in temperature of the solution if excess magnesium is dissolved in 50 cm^3 of 0.2 mol dm^{-3} iron (II) sulphate solution?

Berapakah kenaikan suhu larutan jika magnesium berlebihan dilarutkan dalam 50 cm^3 larutan ferum (II) sulfat 0.2 mol dm^{-3}?

[Specific heat capacity of solution = 4.0 J $g^{-1}°C^{-1}$]
[Muatan haba tentu larutan = 4.0 J g^{-1} °C^{-1}]

A 4 °C

B 5 °C

C 8 °C

D 10 °C

48 A student is stung by an insect with alkaline sting. Which substance is the most suitable to be applied to treat the student?

Seorang pelajar disengat oleh serangga yang mempunyai sengatan beralkali. Bahan manakah yang paling sesuai untuk merawat pelajar itu?

A Ethanol
Etanol

B Toothpaste
Ubat gigi

C Vinegar
Cuka

D Cooking oil
Minyak masak

49 What is the oxidation number of oxygen in the sulphate ion, SO_4^{2-}?

Apakah nombor pengoksidaan bag sulfur dalam ion sulfat, SO_4^{2-}?

A +2

B +3

C +4

D +6

50 Shaun discovered that an apple that was cut into smaller pieces turned brown after several minutes.
Which substance should be added to preserve the browning of apple?

Shaun mendapati bahawa epal yang dipotong kepada kepingan kecil bertukar ke warna perang selepas beberapa minit.
Bahan manakah yang dapat ditambah untuk mengelakkan epal menjadi perang?

A Lecithin
Lecitin

B Sugar
Gula

C Ethanol
Etanol

D Ascorbic acid
Asid askorbik

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES

MATLUMAT UNTUK CALON

1. This question paper consists of **50** questions.

   *Kertas soalan ini mengandungi **50** soalan.*

2. Answer **all** questions.

   *Jawab **semua** soalan.*

3. Each question is followed by four alternative answers, **A**, **B**, **C** and **D**. For each question, choose **one** answer only. Blacken your answer on the objective answer sheet provided.

   *Tiap-tiap soalan diikuti oleh empat pilihan jawapan, iaitu **A**, **B**, **C** dan **D**.Bagi setiap soalan, pilih **sat**u jawapan sahaja.Hitamkan jawapan anda pada kertas jawapan objektif yang disediakan.*

4. If you wish to change your answer, erase the blackened mark that you have made. Then blacken the space for the new answer.

   Jika anda hendak menukar jawapan, padamkan tanda yang telah dibuat. Kemudian hitamkan jawapan yang baru.

5. The diagrams in the questions provided are not drawn to scale unless stated.

   Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

6. You may use a non-programmable scientific calculator.

   Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.

NAMA

TINGKATAN

MODUL LATIHAN BERFOKUS
SIJIL PELAJARAN MALAYSIA 2016

ANJURAN
MAJLIS PENGETUA SEKOLAH MALAYSIA
NEGERI PULAU PINANG

SIJIL PELAJARAN MALAYSIA 2016 4541/2

KIMIA
Kertas 2
Ogos
2 ½ jam **Dua jam lima tiga puluh minit**

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. Tulis **nama** dan **tingkatan** anda pada ruang yang disediakan.
2. Kertas soalan ini dalam dwibahasa.
3. Soalan dalam Bahasa Inggeris mendahului soalan yang sepadan dalam Bahasa Melayu.
4. Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam Bahasa Inggeris atau Bahasa Melayu.
5. Calon dikehendaki membaca maklumat di halaman 23.

Untuk Kegunaan Pemeriksaan			
Bahagian	Soalan	Markah Penuh	Markah Diperolehi
A	1	9	
	2	9	
	3	10	
	4	10	
	5	11	
	6	11	
B	7	20	
	8	20	
C	9	20	
	10	20	
Jumlah			

Kertas soalan ini mengandungi 24 halaman bercetak

Section A
Bahagian A

[60 marks]
[*60 markah*]

Answer **all** questions
*Jawab **semua** soalan*

1. Diagram 1 shows the production of compound M.
Rajah 1 menunjukkan penghasilan bahan M.

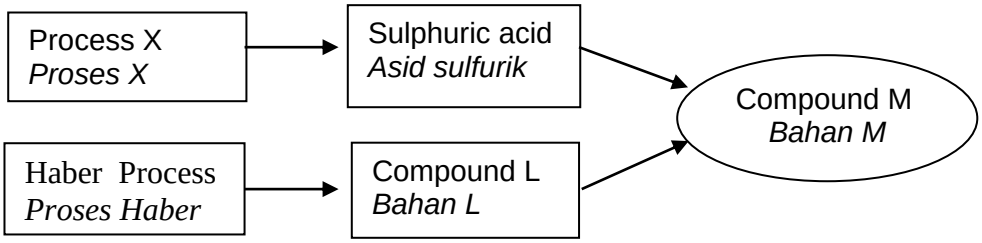


Diagram 1
Rajah 1

(a) (i) Name process X.

Namakan proses X.

……

[1 mark]
[*1 markah*]

(ii) In process X, the catalyst and high temperature is used to increase the rate of reaction. State the catalyst and the temperature used.

Dalam proses X, mangkin dan suhu yang tinggi digunakan untuk meningkatkan kadar tindak balas. Nyatakan mangkin dan suhu yang digunakan.

Catalyst / Mangkin : .....

Temperature / *Suhu : .....*

[2 marks]
[*2 markah*]

(iii) In Process X, sulphur trioxide gas is not directly dissolved into water to form liquid sulphuric acid. Explain why.

Dalam Proses X, gas sulfur trioksida tidak terus dilarutkan ke dalam air untuk menghasilkan cecair asid sulfurik. Terangkan mengapa.

……

……

[2 marks]
[*2 markah*]

(b) (i) What is the name of compound L that is produced through Haber process?

Apakah nama bahan L yang terhasil melalui proses Haber.

……

[1 mark]
[*1 markah*]

(ii) Compound L is produced when nitrogen gas reacts with hydrogen gas. What is the ratio of nitrogen gas and hydrogen gas reacted?

Bahan L terhasil apabila gas nitrogen bertindak balas dengan gas hidrogen. Apakah nisbah gas nitrogen dan gas hidrogen yang bertindak balas?

……

[1 mark]
[*1 markah*]

(c) (i) Sulphuric acid reacts with compound L to produce compound M.
Name compound M.

Asid sulfurik bertindak balas dengan bahan L untuk menghasilkan bahan M.
Namakan bahan M.

……

[1 mark]
[*1 markah*]

(ii) State one of the use of compound M.

Nyatakan satu kegunaan bahan M.

……

[1 mark]
[*1 markah*]

2. (a) Table 2.1 shows the number of protons and number of neutrons for atoms A, B, C, D and E.
Jadual 2.1 menunjukkan bilangan proton dan bilangan neutron bagi atom A, B, C, D, dan E.

Atom *Atom*	Number of protons *Bilangan proton*	Number of neutrons *Bilangan neutron*
A	8	8
B	9	10
C	8	9
D	10	10
E	8	10

Table 2.1
Jadual 2.1

Based on Table 2.1:
Berdasarkan Jadual 2.1:

(i) What is the meaning of isotope?
Apakah yang dimaksudkan dengan isotop?

……
[1 mark]
[*1 markah*]

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

……
[1 mark]
[*1 markah*]

(iii) Determine the nucleon number of atom C.
Tentukan nombor nukleon bagi atom C.

……
[1 mark]
[*1 markah*]

(iv) Write the electron arrangement for atom D.
Tuliskan susunan elektron bagi atom D.

……
[1 mark]
[*1 markah*]

(b) Table 2.2 shows the melting point and boiling point of lead(II) bromide.

Jadual 2.2 menunjukkan takat lebur dan takat didih bagi plumbum(II) bromida.

Melting point *Takat lebur*	– 373 ^{o}C
Boiling point *Takat didih*	– 916 ^{o}C

Table 2.2
Jadual 2.2

(i) State the types of particles in lead(II) bromide.

Nyatakan jenis zarah yang terkandung dalam plumbum(II) bromida.

……

[1 mark]
[*1 markah*]

(ii) Sketch the graph temperature against time if lead(II) bromide is cooled from 500^{o}C to room temperature.

Lakarkan graf suhu melawan masa sekiranya plumbum(II) bromida disejukkan daripada 500 ^{o}C ke suhu bilik.

[2 marks]
[*2 markah*]

(iii) What is the state of matter of lead(II) bromide at 500 ^{o}C?

Apakah keadaan jirim plumbum(II) bromida pada suhu 500 ^{o}C?

……

[1 mark]
[*1 markah*]

(iv) Draw the arrangement of particles in b(iii).

Lukis susunan zarah dalam (b)(iii).

[1 mark]
[*1 markah*]

3. Diagram 3 shows the apparatus set-up to determine the empirical formula of magnesium oxide.

Rajah 3 menunjukkan menunjukkan susunan radas untuk menentukan formula empirik magnesium oksida.

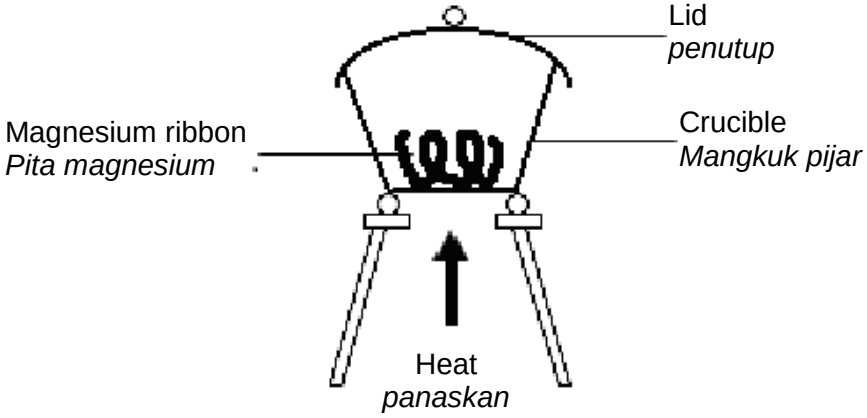


Diagram 3
Rajah 3

(a) When carrying out the experiment, why does the crucible lid need to be opened once awhile?

Semasa menjalankan eksperimen, mengapakah penutup mangkuk pijar perlu dibuka sekali sekala?

…..……

[1 mark]
[*1 markah*]

(b) Table 3 shows the results of the experiment

Jadual 3 menunjukkan keputusan eksperimen ini.

Description ***Penerangan***	**Mass (g)** ***Jisim* (g)**
Mass of crucible + lid *Jisim mangkuk pijar + penutup*	21.45
Mass of crucible + lid + magnesium *Jisim mangkuk pijar + penutup + magnesium*	23.85
Mass of crucible + lid + magnesium oxide *Jisim mangkuk pijar + penutup + magnesium oksida*	25.45

Table 3
Rajah 3

Based on Table 3, determine the value of the following:

Berdasarkan Jadual 3, tentukan nilai yang berikut:

[Relative atomic mass : O,16; Mg, 24]
[*Jisim atom relatif :* O,16; Mg, 24]

(i) Mass of magnesium

Jisim magnesium

[1mark]
[1 *markah*]

(ii) Number of moles of magnesium

Bilangan mol magnesium

[1mark]
[1 *markah*]

(iii) Mass of oxygen

Jisim oksigen

[1mark]
[1 *markah*]

(iv) Number of moles of oxygen

Bilangan mol oksigen

[1mark]
[1 *markah*]

(v) Empirical formula of magnesium oxide

Formula empirik magnesium oksida

…..…….

[1 mark]
[*1 markah*]

(c) Write the chemical equation for the reaction between magnesium and oxygen

Tulis persamaan kimia bagi tindak balas antara magnesium dan oksigen

…..……

[2 marks]
[*2 markah*]

(d) Can the method above be used to determine the empirical formula of lead(II) oxide? Give a reason.

Bolehkah kaedah di atas digunakan untuk menentukan formula empirik plumbum(II) oksida? Berikan satu sebab.

…...…..…….

[2 marks]
[*2 markah*]

4. Diagram 4 shows the position of several elements Q, R, S, T, U, W and X.
Rajah 4 menunjukkan kedudukan beberapa unsur-unsur Q, R, S, T, U, W dan X.

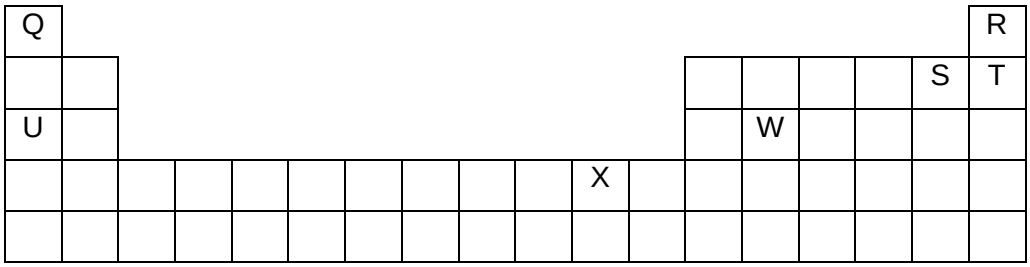


Diagram 4
Rajah 4

Based on Diagram 4:
Berdasarkan Rajah 4:

(a) State on element that is halogen.
Nyatakan satu unsur halogen.

……
[1 mark]
[*1 markah*]

(b) (i) State one element that is monoatomic.
Nyatakan satu unsur monoatom.

……
[1 mark]
[*1 markah*]

(ii) Why does the element in b (i) exist as monoatomic?
Mengapakah unsur dalam b(i) wujud sebagai monoatom?

……

……
[2 marks]
[*2 markah*]

(c) (i) Identify the element that reacts with water to produce hydrogen gas.
Kenal pasti unsur yang bertindak balas dengan air untuk menghasilkan gas hidrogen.

……
[1 mark]
[*1 markah*]

(ii) Write the balanced chemical equation for the reaction in c(i).

Tulis persamaan kimia yang seimbang bagi tindak balas di c(i).

……

[2 mark]
[*2 markah*]

(d) Identify the element that can forms a coloured solution when dissolved in water.

Kenal pasti unsur yang menghasilkan larutan yang berwarna apabila dilarutkan dalam air.

……

[1 mark]
[*1 markah*]

(e)

Gas Q	**Gas R**
• light / *ringan* • flammable / *mudah terbakar* • colourless / *tidak berwarna*	• light / *ringan* • not reactive / *tidak reaktif* • colourless / *tidak berwarna*

Based on the above information, which gas is more suitable to be used in meteorological balloons?
Give one reason.

Berdasarkan maklumat di atas, gas yang manakah lebih sesuai digunakan dalam belon kaji cuaca?
Berikan satu sebab.

……

[2 marks]
[*2 markah*]

5. Diagram 5.1 shows a preparation of ethanol and some of the reactions involving ethanol.
Rajah 5.1 menunjukkan penyediaan etanol dan beberapa tindak balas yang melibatkan etanol.

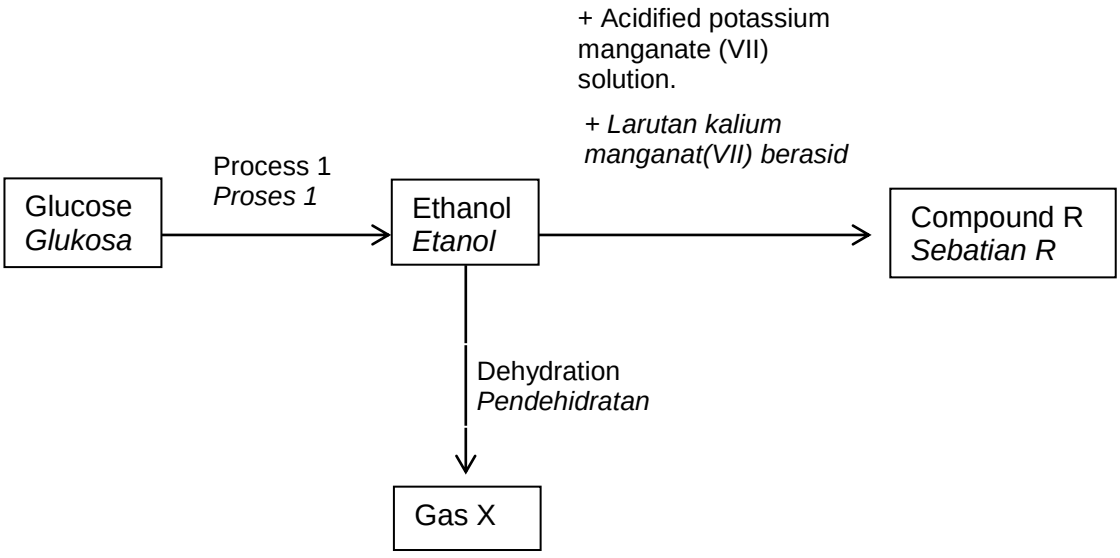


Diagram 5.1
Rajah 5.1

(a) Ethanol can be prepared from glucose in a laboratory through process 1. Name process 1.
Etanol boleh disediakan daripada glukosa dalam makmal melalui proses 1. Namakan proses 1.

……

[1 mark]
[*1 markah*]

(b) Ethanol undergoes dehydration to produce gas X.
Etanol mengalami pendehidratan untuk menghasilkan gas X.

Name gas X and describe a chemical test to determine the presence of gas X.
Namakan gas X dan huraikan satu ujian kimia untuk menentukan kehadiran gas X.

……

……

……

[3 marks]
[*3 markah*]

(c) Compound R is produced through oxidation of ethanol in the presence of acidified potassium manganate (VII) solution.

Sebatian R terhasil daripada tindak balas pengoksidaan ke atas etanol dengan kehadiran larutan kalium manganat(VII) berasid.

(i) Name compound R.

Namakan sebatian R.

…….

[1 mark]
[*1 markah*]

(ii) Draw the structural formula of compound R.

Lukis formula struktur bagi sebatian R.

[1 mark]
[*1 markah*]

(d) Diagram 5.2 shows the compound S prepared in the laboratory through the reaction between ethanol and compound R.

Rajah 5.2 menunjukkan sebatian S yang disediakan dalam makmal melalui tindak balas antara etanol dengan sebatian R.

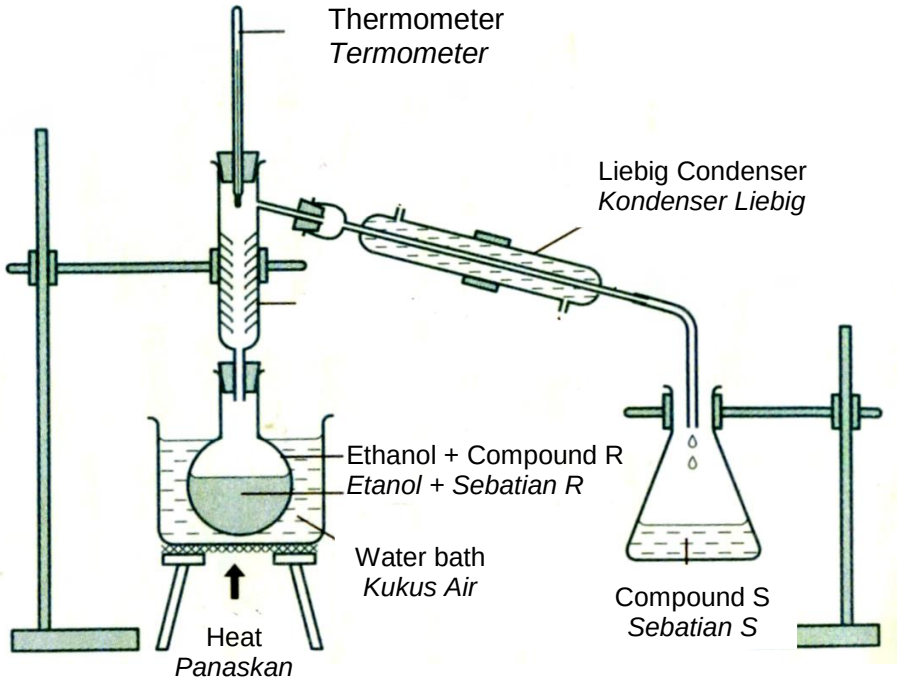


Diagram 5.2
Rajah 5.2

(i) Label **water in** as 'X' and **water out** as 'Y' in Diagram 5.2.

*Label **air masuk** sebagai 'X' dan **air keluar** sebagai 'Y' pada Rajah 5.2.*

[1 mark]
[1 markah]

(ii) Compound S is the product of this experiment. Name the compound S?

Sebatian S ialah hasil bagi eksperimen ini. Namakan sebatian S?

…….……

[1 mark]
[*1 markah*]

(iii) Write a chemical equation for this reaction.

Tulis persamaan kimia untuk tindak balas ini.

…….……

[2 marks]
[*2 markah*]

(iv) State one use of compound S in everyday life.

Nyatakan satu kegunaan sebatian S dalam kehidupan seharian.

…….……

[1 mark]
[*1 markah*]

6. Diagram 6 shows an experiment that involves the transfer of electrons through a distance. The reactions that occur is a redox reaction.

Rajah 6 menunjukkan satu eksperimen yang melibatkan pemindahan elektron pada suatu jarak. Tindak balas yang berlaku ialah tindak balas redoks

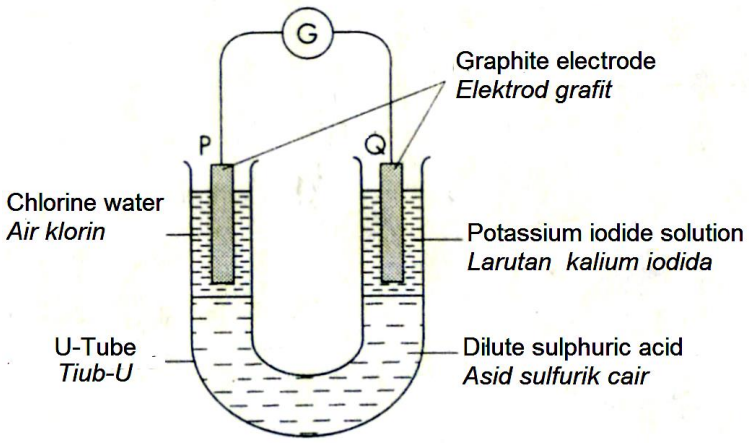


Diagram 6
Rajah 6

(a) What is a *redox reaction*?

Apakah itu tindak balas redoks?

……

[1 mark]
[*1 markah*]

(b) (i) Write the half equation for the reaction occurred at electrode P and Q.

Tuliskan persamaan setengah bagi tindak balas yang berlaku di elektrod P dan Q.

Electrode P / *Elektrod P :* ……

Electrode Q / *Elektrod Q:* ……

[2 marks]
[2 markah]

(ii) Write a complete ionic equation for the reaction occurred in this experiment.

Tuliskan satu persamaan ion bagi tindak balas yang berlaku dalam eksperimen ini.

……

[1 mark]
[*1 markah*]

(c) Show the direction of electron flow in Diagram 6 by using an arrow.

Tunjukkan arah aliran elektron pada Rajah 6 dengan menggunakan anak panah.

[1 mark]
[1 markah]

(d) State the observation at:

Nyatakan pemerhatian pada:

Electrode P / *Elektrod P :* ……

Electrode Q / *Elektrod Q:* ……

[2 marks]
[2 markah]

(e) Identify the reducing agent.

Kenal pasti agen penurunan.

…….……

[1 mark]
[*1 markah*]

(f) Suggest a chemical test to identify the product formed at electrode Q

Cadangkan satu ujian kimia untuk mengenal pasti hasil yang terbentuk di elektrod Q.

…….……

[2 marks]
[*2 markah*]

(g) Suggest another substance that can be used to replace the oxidising agent in Diagram 6.

Cadangkan satu bahan lain yang dapat digunakan untuk menggantikan agen pengoksidaan dalam Rajah 6.

…….……

[1 mark]
[*1 markah*]

Section B
Bahagian B

[20 marks]
[*20 markah*]

Answer any **one** questions
*Jawab mana-mana **satu** soalan*

7. (a) Table 7 shows the proton number of elements X, Y and Z.

Jadual 7 menunjukkan nombor proton bagi unsur-unsur X, Y dan Z.

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

Table 7
Jadual 7

Element Z reacts with iron wool to form a halide compound.

Unsur Z bertindak balas dengan wul besi untuk membentuk sebatian halida.

(i) State the position of element Z in the Periodic table of elements.
Explain the position of element Z based on its electron arrangement.

Nyatakan kedudukan unsur Z dalam Jadual Berkala Unsur.
Terangkan kedudukan unsur Z berdasarkan susunan elektron.

(ii) State **one** observation when element Z reacts with iron wool.

*Nyatakan **satu** pemerhatian apabila unsur Z bertindak balas dengan wul besi.*

[4 marks]
[*4 markah*]

(b) Reaction between element Y and cold water produces hydrogen gas.

Tindak balas antara unsur Y dengan air sejuk menghasilkan gas hidrogen.

(i) Write a balanced chemical equation for the reaction involved.

Tulis satu persamaan kimia yang seimbang bagi tindak balas yang terlibat.

(ii) Calculate the volume of hydrogen gas that may be released at room conditions if 2.3 g of element Y is used in the reaction.

Hitung isi padu gas hidrogen yang mungkin dibebaskan pada keadan bilik jika 2.3 g unsur Y digunakan dalam tindak balas tersebut.

[Relative atomic mass of Y, 23; molar volume = 24 dm^3 mol^{-1}]
[Jisim atom relatif Y, 23; isi padu molar = 24 dm^3 mol^{-1}]

[6 marks]
[*6 markah*]

(c) Explain the formation of two compounds from these elements. The two compounds should have different types of bonds.

Nyatakan pembentukan dua sebatian daripada unsur-unsur itu. Kedua-dua sebatian seharusnya mempunyai ikatan yang berlainan.

[10 marks]
[*10 markah*]

8. (a) Table 8 shows the information of two types of acids.

Jadual 8 menunjukkan maklumat tentang dua jenis asid.

Acid *Asid*	Concentration / mol dm^{-3} *Kepekatan / mol dm^{-3}*	pH value *Nilai pH*
Acid A *Asid A*	0.5	1
Acid B *Asid B*	0.5	4

Table 8
Jadual 8

Based on the information in Table 8,

Berdasarkan maklumat dalam Jadual 8,

(i) Name acid A and acid B
Namakan asid A dan asid B

(ii) Explain why acid A and acid B with the same concentration have different pH values.
Terangkan mengapa asid A dan asid B dengan kepekatan yang sama mempunyai nilai pH yang berbeza.

[5 marks]
[*5 markah*]

(b) The following are two chemical substances. The reaction between hydrochloric acid with each substance below can show the chemical properties of acid.

Berikut adalah dua bahan kimia. Tindak balas antara asid hidroklorik dengan setiap bahan kimia di bawah dapat menunjukkan sifat-sifat kimia asid.

- Magnesium
  M*agnesium*
- Calcium carbonate
  Kalsium karbonat

Explain the chemical reactions of the acid and write the chemical equation for each reaction.

Terangkan tindak balas asid tersebut dan tuliskan persamaan kimia bagi setiap tindak balas.

[6 marks]
[6 *markah*]

(c) Diagram 8 show the set up of apparatus and the observations involved in Set I and Set II.

Rajah 8 menunjukkan susunan radas dan pemerhatian yang terlibat bagi Set I dan Set II.

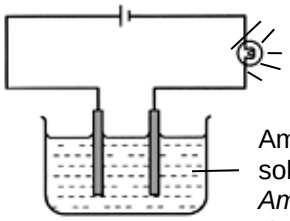
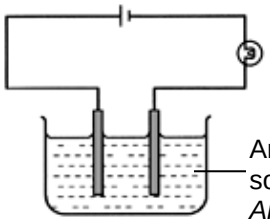
Set I	Set II
	
Observation : Bulb lights up *Pemerhatian : Mentol menyala*	Observation : Bulb does not light up *Pemerhatian : Mentol tidak menyala*

Diagram 8
Rajah 8

Based on the information in Diagram 8
Berdasarkan maklumat dalam Rajah 8

(i) Name an example of solvent X and solvent Y.
Namakan satu contoh bagi pelarut X dan pelarut Y.

(ii) Explain why the bulb in Set I lights up while the bulb in Set II does not light up.
Terangkan mengapa mentol dalam Set I menyala manakala mentol dalam Set II tidak menyala.

[5 marks]
[*5 markah*]

(d) Fertilisers are commonly used for growing crops. Mr Rosdi, a farmer has two types of fertilisers which are ammonium suphate, $(NH_4)_2SO_4$ and urea, $CO(NH_2)_2$.

Baja digunakan secara meluas untuk menyuburkan tanaman. Encik Rosdi, seorang petani, mempunyai dua jenis baja iaitu, ammonium sulfat, $(NH_4)_2SO_4$ dan urea, $CO(NH_2)_2$.

(i) Name **one** element in the fertilisers above which is required for normal and healthy growth of plants.

*Namakan **satu** unsur dalam baja di atas yang diperlukan untuk pertumbuhan tumbuhan yang normal dan sihat.*

(ii) If you are Mr Rosdi, which fertiliser will you choose? Explain your answer.

Jika anda sebagai Encik Rosdi, baja manakah yang akan anda pilih? Terangkan jawapan anda.

[Relative atomic mass: N,14; C,12; H,1; O,16]
[*Jisim atom relatif*: *N,14; C,12; H,1; O,16*]

[4 marks]
[*4 markah*]

Section C
Bahagian C

[20 marks]
[*20 markah*]

Answer any **one** questions
*Jawab mana-mana **satu** soalan*

9 (a) Ethanoic acid or acetic acid is a colourless liquid organic compound with the chemical formula CH_3COOH. If ethanoic acid solution is electrolysed by using platinum electrode, what is the product formed at the anode and cathode?

Write a half-equation for the reaction occurred at the anode and at the cathode.

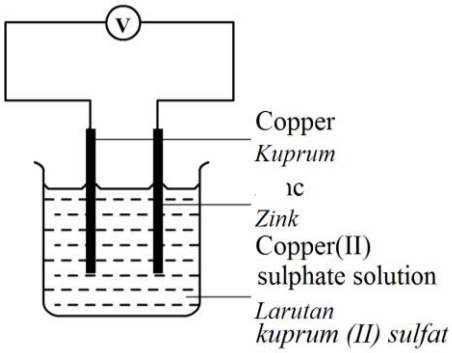
Asid etanoik atau asid asetik adalah cecair sebatian organik yang tidak berwarna dengan formula kimianya CH_3COOH. Jika asid etanoik dielektrolisiskan dengan menggunakan elektrod platinum, apakah yang terhasil pada anod dan katod?

Tuliskan persamaan setengah bagi tindak balas yang berlaku di anod dan di katod.

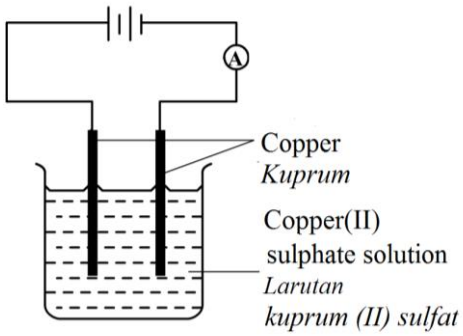
[4 marks]
[*4 markah*]

(b) The diagram below shows two cells. Cell Y is a chemical cell while cell Y is an electrolytic cell. Compare cell X and cell Y.

Rajah di bawah menunjukkan dua sel. Sel X merupakan satu sel kimia manakala sel Y merupakan satu sel elektrolisis. Bandingkan sel X dan sel Y.



Cell X
Sel X



Cell Y
Sel Y

[6 marks]
[*6 markah*]

(c)

A more electropositive metal will displace a less electropositive metal from its salt solution. *Logam yang lebih elektropositif akan menyesarkan logam yang kurang elektropositif daripada larutan garamnya.*

By using suitable metals and **one** suitable salt solution, describe a laboratory experiment to prove the above statement.

*Dengan menggunakan logam-logam dan **satu** larutan garam yang sesuai, huraikan satu eksperimen makmal untuk membuktikan pernyataan di atas.*

Your description should include the following:

Huraian anda perlu merangkumi yang berikut:

- Procedure of the experiment
  Prosedur eksperimen
- Expected results
  Keputusan yang dijangka
- Balanced equation
  Persamaan yang seimbang

[10 marks]
[*10 markah*]

10 (a) Table 10.1 shows the fuel values of various fuels.

Jadual 10.1 menunjukkan nilai bahan api bagi beberapa jenis bahan api.

Fuel *Bahan api*	Fuel value (kJg^{-1}) *Nilai bahan api* (kJg^{-1})
Ethanol *Etanol*	30
Petrol *Petrol*	34
Natural gas *Gas asli*	50
Hydrogen gas *Gas hidrogen*	143

Table 10.1
Jadual 10.1

(i) Based on Table 10.1 choose **one** fuel that is suitable to replace petrol in vehicles. Compare the fuel that you have chosen with petrol in terms of impact to the environment.
*Berdasarkan Jadual 10.1, pilih **satu** bahan api yang sesuai untuk menggantikan petrol dalam kenderaan. Bandingkan bahan api yang anda pilih itu dengan petrol dari segi kesan terhadap persekitaran.*

[5 marks]
[*5 markah*]

(ii) Suggest **one** way how you can save the consumption of electrical energy in your daily life.
*Cadangkan **satu** cara bagaimana anda boleh menjimatkan penggunaan tenaga elektrik dalam kehidupan harian anda.*

[1 mark]
[1 *markah*]

(b) Table 10.2 shows the molecular formulae and the heat of combustion for methanol and ethanol.

Jadual 10.2 menunjukkan formula molekul dan haba pembakaran bagi metanol dan etanol.

Alcohol *Alkohol*	Molecular formula *Formula molekul*	Heat of combustion ($kJmol^{-1}$) *Haba pembakaran* ($kJmol^{-1}$)
Methanol *Metanol*	CH_3OH	-X
Ethanol *Etanol*	C_2H_5OH	-Y

Table 10.2
Jadual 10.2

(i) Which alcohol in Table 10.2 has a higher heat of combustion?

Alkohol manakah dalam Jadual 10.2 mempunyai haba pembakaran yang lebih tinggi?

[1 mark]
[*1 markah*]

(ii) Based on information in Table 10.2 , explain why there is a difference in the values of heat of combustion between methanol and ethanol. [3 marks]

Berdasarkan maklumat dalam Jadual10.2, terangkan mengapa terdapat perbezaan bagi nilai haba pembakaran antara metanol dan etanol.

[3 marks]
[*3 markah*]

(c) Describe a laboratory experiment to determine the heat of combustion of an alcohol that has less than four carbon atoms per molecule.
Your description should include:

- List of materials and apparatus
- Procedure
- The method to calculate heat of combustion

Huraikan satu eksperimen makmal untuk menentukan haba pembakaran bagi alkohol yang mempunyai kurang daripada empat atom karbon per molekul.
Huraian anda haruslah merangkumi:

- *Senarai bahan dan radas*
- *Prosedur*
- *Kaedah pengiraan untuk menghitung haba pembakaran*

[10 marks]
[*10 markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES

1. *This question paper consists of three sections:* **Section A, Section B** *and* **Section C**.

2. *Answer* **all** questions in **Section A**. *Write your answers for* **Section A** *in the spaces provided in question paper.*

3. *Answer* **one** *question from* **Section B** *and* **one** *question from* **Section C.** *Write your answers for* **Section B** *and* **Section C** *on the answer sheet provided by the invigilators. Answer questions in* **Section B** *and* **Section C** *in detail. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answer.*

4. *Show your working. It may help you to get marks.*

5. *If you wish to change your answer, neatly cross out the answer that you have done.*

6. *The diagrams in the question are not drawn to scale unless stated.*

7. *Marks allocated for each question or part question are shown in brackets.*

8. *The time suggested to answer* **Section A** *is 90 minutes,* **Section B** *is 30 minutes and* **Section C** *is 30 minutes.*

9. *You may use a non-programmable scientific calculator.*

10. *Hand in your answer sheets at the end of the examination.*

MAKLUMAT UNTUK CALON

1. *Kertas soalan ini mengandungi tiga bahagian*: **Bahagian A, Bahagian B** *dan* **Bahagian C**.

2. *Jawab* **semua** *soalan dalam* **Bahagian A**. *Tuliskan jawapan bagi* **Bahagian A** *dalam ruang yang disediakan dalam kertas soalan..*

3. *Jawab* **satu** *soalan daripada* **Bahagian B** *dan* **satu** *soalan daripada* **Bahagian C.** *Tuliskan jawapan bagi* **Bahagian B** *dan* **Bahagian C** *pada kertas jawapan yang dibekalkan oleh pengawas peperiksaan. Jawab* **Bahagian B** *dan* **Bahagian C** *dengan terperinci. Anda boleh menggunakan persamaan, gambar rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda.*

4. *Tunjukkan kerja mengira, ini membantu anda mendapat markah.*

5. *Sekirannya anda hendak membatalkan sesuatu jawapan, buat satu garisan di atas jawapan itu.*

6. *Rajah yang mengiringi, soalan tidak dilukis mengikut skala kecuali dinyatakan.*

7. *Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.*

8. *Masa yang dicadangkan untuk menjawab* **Bahagian A** *ialah 90 minit,* **Bahagian B** *ialah 30 minit dan* **Bahagian C** *ialah 30 minit.*

9. *Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.*

10. *Serahkan semua kertas jawapan anda diakhir peperiksaan.*

NAMA

TINGKATAN

MODUL LATIHAN BERFOKUS
SIJIL PELAJARAN MALAYSIA 2016

ANJURAN
MAJLIS PENGETUA SEKOLAH MALAYSIA
NEGERI PULAU PINANG

SIJIL PELAJARAN MALAYSIA 2016 4541/3

KIMIA
Kertas 3
Ogos
1 ½ jam **Satu jam limatigapuluhminit**

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan **nama** dan **tingkatan** pada ruang yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*

UntukKegunaanPemeriksa		
Soalan	**Markah Penuh**	**Markah Diperoleh**
1	15	
2	18	
3	17	
JUMLAH	50	

Kertas soalan ini mengandungi 8 halaman bercetak

1. An experiment was carried out to determine the concentration of nitric acid. A burette was filled with nitric acid and 25.0 cm^3 of 0.2 mol dm^{-3} potassium hydroxide was added into a conical flask. Titration was carried out and phenolphthalein indicator was used.

   Satu eksperimen telah dijalankan untuk menentukan kepekatan asid nitrik. Buret diisi dengan asid nitrik dan 25.0 cm^3 0.2 mol dm^{-3} larutan kalium hidroksida dimasukkan ke dalam sebuah kelalang kon. Pentitratan dijalankan dan penunjuk fenolftalein digunakan.

   Diagram 1.1 shows the results of the experiment.

   Rajah 1.1menunjukkan keputusan bagi eksperimen itu.

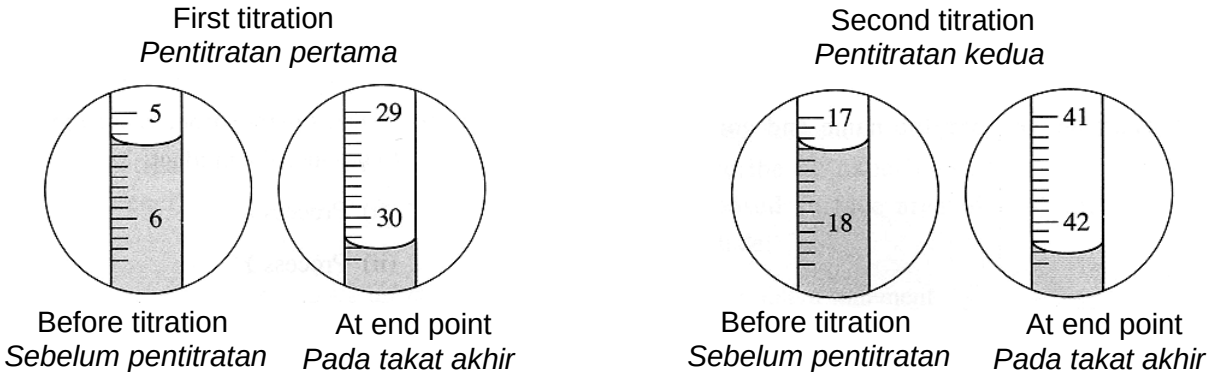


Diagram 1.1
Rajah 1.1

(a) Record the burette reading in Table 1.

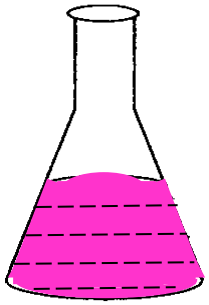
Catat bacaan buret dalam Jadual 1.

Titration *Pentitratan*	Initial burette reading (cm^3) *Bacaan awal buret (cm^3)*	Final burette reading (cm^3) *Bacaan akhir buret (cm^3)*
First *Pertama*		
Second *Kedua*		

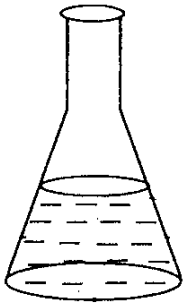
Table 1
Jadual 1

[3 marks]
[*3 markah*]

3



Before end point
Sebelum takat akhir



At end point
Pada takat akhir

Diagram 1.2
Rajah 1.2

(b)Based on Diagram 1.2, give an observation for this experiment.

Berdasarkan Rajah 1.2, berikan satu pemerhatian untuk eksperimen ini.

……

[3 marks]
[*3 markah*]

3

(c) Give an inference for the answer in 1(b).

Berikan satu inferens kepada jawapan di 1(b).

……

[3 marks]
[*3 markah*]

3

(d) Determine the concentration of nitric acid.

Tentukan kepekatan asid nitrik.

[3 marks]
[*3 markah*]

3

(e) State the operational definition for end point in this experiment.

Nyatakan definisi secara operasi bagi takat akhir dalam eksperimen ini.

……

……

[3 marks]
[*3 markah*]

3

2. A student carried out an experiment to investigate the effect of temperature on the rate of reaction between sodium thiosulphate solution and sulphuric acid.

Seorang murid telah menjalankan satu eksperimen untuk mengkaji kesan suhu ke atas kadar tindak balas antara larutan natrium tiosulfat dengan asid sulfurik.

(a) For this experiment, state the:

Bagi eksperimen ini, nyatakan:

(i) Manipulated variable:

Pemboleh ubah dimanipulasikan:

……

(ii) Responding variable:

Pemboleh ubah bergerak balas:

……

(iii) Constant variable:

Pemboleh ubah dimalarkan:

……

[3 marks]
[*3 markah*]

3

(b) State one hypothesis for this experiment.

Nyatakan satu hipotesis bagi eksperimen ini.

……

……

[3 marks]
[*3 markah*]

3

(c) Table 2 shows the data obtained from the experiment. Complete the table.

Jadual 2 menunjukkan data yang diperoleh daripada eksperimen itu. Lengkapkan jadual itu.

Experiment *Eksperimen*	Temperature (ºC) *Suhu (ºC)*	Time taken for the mark 'X' to disappear from sight, t (s) *Masa yang diambil bagi tanda 'X' tidak kelihatan, t (s)*	$\frac{1}{\text{Time}}, \frac{1}{\text{t}} (\text{s}^{-1})$ $\frac{1}{Masa}, \frac{1}{t} (s^{-1})$
1	30.0	200	
2	40.0	44	
3	50.0	24	
4	60.0	17	
5	70.0	13	

Table 2
Jadual 2

[3 marks]
[*3 markah*]

3

(d) Based on Table 2, plot a graph of temperature of sodium thiosulphate solution against $\frac{1}{\text{Time}}$

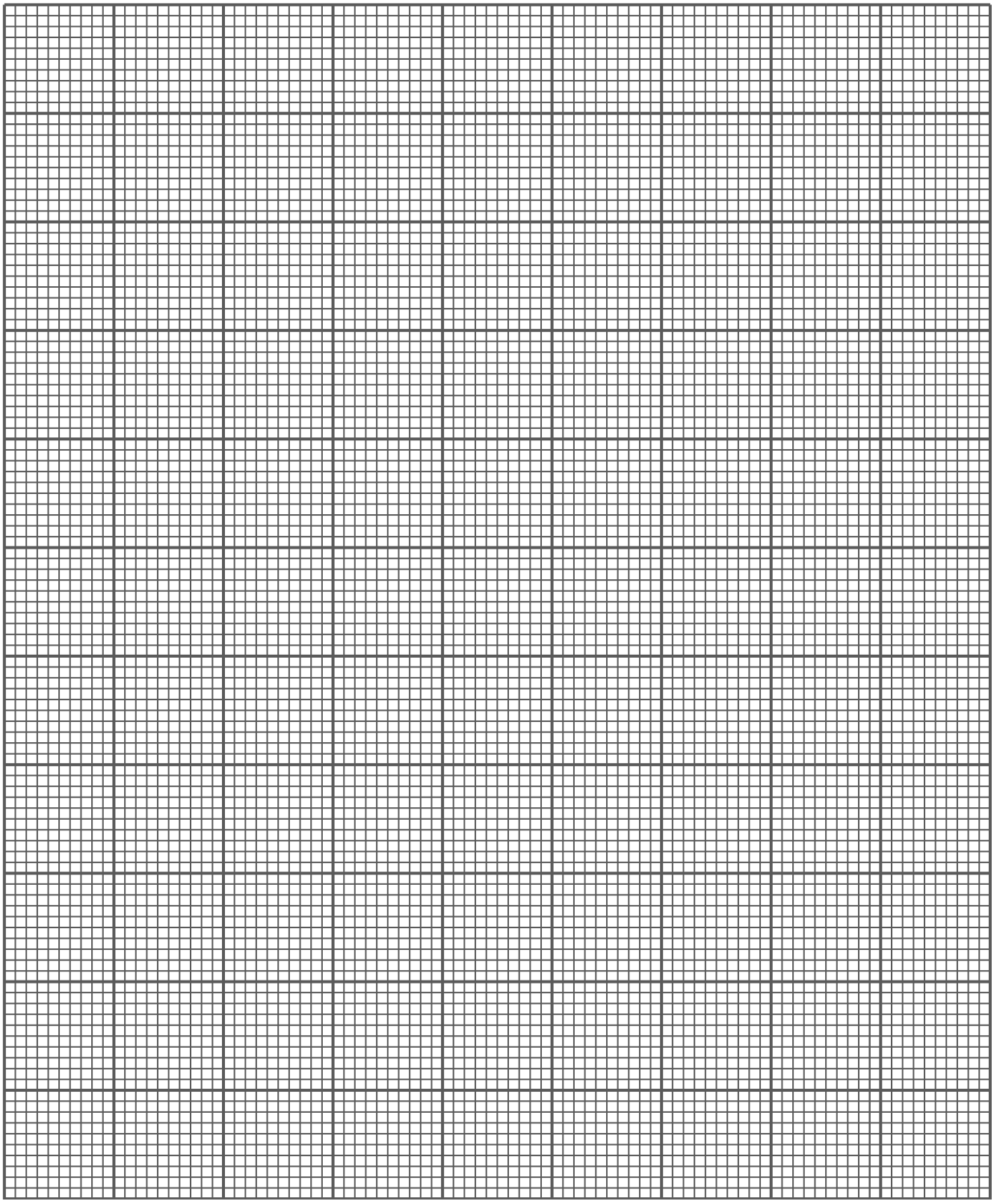
Berdasarkan Jadual 2, plot satu graf suhu larutan natrium tiosulfat melawan $\frac{1}{Masa}$

[3 marks]
[*3 markah*]

3

Graph of temperature against $\frac{1}{\text{Time}}$

Graf suhu melawan $\frac{1}{Masa}$



(e) Based on the graph in (d), predict the time taken for the mark 'X' to disappear from sight if the experiment is carried out by using sodium thiosulphate solution at 80 ºC.

Berdasarkan graf dalam (d), ramalkan masa yang diambil bagi tanda 'X' tidak kelihatan jika eksperimen itu dilakukan dengan menggunakan larutan natrium tiosulfat pada suhu 80 ºC.

……

[3 marks]
[*3 markah*]

3

(f) Classify the reactions below into slow reaction and fast reaction.

Kelaskan tindak balas di bawah kepada tindak balas perlahan dan tindak balas cepat.

- Rusting of iron

  Pengaratan besi

- Combustion of petrol

  Pembakaran petrol

- Photosynthesis

  Fotosintesis

- Neutralisation

  Peneutralan

Slow reaction *Tindak balas perlahan*	Fast reaction *Tindak balas cepat*

[3 marks]
[*3 markah*]

3

3. Sarah is helping her mother to wash the clothes. She then tries to wash a pair of socks stained with oil using soap and water from two different sources as shown in Table 3. Sarah found that the cleaning was only effective when using the water from one of the sources.

   Sarah sedang membantu ibunya membasuh baju.Dia cuba membasuh sepasang sarung kaki yang dikotori dengan minyak menggunakan sabun dan air daripada dua sumber yang berlainan seperti yang ditunjukkan dalam Jadual 3. Sarah mendapati bahawa pencucian hanya berkesan apabila menggunakan air daripada salah satu sumber.

Water source *Sumber air*	Concentration (mg dm^{-3}) *Kepekatan (mg dm^{-3})*	
	Ca^{2+}	Mg^{2+}
A	36	12
B	2	1

Table 3
Jadual 3

You are given a task to plan a laboratory experiment to study the effectiveness of the cleansing action of soap on the socks which are stained with oil using water from two different sources in Table 3.

Anda diberikan satu tugasan untuk merancang satu eksperimen makmal untuk mengkaji keberkesanan tindakan pencucian sabun ke atas sarung kaki yang dikotori dengan minyak menggunakan air daripada dua sumber berlainan di dalam Jadual 3.

Your planning should include the following aspects:

Rancangan anda harus mengandungi aspek-aspek berikut:

a) Problem statement
   Pernyataan masalah

b) All the variables
   Semua pemboleh ubah

c) Statement of hypothesis
   Pernyataan hipotesis

d) List of materials and apparatus
   Senarai bahan dan radas

e) Procedure for the experiment
   Prosedur eksperimen

f) Tabulation of data
   Penjadualan data

[17 marks]
[17 markah]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT
https://cikguadura.wordpress.com/

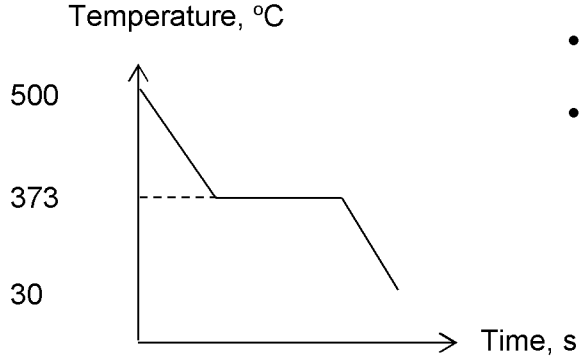
Skema Jawapan Kertas 1 Kimia 2016

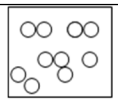
https://cikguadura.wordpress.com/

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

SKEMA PERMARKAHAN KIMIA KERTAS 2
https://cikguadura.wordpress.com/

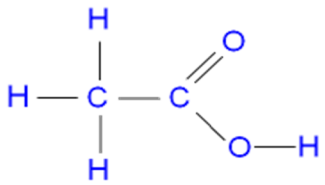
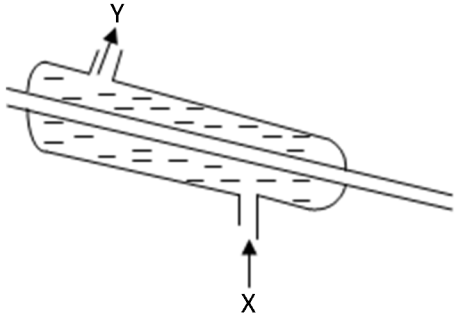
Question	Mark scheme	Mark
1(a)(i)	Contact process *Proses Sentuh*	1
(ii)	Catalyst: Vanadium (V) oxide *Mangkin:Vanadium (V)oksida* Temperature : [450-550] ºC // 450ºC *Suhu*: [*450-550] ºC*	1 1 1
(iii)	Exothermic reaction *Tindak balas eksotermik* Sulphuric acid mist produced is corrosive // difficult to condense *Wasap asid sulfurik yang terhasil bersifat mengakis // susah terkondensasi*	1 1
(b)(i)	Ammonia	1
(ii)	Nitrogen : hydrogen /hidrogen 1 : 3	1
(c)(i)	Ammonium sulphate *Ammonium sulfat*	1
(ii)	Fertilizer *Baja*	1
	Total	9

Question	Mark scheme	Mark
2 (a)(i)	**Atoms** of the **same element** which have same number of proton but different number of neutron. *Atom-atom bagi unsur yang sama yang mempunyaibilangan proton yang sama tetapi bilangan neutron yang berbeza*	1
(ii)	A, C and E*// A, C dan E*	1
(iii)	17	1
(iv)	2.8	1
(b) (i)	Ion	1
(ii)	 • Labelled axes with correct unit • Correct curve with label of temperatures	2
(iii)	Liquid *Cecair*	1

(iv)		1
	Total	9

Question	Mark scheme	Mark
3(a)	To allow the oxygen **enter** into crucible for **complete** combustion *Untuk memastikan oksigen memasuki mangkuk pijar untuk pembakaran lengkap.*	1
(b) (i)	23.85 – 21.45 = 2.4 g	1
(ii)	2.4/24 = 0.1 mol	1
(iii)	25.45 – 23.85 = 1.6 g	1
(iv)	1.6/16 = 0.1	1
(v)	MgO	1
(c)	2Mg + O_2→ 2MgO	2
(d)	Cannot / *TidakBoleh* Lead cannot react readily with oxygen *Plumbum tidak bertindak balas cergas dengan oksigen*	1 1
	Total	10

Question	Mark scheme	Marks	
		sub	**total**
4. a	S	1	1
b. (i)	R// T	1	1
b. (ii)	1. Atom R has achieved a stable duplet electron arrangement// Atom T has achieved a stable octet electron arrangement// *Atom R mencapai susunan elektron duplet yang stabil //* *Atom T mencapai susunan elektron oktet yang stabil //* 2. Does not release, gain or share electrons // *Tidak menderma, menerima atau berkongsi elektron*	1 1	2
c.(i)	U	1	1
c.(ii)	2U + $2H_2O$ → 2UOH + H_2 Correct formulae of reactant and product Balanced equation	1 1	2
d.	X	1	1
e.	Gas R The gas is unreactive // does not burn easily *Kerana gas tidak reaktif // tidak mudah terbakar*	1 1	2
		Total	10

Question		Mark Scheme https://cikguadura.wordpress.com/	Sub Mark	Total Mark
5 (a)		Fermentation *Penapaian*	1	1
(b)		Ethene // *Etena* • Method-1 • Observation -1 Sample answer: 1.Ethene gas is passed through bromine water. *Gas etena dialir melalui air bromin.* 2.Brown solution turns colourless *Larutan perang menjadi tidak berwarna*	1 1 1	 3
(c)	(i)	Ethanoic acid // *Asid etanoik*	1	1
	(ii)		1	1
(d)	(i)	Label water in and water out in the diagram correctly. 	1	1
	(ii)	Ethyl ethanoate // *etil etanoat* **r: ester**	1	1
	(iii)	Formula of product and reactant • Balance equation • Answer $CH_3COOH + C_2H_5OH \rightarrow CH_3COOC_2H_5 + H_2O$	 1 1	 2
	(iv)	To make perfume // food flavouring *Membuat minyak wangi // perisa makanan*	1	1
			Total	11

Question		Mark Scheme	Sub Mark	Total Mark
6 (a)		Reaction that involves oxidation and reduction occur simultaneously. *Tindak balas yang melibatkan pengoksidaan dan penurunan berlaku serentak.*	1	1
(b)	(i)	Electrode P / *elektrod P*: $Cl_2 + 2e \rightarrow 2Cl^-$ Electrode Q / *elektrodQ*: $2I^- \rightarrow I_2 + 2e$	1 1	2
	(ii)	$Cl_2 + 2I^- \rightarrow 2Cl^- + I_2$	1	1
(c)		Show the arrow direction of electron transfer from electrode Q to P in Diagram 6 *Tunjukkan arah anak panah pemindahan elektron dari elektrod Q ke P dalam Rajah 6*	1	1
(d)		Electrode P / *elektrod P*: Pale yellow solution turns colourless *Larutan kuning pudar menjadi tidak berwarna.* Electrode Q / *elektrodQ*: Colourless solution turns to brown. *Larutan tidak berwarna berubah menjadi perang.*	1 1	2
(e)		Potassium iodide solution / *Larutan kalium iodide //* iodide ion */ ion iodida*	1	1
(f)		Add several drops of starch solution, The solution turns dark blue. *Titis beberapa titik larutan kanji .* *Larutan bertukar menjadi biru tua.*	1 1	2
(g)		Bromine water/ Air *bromin*	1	1
			Total	11

Question		Mark Scheme	Sub Mark	Total Mark
7 (a)	(i)	Group 17, Period 3 *Kumpulan 17, Kala 3* **Atom** Z has 7 valence electrons. So atom Z is in Group 17. ***Atom Z** mempunyai 7 elektron valens. Jadi, atom Z dalam Kumpulan 17* Atom Z has 3 shells filled with electrons. So atom Z is in Period 3. *Atom Z mempunyai 3 petala berisi elektron. Jadi, atom Z dalam Kala 3.*	1 1 1	
	(ii)	Brown solid is formed // Burn vigorously to form brown solid *Pepejal perang terbentuk // Terbakar cergas untuk membentuk pepejal perang*	1	4
(b)	(i)	$2Y + 2H_2O \rightarrow 2YOH + H_2$	1	

		• Correct formulae of reactants and products • Correct balance of equation	1	
	(ii)	Mol Y = 2.3/23 // 0.1	1 1	
		2 mol Y produce 1 mol H_2 // *2 mol Y menghasilkan 1 mol H_2* 0.1 mol Y produce 0.05 mol H_2 //*0.1mol Y menghasilkan 0.05 mol H_2*	1	
		Volume = 0.05 x 24 dm^3 // 1.2 dm^3 *Isi padu*	1	6
(c)		<u>Ionic Compound</u> Electron arrangement of atom Y is 2.8.1 *Susunan elektron atom Y ialah 2.8.1* Electron arrangement of atom Z is 2.8.7 *Susunan elektron atom Z ialah 2.8.7*	1	
		Atom Y has 1 valence electron. *Atom Y mempunyai 1 elektron valens.* Atom Z has 7 valence electrons. *Atom Z mempunyai 7 elektron valens.*	1	
		To achieve a stable octet electron arrangement, atom Y loses 1 electron to form Y^+ ion. *Untuk mencapai susunan elektron oktet yang stabil, atom Y melepaskan 1 elektron untuk membentuk ion Y^+*	1	
		To achieve a stable octet electron arrangement, atom Z gains 1 electron to form Z^-ion. *Untuk mencapai susunan elektron oktet yang stabil, atom Z menerima 1 elektron untuk membentuk ion Z^-*	1	
		Ion Y^+ and ion Z^- are attracted by strong electrostatic force *Ion Y^+dan ion Z^-tertarik dengan daya elektrostatik yang kuat*	1	
		Ionic bond is formed *Ikatan ion terbentuk* Ionic compound with formula YZ is produced. *Sebatian ion dengan formula YZ dihasilkan.*	1 1	
		*1 mark is awarded to the correct pairs of electron arrangements *1 mark is awarded for the correct pairs of valence electrons	Max 5	
		<u>Covalent compound</u> Electron arrangement of atom X is 2.4 *Susunan elektron atom X ialah 2.4* Electron arrangement of atom Z is 2.8.7 *Susunan elektron atom Z ialah 2.8.7*	1	

		Atom X has 4 valence electrons. *Atom X mempunyai 4 elektron valens.* Atom Z has 7 valence electrons. *Atom Z mempunyai 7 elektron valens.* To achieve a stable octet electron arrangement, atom X needs 4 electrons. So atom X contributes 4 electrons for sharing. *Untuk mencapai susunan elektron oktet yang stabil, atom X memerlukan 4 elektron. Jadi, atom X menyumbangkan 4 elektron untuk dikongsi* To achieve a stable octet electron arrangement, atom Z needs 1 electron. So atom Z contributes 1 electron for sharing. *Untuk mencapai susunan elektron oktet yang stabil, atom Z memerlukan 1 elektron. Jadi, atom X menyumbangkan 1 elektron untuk dikongsi* 1 atom X shares 4 pairs of electrons with 4 atom Z *1 atom X berkongsi 4 pasang elektron dengan 4 atom Z* Single covalent bonds is formed. *Ikatan kovalen tunggal terbentuk.* Covalent compound with the formula XZ_4 is produced. *Sebatian kovalen dengan formula XZ_4 dihasilkan.* *1 mark is awarded to the correct pairs of electron arrangements *1 mark is awarded for the correct pairs of valence electrons * description of sharing pairs of electrons can be replaced with diagram of electron arrangement	1 1 1 1 1 1 Max 5	10
			Total	20

Question		Mark Scheme	Sub Mark	Total Mark
8 (a)	(i)	Acid A : Hydrochloric acid (accept any strong acid) *Asid A : Asid hidroklorik (terima sebarang asid kuat)* Acid B : Ethanoic acid (accept any weak acid) *Asid B : Asid etanoik (terima sebarang asid lemah)*	1 1	2
	(ii)	Acid A is strong acid, acid B is weak acid *Asid A ialah asid kuat, asid B ialah asid lemah*	1	

		Acid ionizes completely in water, acid B ionizes partially in water *Asid mengion lengkap dalam air, asid B mengion separa dalam air* Acid A produces high concentration of H^+ ions, acid B produces low concentration of H^+ ions *Asid A menghasilkan kepekatan ion H^+ yang tinggi, asid B menghasilkan kepekatan ion H^+ yang rendah.*	1 1	3
8 (b)		Hydrochloric acid can react with magnesium to form salt and hydrogen gas *Asid hidroklorik boleh bertindak balas dengan magnesium untuk menghasilkan garam dan gas hidrogen.* $2HCl + Mg \longrightarrow MgCl_2 + H_2$ Hydrochloric acid can react with calcium carbonate to form salt and carbon dioxide and water *Asid hidroklorik boleh bertindak balas dengan kalsium karbonat untuk menghasilkan garam, karbon dioksida dan air.* $2HCl + CaCO_3 \longrightarrow CaCl_2 + CO_2 + H_2O$	1 2 1 2	6
8 (c)	(i)	Solvent X: Methyl benzene// propanone [any organic solvent] *Pelarut X: Metil benzene // propanon [sebarang pelarut organik]* Solvent Y: Water *Pelarut Y: Air*	1 1	2
	(ii)	Ammonia in solvent X exist as molecule *Ammonia dalam pelarut X wujud sebagai molekul* Ammonia in solvent Y can ionizes *Ammonia dalam pelarut Y boleh mengion* Produce free moving ions *Menghasilkan ion-ion yang bergerak bebas*	1 1 1	3
8 (d)	(i)	Nitrogen	1	
	(ii)	% N in $(NH_4)_2SO_4 = \frac{2 \times 14}{2[14+4(1)]+32+4(16)} \times 100 = 21.21\%$ % N in $CO(NH_2)_2 = \frac{2 \times 14}{12+16+2[14+2(1)]} \times 100 = 46.67\%$ Urea is the better fertiliser because it has higher percentage of nitrogen element. *Urea adalah baja yang lebih baik kerana menpunyai peratus unsur nitrogen yang lebih tinggi*	1 1 1	4
			Total	20

<table>
<tr><th colspan="2">Question</th><th>Mark Scheme
https://cikguadura.wordpress.com/</th><th>Sub Mark</th><th>Total Mark</th></tr>
<tr><td>9</td><td>(a)</td><td>Anode/ anod
Product: oxygen gas
Hasil: gas oksigen
Half-equation: $4OH^- \rightarrow O_2 + 2H_2O + 4e^-$
Persamaan setengah: $4OH^- \rightarrow O_2 + 2H_2O + 4e^-$
Cathode/ katod
Product: hydrogen gas
Hasil: gas hidrogen
Half-equation: $2H^+ + 2e^- \rightarrow H_2$
Persamaan setengah: $2H^+ + 2e^- \rightarrow H_2$</td><td>1
1
1
1</td><td>4</td></tr>
<tr><td></td><td>(b)</td><td>
<table>
<tr><th></th><th>Cell X/ Sel X</th><th>Cell Y/ Sel Y</th></tr>
<tr><td>Energy change
Perubahantenaga</td><td>Chemical energy to electrical energy
Tenaga kimia kepada tenaga elektrik</td><td>Electrical energy to chemical energy
Tenaga elektrik kepada tenaga kimia</td></tr>
<tr><td>Terminal
Terminal</td><td>Positive: copper
Positif: kuprum
Negative: zinc
Negatif: zink</td><td>Positive: copper
Positif: kuprum
Negative: copper
Negatif: kuprum</td></tr>
<tr><td>Half equation at the positive terminal
Persamaan setengah di terminal positif</td><td>$Cu^{2+} + 2e^- \rightarrow Cu$</td><td>$Cu \rightarrow Cu^{2+} + 2e^-$</td></tr>
<tr><td>Half equation at the negative terminal
Persamaan setengah di terminal negatif</td><td>$Zn \rightarrow Zn^{2+} + 2e^-$</td><td>$Cu^{2+} + 2e^- \rightarrow Cu$</td></tr>
<tr><td>Observation at the positive terminal
Pemerhatian di terminal positif</td><td>Brown solid deposited// copper plate becomes thicker</td><td>Copper plate becomes thinner
Kepingan kuprum menjadi nipis</td></tr>
</table>
</td><td>1+1
1+1
1+1
1+1
1+1</td><td></td></tr>
</table>

			Pepejal perang terenap// kepingan kuprum menjadi tebal			Max 6
		Observation at the negative terminal *Pemerhatian di terminal negatif*	zinc plate becomes thinner *Kepingan zink menjadi nipis*	Brown solid deposited// copper plate becomes thicker *Pepejal perang terenap//kepingan kuprum menjadi tebal*	1+1	
	(c)	[Name of a more electropositive metal and name of a less electropositive metal] *[Nama satu logam yang lebih elektropositif dan nama satu logam yang kurang elektropositif]* [Name of one suitable salt solution] *[Nama satu larutan garam yang sesuai]* Procedure/ *prosedur:* 1. Clean [named metal] with sandpaper. *Bersihkan [logam yang dinamakan] dengan kertas pasir.* 2. Pour about 5 cm^3 of [named salt solution] into a test tube. *Tuangkan lebih kurang 5 cm^3 [larutan garam yang dinamakan] ke dalam satu tabung uji.* 3. Place [named metal] into the solution. *Letakkan [logam yang dinamakan] ke dalam larutan itu.* 4. Record the observation in a table. *Catatkan pemerhatian di dalam satu jadual.* 5. Repeat the experiment by using [another named metal]. *Ulang eksperimen dengan [logam lain yang dinamakan].*			1 1 1 1 1 1 1	5
		Expected results/ *Keputusan yang dijangka*: Metal/ *Logam* — Observation/ *Pemerhatian* [Name of a more electropositive metal] / *[Nama satu logam yang lebih elektropositif]* — Deposit formed / *Enapan terbentuk* [Name of a less electropositive metal] / *[Nama satu logam yang kurang elektropositif]* — No change / *Tiada perubahan*			1 1	2

		[Balanced equation] *[Persamaanseimbang]*	1	1
			Total	20

<table>
<tr><th>Question</th><th></th><th>Mark Scheme</th><th>Sub Mark</th><th>Total Mark</th></tr>
<tr><td>10</td><td>(a)</td><td>(i) Hydrogen gas // Natural gas
Gas hidrogen // Gas asli
<table>
<tr><th></th><th>Hydrogen gas
Gas hidrogen</th><th>Natural gas
Gas asli</th><th>Petrol
Petrol</th></tr>
<tr><td>Environmental impact
Kesan terhadap alam sekitar</td><td>1. Clean burning// zero emission//
Pembakaran bersih

2. Does not release greenhouse / carbon dioxide gas.
Tidak membebaskan gas rumah hijau /karbon dioksida</td><td>1. Less carbon emission.
Kurang pembebasan karbon.

2.Less greenhouse/ carbon dioxide gas
Kurang membebaskan gas rumah hijau /karbon dioksida</td><td>1. Produce soot // carbon emission
Menghasilkan jelaga // karbon

2. Release greenhouse/ carbon dioxide gas
Membebaskan gas rumah hijau /karbon dioksida</td></tr>
</table></td><td>1

1 + 1

1 + 1</td><td rowspan="2">6</td></tr>
<tr><td></td><td></td><td>(ii) Sample answer:
Sampel jawapan:
- Use electrical appliances that use energy efficiently (energy saving model)
Menggunakan peralatan yang cekap tenaga (model jimat tenaga)
- Unplug appliances that are not in used.
Mencabut plag peralatan yang tidak digunakan.
- Replace regular bulb with LED bulb.
Menggantikan mentol biasa dengan mentol LED.
- Allow natural lighting.
Membenarkan pencahayaan semulajadi.

* accept any relevant answer
Terima mana-mana jawapan yang releven</td><td>1</td></tr>
</table>

	(b)	(i) Ethanol has higher heat of combustion than methanol *Etanol mempunyai haba pembakaran lebih tinggi daripada methanol.* (ii) 1. Heat of combustion of ethanol is higher than methanol. *Haba pembakaran etanol lebih tinggi daripada metanol.* 2. More carbon atoms per ethanol molecule // Bigger molecular size of ethanol. *Lebih banyak atom karbon per molekul etanol // Saiz molekul etanol yang lebih besar.* 3. More heat is released // Produce more carbon dioxide and water. *Lebih banyak haba dibebaskan // Menghasilkan lebih banyak gas karbon dioksida dan air.*	1 1 1 1	4
	(c)	Sample answer *Sampel jawapan* Materials and apparatus: *Bahan dan radas:* 1. spirit lamp filled with [propan-1-ol], water, copper tin, thermometer, tripod stand, pipe-clay triangle, wind shield, measuring cylinder, balance. *Pelita berisi [propan-1-ol], air, tin kuprum, termometer, tungku kaki tiga, segi tiga tanah liat, pengadang angin, silinder penyukat, penimbang.* Procedure: *Prosedur:* 2. [100- 250] cm^3 of water is measured and poured into a copper can. *[100- 250] cm^3 air disukat dan dituang ke dalam tin kuprum.* 3. The initial temperature of water is recorded. *Suhu awal air direkodkan.* 4. The mass of spirit lamp filled with [propan-1-ol] is recorded. *Jisim pelita berisi [propan-1-ol] direkodkan.* 5. The spirit lamp is placed under the copper can and the wick of the lamp is lighted up immediately. *Pelita itu diletakkan di bawah tin kuprum dan sumbunya dinyalakan dengan segera.* 6. The water is stirred continuously *Air sentiasa dikacau.* 7. The flame is put off when the temperature of water increases by 30°C. *Api dipadam apabila suhu air meningkat sebanyak 30°C.* 8. The mass of spirit lamp and its content is recorded. *Jisim pelita beserta kandungannya direkodkan.*	1 1 1 1 1 1 1 1 Max 7	

		Data: *Data:* Initial temperature of water = T_1 °C *Suhu awal air* Highest temperature of water = T_2°C *Suhu tertinggi air* Change in temperature = T_2- T_1 =Θ °C *Perubahan suhu air* …1 Mass of lamp before burning = m_1 g *Jisim pelita sebelum pembakaran* Mass of lamp after the burning = m_2 g *Jisim pelita selepas pembakaran* Mass of propan-1-ol burnt = $m_1 – m_2$ = m g *Jisim propan-1-ol yang terbakar* …1 Calculation: *Penghitungan:* Number of mole propan-1-ol burnt = $\frac{m}{60}$ = n *Bilangan mol propan-1-ol yang terbakar* Heat released = heat absorbed by water *Haba yang dibebaskan haba yang diserap oleh air* = m c Θ J Heat of combustion = $\frac{mc\theta}{n}$ $Jmol^{-1}$ …. 1 *Haba pembakaran*	3	10
		https://cikguadura.wordpress.com/	Total	20

PERATURAN PEMARKAHAN MODUL KIMIA KERTAS 3 MPSM 2016

<table>
<tr><th>Qn No.</th><th>https://cikguadura.wordpress.com/</th><th>Score</th></tr>
<tr><td rowspan="4">1(a)</td><td>Able to record all the burette readings accurately to two decimal places.

Answer

<table>
<tr><th>Titration
Pentitratan</th><th>Initial burette reading (cm^3)
Bacaan awal buret (cm^3)</th><th>Final burette reading (cm^3)
Bacaan akhir buret (cm^3)</th></tr>
<tr><td>First
Pertama</td><td>5.30</td><td>30.30</td></tr>
<tr><td>Second
Kedua</td><td>17.30</td><td>42.30</td></tr>
</table></td><td>3</td></tr>
<tr><td>Able to record all the burette readings correctly.

Sample asnwer:
<table>
<tr><th>Titration
Pentitratan</th><th>Initial burette reading (cm^3)
Bacaan awal buret (cm^3)</th><th>Final burette reading (cm^3)
Bacaan akhir buret (cm^3)</th></tr>
<tr><td>First
Pertama</td><td>5.3</td><td>30.3</td></tr>
<tr><td>Second
Kedua</td><td>17.3</td><td>42.30</td></tr>
</table></td><td>2</td></tr>
<tr><td>Able to record at least two burette readings correctly.</td><td>1</td></tr>
<tr><td>Wrong response or no response</td><td>0</td></tr>
<tr><td rowspan="4">(b)</td><td>Able to state the correct observation

Sample answer:
1. Pink solution turns colourless // Larutan merah jambu menjadi tidak berwarna</td><td>3</td></tr>
<tr><td>Able to state the correct observation less correctly.

Sample answer:
1. Colourless solution // Larutan tidak berwarna</td><td>2</td></tr>
<tr><td>Able to give an idea of the observation

Sample answer:
1. Colour changes. // Warna bertukar</td><td>1</td></tr>
<tr><td>Wrong response or no response</td><td>0</td></tr>
<tr><td rowspan="4">(c)</td><td>Able to state the inference correctly

Sample answer:
1. Solution is neutral. // Larutan adalah neutral</td><td>3</td></tr>
<tr><td>Able to state the inference less correctly

Sample answer:
1. pH value changes // Nilai pH bertukar</td><td>2</td></tr>
<tr><td>Able to give an idea of the inference
Sample answer:
1. Potassium hydroxide reacts. // Kalium hidroksida bertindak balas.</td><td>1</td></tr>
<tr><td>Wrong response or no response</td><td>0</td></tr>
</table>

(d)	***Able to determine the concentration of nitric acid correctly*** 1. Number of moles of potassium hydroxide 2. Number of moles of nitric acid 3. Concentration of nitric acid Sample answers 1. Number of moles of potassium hydroxide $= \frac{0.2 \times 25}{1000}$ // 0.005 mol Number of moles of nitric acid = 0.005 mol Concentration of nitric acid = $\frac{0.005 \times 1000}{25}$ // 0.2 mol dm^{-3} // *Bilangan mol kalium hidroksida* = $\frac{0.2 \times 25}{1000}$ // 0.005 mol *Bilangan mol asid nitrik* = 0.005 mol *Bilangan mol asid nitrik* = $\frac{0.005 \times 1000}{25}$ // 0.2 mol dm^{-3}	**3**
	Able to determine the concentration of nitric acid by calculating two of the three aspects 1. Number of moles of potassium hydroxide 2. Number of moles of nitric acid 3. Concentration of nitric acid	**2**
	Able to determine the concentration of nitric acid by calculating one of the three aspects 1. Number of moles of potassium hydroxide 2. Number of moles of nitric acid 3. Concentration of nitric acid	**1**
	Wrong response or no response	**0**
(e)	***Able to state the operational definition for end point correctly*** 1. Colour change 2. Add acid to alkali Sample answer: 1. Pink solution becomes colourless when acid is added to alkali // *Larutan merah jambu menjadi tidak berwarna apabila asid ditambah ke alkali.*	**3**
	Able to state the operational definition for end point correctly 1. Colour change *or* Add acid to alkali Sample answer: 1. Pink solution becomes colourless when addition is done. // *Larutan merah jambu menjadi tidak berwrna apabila penambahan dilakukan.*	**2**
	Able to state the idea of operational definition for end point Sample answer: 1. Colour changes. *// Warna bertukar*	**1**
	Wrong response or no response	**0**

2(a)	***Able to state all the variables correctly*** **Manipulated variable:** Temperature // *Suhu* **Responding variable :** Rate of reaction // Time taken for mark X to dissapear from sight // *Kadar tindak balas // Masa untuk tanda X hilang dari penglihatan* **Constant variable** : Sodium thiosulphate solution // volume and concentration of sodium thiosulphate solution // *Larutan natrium tiosulfat // Isipadu dan kepekatan larutan natrium tiosulfat*	**3**
	Able to state any two of the variables correctly	**2**
	Able to state any one variable correctly or give an idea of any two variables	**1**
	Wrong response or no response	**0**
(b)	***Able to state the relationship between the manipulated variable and the responding variable and state the direction correctly*** Sample answer 1. The higher / lower the temperature, the lower / higher the rate of reaction // *Semakin tinggi / rendah suhu, semakin rendah / tinggi kadar tindak balas.*	**3**
	Able to state the relationship between the manipulated variable and the responding variable less correctly Sample answer 1. Change in temperature affects the rate of reaction.// *Perubahan dalam suhu mempengaruhi kadar tindak balas.*	**2**
	Able to state the idea of hypothesis Sample answer 1. Temperature and rate are related. // *Suhu dan kadar tindak balas dikaitkan.*	**1**
	Wrong response or no response	**0**
(c)	***Able to calculate all the values of 1/time correctly to three decimal places*** Annswer: Experiment 1: 0.005 ; Experiment 2: 0.023 ; Experiment 3: 0.042 ; *Eksperimen 1* *Eksperimen 2* *Eksperimen 3* Experiment 4: 0.059 ; Experiment 5: 0.077 *Eksperimen 4* *Eksperimen 5*	**3**
	Able to calculate all the values of 1/time correctly	**2**
	Able to calculate at least three values of 1/time correctly	**1**
	Wrong response or no response	**0**
(d)	***Able to draw the graph of temperature against 1/time correctly*** 1. Both axes with correct labels and unit y-axis: Temperature (^oC) x-axis: 1/time (s^{-1}) 2. All the points are transferred correctly 3. Size of graph 50% and above 4. Best fit line	**3**
	Able to draw the graph with the following criteria 1. Both axes with correct label. 2. Three points are transferred correctly 3. Straight line	**2**

<table>
<tr><td></td><td>Able to give an idea to draw the graph

1. Positive gradient line</td><td>1</td></tr>
<tr><td></td><td>Wrong response or no response</td><td>0</td></tr>
<tr><td>(e)</td><td>Able to predict the time taken for the mark X to disappear from sight correctly

<u>Answer</u>
[A value in the range $10 \leq t \leq 11$ seconds] // [Satu nilai dalam julat $10 \leq t \leq 11$ saat]</td><td>3</td></tr>
<tr><td></td><td>Able to predict the time taken for the mark X to disappear from sight less correctly
<u>Sample Answers</u>
1. [A value in the range $9 \leq t < 10$ seconds or $12 \leq t < 13$ seconds] //
[Satu nilai dalam julat $9 \leq t < 10$ saat atau $12 \leq t < 13$ saat]

2. [$0.083 \leq 1/\text{time} \leq 0.11\ s^{-1}$]
[$0.083 \leq 1/masa \leq 0.11\ s^{-1}$]</td><td>2</td></tr>
<tr><td></td><td>Able to have an idea to predict the time taken for the mark X to disappear from sight

<u>Sample answers</u>
1. Less than 13 seconds. //
Kurang daripada 13 saat
2. Greater than 0.083
Lebih besar daripada 0.083</td><td>1</td></tr>
<tr><td></td><td>Wrong response or no response</td><td>0</td></tr>
<tr><td>(f)</td><td>Able to classify all the substances correctly

<u>Sample answer</u>
<table><tr><th>Slow reaction
Tindak balas lambat</th><th>Fast reaction
Tindak balas cepat</th></tr><tr><td>Rusting of iron
Pengaratan besi</td><td>Combustion of petrol
Pembakaran petrol</td></tr><tr><td>Plant photosynthesis
Fotosintesis tumbuhan</td><td>Neutralisation
Peneutralan</td></tr></table></td><td>3</td></tr>
<tr><td></td><td>Able to classify any 3 substances correctly</td><td>2</td></tr>
<tr><td></td><td>Able to classify any two substances correctly</td><td>1</td></tr>
<tr><td></td><td>Wrong response or no response</td><td>0</td></tr>
</table>

3(a)	***Able to state the problem statement correctly*** Sample answer 1. Which water source allows soap to clean the oil stain on the cloth? // *Sumber air manakah membolehkan sabun mencuci kotoran minyak pada kain?* 2. What is the cleansing action of soap on the cloth with oil stain using hard water and soft water? *Apakah tindakan pembersihan sabun ke atas kain berkotoran minyak dengan menggunakan air liat dan air lembut?*	**3**
	Able to state the problem statement less correctly Sample answer 1. How does soap clean the oil stain in water? // *Bagaimana sabun membersih kotoran minyak dalam air?*	**2**
	Able to to give an idea of problem statement Sample answer 1. Does cleaning take place? // *Adakah pembersihan berlaku?*	**1**
	Wrong response or no response	**0**
(b)	***Able to state all the variables correctly*** Sample answers: **Manipulated variable:** Type of water // Water source A and water source B // *Jenis air // Air dari sumber A dan sumber B* **Responding variable :** Cleansing action of soap // Presence or absence of oil stain *Tindakan pembersihan sabun // Kehadiran atau ketidakhadiran kotoran minyak* **Fixed variable** : Size of oil stain // soap // *Saiz kotoran minyak // sabun*	**3**
	Able to state any two variables correctly	**2**
	Able to state any one variable correctly or idea of all variables	**1**
	Wrong response or no response	**0**
(c)	***Able to state the relationship between the manipulated variable and the responding variable with direction correctly*** Sample answer 1. Soap in hard water has better cleansing effect than soap in soft water. *Sabun dalam air liat mempunyai kesan pencucian yang lebih baik daripada sabun dalam air lembut*	**3**
	Able to state the relationship between the manipulated variable and the responding variable Sample answer 1. Hard and soft water produces different result on the oil stain on cloth. *Air liat dan air lembut menghasilkan keputusan yang berbeza ke atas kotoran minyak pada kain.*	**2**
	Able to state an idea of hypothesis Sample answer 1. Water can result in removing oil stain. *Air menyebabkan kotoran minyak ditanggalkan.*	**1**
	Wrong response or no response	**0**

<table>
<tr><td>(d)</td><td>Able to list all the materials and apparatus

Sample answers:

Materials .
1. Water from sources A and B
Air dari sumber A dan sumber B
2. Soap
Sabun
3. socks / shirts / pants/ clothes with oil stain //
sarung kaki / baju / seluar / pakaian dengan kotoran minyak

Apparatus
1. Beaker / Basin
Bikar / Basin
2. Glass rod //
Rod kaca</td><td>3</td></tr>
<tr><td></td><td>Able to list the following materials and apparatus

Sample answers:

Materials .
1. Water from sources A / B
Air dari sumber A / B
2. Soap
Sabun
3. socks / shirts / pants/ clothes with oil stain //
sarung kaki / baju / seluar / pakaian dengan kotoran minyak

Apparatus
1. [Any container]
[Sebarang bekas]</td><td>2</td></tr>
<tr><td></td><td>Able to list the following materials and apparatus

Sample answers:

Materials .
1. Soap
Sabun
2. socks / shirts / pants/ clothes with oil stain //
sarung kaki / baju / seluar / pakaian dengan kotoran minyak

Apparatus
1. [Any container]
[Sebarang bekas]</td><td>1</td></tr>
<tr><td></td><td>Wrong response or no response</td><td>0</td></tr>
<tr><td>(e)</td><td>Able to state all the steps in the procedure correctly.

Sample answer:

1. Pour water from source A into a beaker until half full. //
Tuang air dari sumber A ke dalam bikar sehingga separuh penuh.
2. Add 2 spatulas of soap into the beaker. //
Tambah dua spatula sabun ke dalam bikar.
3. Stir the mixture. //
Kacau campuran.
4. Place a piece of sock with oil stain into the beaker. //
Letakkan sehelai sarung kaki dengan kotoran minyak ke dalam bikar.
5. Stir the sock in the soap solution. //
Kacau sarung kaki dalam larutan sabun.
6. Observe the oil stain on the sock and record it. //
Perhati kotoran minyak pada sarung kaki dan rekod.
7. Repeat the experiment by using water from source B.
Ulang eksperimen dengan menggunakan air dari sumber B.</td><td>3</td></tr>
</table>

<table>
<tr><td></td><td>Able to state steps 4, 5, 6 and 7</td><td>2</td></tr>
<tr><td></td><td>Able to state an idea of procedure for cleaning
Sample answer:
Put sock into soap //
Letak sarung kaki dalam sabun</td><td>1</td></tr>
<tr><td></td><td>Wrong response or no response</td><td>0</td></tr>
<tr><td>(f)</td><td>Able to tabulate the data with the following aspects

1. Correct headings
2. List of both water sources

Sample answer:
1.<table><tr><td>Water
Air</td><td>Observation
Pemerhatian</td></tr><tr><td>Source A
Sumber A</td><td></td></tr><tr><td>Source B
Sumber B</td><td></td></tr></table></td><td>2</td></tr>
<tr><td></td><td>Able to tabulate the data with a correct heading or list of water source

Sample answer:
1.<table><tr><td>Water
Air</td><td>Observation
Pemerhatian</td></tr><tr><td></td><td></td></tr></table></td><td>1</td></tr>
<tr><td></td><td>Wrong response or no response</td><td>0</td></tr>
</table>