PENTAKSIRAN DIAGNOSTIK AKADEMIK SEKOLAH BERASRAMA PENUH 2016

PEPERIKSAAN PERCUBAAN SIJIL PELAJARAN MALAYSIA

CHEMISTRY **4541/1**

Kertas 1

September 2016

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 setiap soalan, pilih **satu jawapan sahaja.** Hitamkan jawapan anda pada kertas jawapan objektif yang disediakan.*
4. *Jika anda hendak menukar jawapan, padamkan tanda yang telah dibuat, kemudian hitamkan jawapan yang baru.*
5. *Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan.*
6. *Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.*

Kertas soalan ini mengandungi 27 halaman bercetak.

[Lihat Halaman Sebelah

1 Which substance is an element?
Bahan manakah yang merupakan satu unsur?

A Tetrachloromethane, CCl_4
Tetraklorometana, CCl_4
B Naphthalene, $C_{10}H_8$
Naftalena, $C_{10}H_8$
C Methane, CH_4
Metana, CH_4
D Carbon, C
Karbon, C

2 Which chemical formula is correctly named according to IUPAC nomenclature system?
Formula kimia manakah yang dinamakan dengan betul mengikut sistem penamaan IUPAC?

	Chemical formula *Formula kimia*	**Name** *Nama*
A	PbO_2	Lead(IV) oxide *Plumbum(IV) oksida*
B	Al_2O_3	Aluminium trioxide *Aluminium trioksida*
C	$ZnNO_3$	Zinc nitrate *Zink nitrat*
D	Cu_2O	Copper(II) oxide *Kuprum(II) oksida*

3 Which substance is a covalent compound?
Bahan manakah yang merupakan satu sebatian kovalen?

A Ethanol
Etanol
B Marble
Marmar
C Bauxite
Bauksit
D Hematite
Hematit

4 The following information is about an element in the Periodic Table.
Maklumat berikut adalah mengenai satu unsur dalam Jadual Berkala.

- Located in Period 3 in the Periodic Table
  Terletak pada Kala 3 dalam Jadual Berkala
- Reacts with water to produce acidic solution and bleaching agent
  Bertindak balas dengan air menghasilkan larutan berasid dan agen peluntur
- Reacts with hot iron to produce a brown solid
  Bertindak balas dengan besi panas menghasilkan satu pepejal perang

Which of the following shows the electron arrangement of the element?
Yang manakah antara berikut menunjukkan susunan elektron bagi unsur itu?

A 

B 

C 

D 

5 Which substance is an electrolyte?
Bahan yang manakah adalah elektrolit?

A Zinc powder
Serbuk zink

B Molten sulphur
Leburan sulfur

C Ammonia solution
Larutan ammonia

D Hydrogen chloride gas
Gas hidrogen klorida

6 Which of the following is correct about an alkali?
Antara pernyataan berikut yang manakah benar tentang alkali?

A An alkali is not corrosive
Alkali tidak mengkakis

B A strong alkali has a low pH value
Alkali kuat mempunyai nilai pH yang rendah

C An alkali is a base that is soluble in water
Alkali ialah bes yang larut dalam air

D A weak alkali has a high degree of ionisation
Alkali lemah mempunyai darjah pengionan yang tinggi

7 Which salt is prepared by double decomposition reaction?
Garam manakah yang disediakan melalui tindak balas penguraian ganda dua?

A Zinc sulphate
Zink sulfat

B Lead(II) nitrate
Plumbum(II) nitrat

C Ammonium chloride
Ammonium klorida

D Copper(II) carbonate
Kuprum(II) karbonat

8 Diagram 1 shows a set of cookware usually used in the kitchen.
Rajah 1 menunjukkan satu set peralatan memasak yang biasa digunakan di dapur.

Diagram 1
Rajah 1

Which substance is added to the glass to make it suitable for making the cookware?
Bahan manakah yang ditambah kepada kaca itu untuk menjadikannya sesuai untuk membuat peralatan memasak?

A Boron oxide
Boron oksida

B Lead(II) oxide
Plumbum(II) oksida

C Aluminium oxide
Aluminium oksida

D Sodium carbonate
Natrium karbonat

9 Which chemical reaction occurs at the lowest rate?
Tindak balas kimia manakah yang berlaku pada kadar yang paling rendah?

A Fermentation of glucose solution.
Penapaian larutan glukosa.

B Combustion of butane in excess oxygen.
Pembakaran butana dalam oksigen berlebihan.

C Neutralisation between nitric acid and potassium hydroxide solution.
Peneutralan antara asid nitrik dan larutan kalium hidroksida.

D Precipitation between barium chloride solution and potassium sulphate solution.
Pemendakan antara larutan barium klorida dan larutan kalium sulfat

10 Which of the following is correct about hydrocarbon?
Antara berikut yang manakah betul tentang hidrokarbon?

A Hydrocarbons are soluble in water.
Hidrokarbon larut dalam air.

B All organic compounds are hydrocarbons.
Semua sebatian organik adalah hidrokarbon.

C Hydrocarbons are saturated organic compound.
Hidrokarbon adalah sebatian organik tepu.

D Hydrocarbons contain hydrogen and carbon only.
Hidrokarbon mengandungi hidrogen dan karbon sahaja.

11 Which statement defines reducing agent?
Pernyataan manakah yang mendefinisikan agen penurunan?

A The substance that accepts electron.
Bahan yang menerima elektron.

B The substance that loses oxygen.
Bahan yang kehilangan oksigen.

C The substance that loses hydrogen.
Bahan yang kehilangan hidrogen.

D The substance that decreases in oxidation number.
Bahan yang mengalami pengurangan nombor pengoksidaan.

12 The following thermochemical equation represents a neutralisation reaction.
Persamaan termokimia berikut mewakili satu tindak balas peneutralan.

$$KOH + HCl \rightarrow KCl + H_2O \qquad \Delta H = -57 \text{ kJ mol}^{-1}$$

Which pair of substances reacts to release the same value of the heat of neutralisation?
Pasangan bahan manakah yang bertindak balas untuk membebaskan nilai haba peneutralan yang sama?

A Ethanoic acid and ammonia solution
Asid etanoik dan larutan ammonia

B Ethanoic acid and sodium hydroxide solution
Asid etanoik dan larutan natrium hidroksida

C Nitric acid and ammonia solution
Asid nitrik dan larutan ammonia

D Nitric acid and sodium hydroxide solution
Asid nitrik dan larutan natrium hidroksida

13 Aida's brother has a headache.
What medicine should Aida give to his brother?
Adik Aida sakit kepala.
Apakah ubat yang patut Aida berikan kepada adiknya?

A Streptomycin
Streptomisin
B Paracetamol
Parasetamol
C Tranquilizers
Trankuilizer
D Insulin
Insulin

14 Diagram 2 shows the apparatus set-up to determine the empirical formula for an oxide of copper. Gas Z is used to reduce the oxide of copper.
What is gas Z?
Rajah 2 menunjukkan susunan radas untuk menentukan formula empirik bagi satu oksida kuprum. Gas Z digunakan untuk menurunkan oksida kuprum itu.
Apakah gas Z?

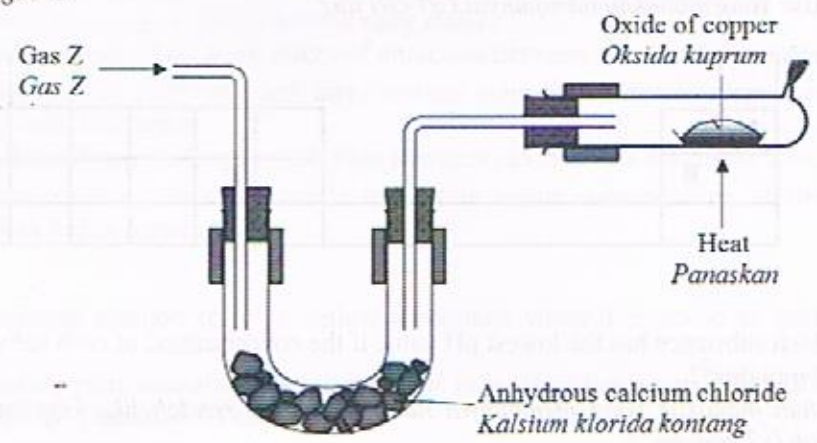


Diagram 2
Rajah 2

A Oxygen
Oksigen
B Chlorine
Klorin
C Hydrogen
Hidrogen
D Carbon dioxide
Karbon dioksida

15 Atom X has 16 neutrons and a nucleon number of 31.
Which of the following is the correct symbol for element X?
Atom X mempunyai 16 neutron dan nombor nukleon 31.
Antara berikut yang manakah simbol unsur X yang betul?

A $^{15}_{16}X$
B $^{16}_{15}X$
C $^{31}_{15}X$
D $^{31}_{16}X$

16 The following is the information about the characteristics of an element in the Periodic Table.
Berikut adalah maklumat mengenai ciri-ciri satu unsur dalam Jadual Berkala.

A soft solid which reacts with water to produced alkaline solution.
Satu pepejal lembut yang bertindak balas dengan air menghasilkan larutan beralkali.

Which element has the characteristics?
Unsur yang manakah mempunyai ciri-ciri itu?

17 Which substance has the lowest pH value if the concentration of each substance is 0.2 mol dm^{-3}?
Bahan manakah yang mempunyai nilai pH paling rendah jika kepekatan setiap bahan ialah 0.2 mol dm^{-3}?

A Ammonia solution
Larutan ammonia
B Potassium hydroxide solution
Larutan kalium hidroksida
C Nitric acid
Asid nitrik
D Sulphuric acid
Asid sulfurik

18 Diagram 3 shows the formation of a bond in a compound.
Which statement is correct about the bond formed?
Rajah 3 menunjukkan pembentukan ikatan dalam satu sebatian.
Pernyataan manakah yang betul tentang ikatan yang terbentuk?

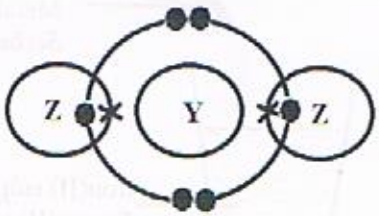


Diagram 3
Rajah 3

A A bond formed when metal atoms share electrons to achieve a stable electron arrangement.
Ikatan yang terbentuk apabila atom-atom logam berkongsi elektron untuk mencapai satu susunan elektron yang stabil.

B A bond formed when non-metal atoms share electrons to achieve a stable electron arrangement.
Ikatan yang terbentuk apabila atom-atom bukan logam berkongsi elektron untuk mencapai satu susunan elektron yang stabil.

C A bond formed by weak forces of attraction between metal and non-metal atoms.
Ikatan yang terbentuk oleh daya tarikan yang lemah antara atom logam dengan atom bukan logam.

D A bond formed when a metal atom transfers electron to a non-metal atom.
Ikatan yang terbentuk apabila satu atom logam memindahkan elektron ke satu atom bukan logam.

19 Which aqueous solution forms a yellow precipitate when it is added to lead(II) nitrate solution?
Larutan akues yang manakah yang membentuk mendakan kuning apabila ia ditambahkan kepada larutan plumbum(II) nitrat?

A Sodium chloride
Natrium klorida

B Potassium iodide
Kalium iodida

C Sodium carbonate
Natrium karbonat

D Potassium sulphate
Kalium sulfat

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

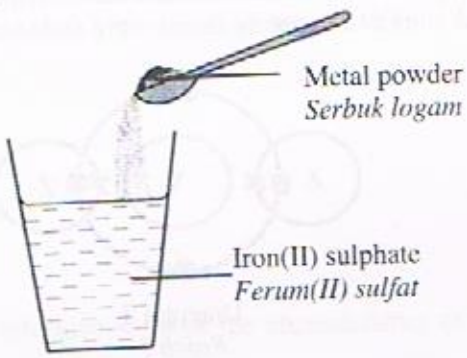


Diagram 4
Rajah 4

Which metal makes the intensity of the green colour of the solution decreases?
Logam manakah yang menyebabkan keamatan warna hijau bagi larutan berkurang?

A Magnesium
Magnesium
B Copper
Kuprum
C Silver
Argentum
D Tin
Stanum

21 One of the methods to determine the rate of reaction is by measuring the time taken for the formation of precipitate.
In which reaction, the rate of reaction can be determined by using this method?
Satu daripada kaedah untuk menentukan kadar tindak balas ialah dengan mengukur masa yang diambil untuk pembentukan mendakan.
Dalam tindak balas manakah, kadar tindak balas boleh ditentukan dengan menggunakan kaedah ini?

A $Zn + 2HCl \rightarrow ZnCl_2 + H_2$
B $NaOH + HNO_3 \rightarrow NaNO_3 + H_2O$
C $CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$
D $Na_2S_2O_3 + H_2SO_4 \rightarrow Na_2SO_4 + S + SO_2 + H_2O$

22 Ammonia, NH_3 is produced in industry through Haber Process. What is the catalyst used in Haber Process?
Ammonia, NH_3 dihasilkan dalam industri melalui Proses Haber. Apakah mangkin yang digunakan dalam Proses Haber?

A Iron
Besi
B Platinum
Platinum
C Vanadium(V) oxide
Vanadium(V) oksida
D Manganese(IV) oxide
Mangan(IV) oksida

23 Fe^{2+} ions can be formed from iron atom.
Which substance causes the changes?
Ion Fe^{2+} boleh terbentuk daripada atom ferum.
Bahan manakah yang boleh menyebabkan perubahan itu?

A Zinc
Zink
B Chlorine gas
Gas klorin
C Magnesium nitrate solution
Larutan magnesium nitrat
D Copper(II) sulphate solution
Larutan kuprum(II) sulfat

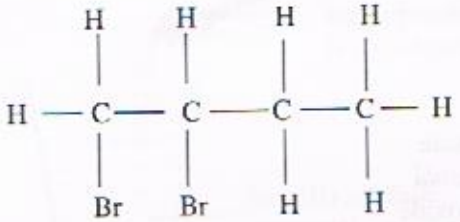
24 Which of the following statement is correct to show the property change of the elements in Period 3 of the Periodic Table from left to right?
Antara pernyataan berikut yang manakah betul menunjukkan perubahan sifat unsur-unsur Kala 3 dalam Jadual Berkala dari kiri ke kanan?

A The number of shells occupied with electrons increases.
Bilangan petala berisi elektron bertambah.
B The electronegativity increases.
Keelektronegatifan bertambah.
C The metallic property increases.
Sifat kelogaman bertambah.
D The atomic size increases.
Saiz atom bertambah.

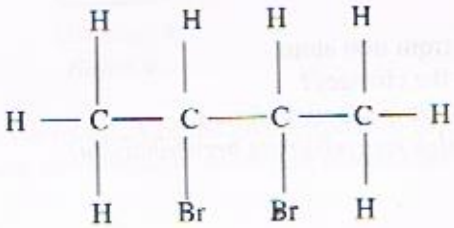
[Lihat Halaman Sebelah

25 But-2-ene decolourises brown colour of bromine water to form a compound X.
Which structural formula represents X?
But-2-ena melunturkan warna perang air bromin untuk membentuk satu sebatian X.
Formula struktur manakah yang mewakili sebatian X?

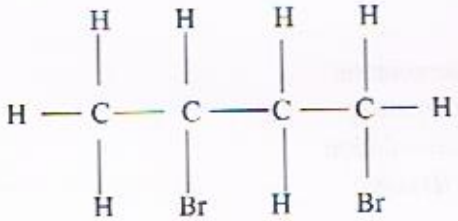
A



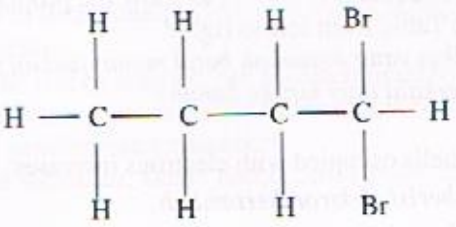
B



C



D



26 Diagram 5 shows an energy level diagram for the decomposition of calcium carbonate.
Rajah 5 menunjukkan gambarajah aras tenaga bagi penguraian kalsium karbonat.

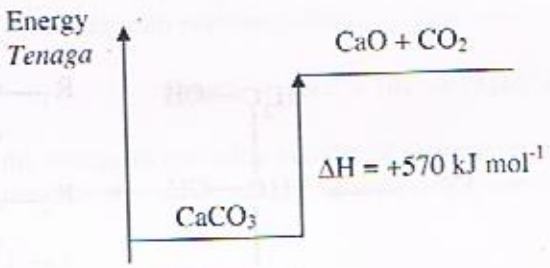


Diagram 5
Rajah 5

Which statement is correct?
Pernyataan manakah yang betul?

A The energy content of reactant is higher than energy content of products.
Kandungan tenaga bahan tindak balas lebih tinggi daripada kandungan tenaga hasil tindak balas.

B Total energy of the reactant and products is 570 kJ.
Jumlah tenaga bahan tindak balas dan hasil tindak balas ialah 570 kJ.

C The temperature of the surroundings decreases.
Suhu persekitaran menurun.

D Heat is released in the reaction.
Haba dibebaskan dalam tindak balas ini.

27 In preparing copper(II) sulphate salt, excess of copper(II) oxide powder is added to sulphuric acid.
What is the purpose of adding excess copper(II) oxide?
Dalam penyediaan garam kuprum(II) sulfat, serbuk kuprum(II) oksida yang berlebihan ditambah kepada asid sulfurik.
Apakah tujuan penambahan kuprum(II) oksida yang berlebihan?

A To prepare a saturated salt solution.
Untuk menyediakan larutan garam yang tepu.

B To ensure the mixture solution is neutral.
Untuk memastikan larutan campuran adalah neutral.

C To increase the solubility of copper(II) sulphate.
Untuk meningkatkan keterlarutan kuprum(II) sulfat.

D To produce a large quantity of copper(II) sulphate salt.
Untuk menghasilkan kuantiti garam kuprum(II) sulfat yang banyak.

28 Diagram 6 shows a chemical equation in saponification process.
Rajah 6 menunjukkan persamaan kimia dalam proses saponifikasi.

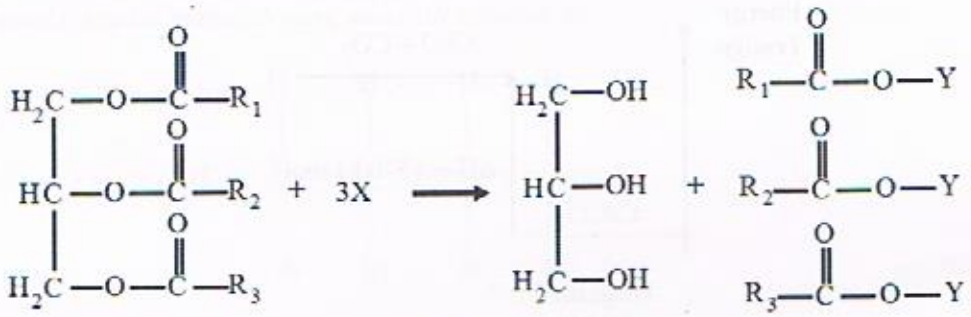


Diagram 6
Rajah 6

What are X and Y?
Apakah X dan Y?

	X	Y
A	NaOH	Na^+
B	NaOH	OH^-
C	H_2O	H^+
D	H_2O	OH^-

29 Table 1 shows the number of electrons and neutrons of ion X^+ and ion Y^{3-}.
Jadual 1 menunjukkan bilangan elektron dan neutron bagi ion X^+ and ion Y^{3-}.

Ion *Ion*	Electron *Elektron*	Neutron *Neutron*
X^+	18	21
Y^{3-}	10	16

Table 1
Jadual 1

Which of the following is the correct electron arrangement of atom X and atom Y?
Antara berikut manakah susunan elektron yang betul bagi atom X dan atom Y?

	X	Y
A	2.8.8.1	2.5
B	2.8.8	2.8
C	2.8.8.1	2.8.3
D	2.8.8.3	2.8.6

30 The following ionic equation represents the reaction between acidified potassium manganate(VII) and sodium iodide solution.
Persamaan ion berikut mewakili tindak balas antara larutan kalium manganat(VII) berasid dengan larutan natrium iodida.

$$2MnO_4^- + 16H^+ + 10I^- \rightarrow 2Mn^{2+} + 8H_2O + 5I_2$$

What is the change in oxidation number of manganese in the reaction?
Apakah perubahan nombor pengoksidaan mangan dalam tindak balas ini?

A $-1 \rightarrow +2$
B $+2 \rightarrow +4$
C $+7 \rightarrow +2$
D $+7 \rightarrow +4$

31 Diagram 7 shows the electron arrangement of a compound.
Rajah 7 menunjukkan susunan elektron bagi satu sebatian.

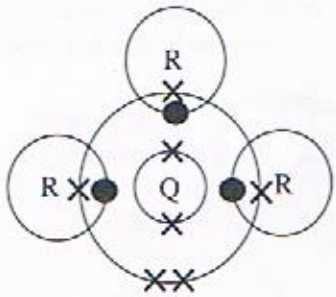


Diagram 7
Rajah 7

Which elements are represented by Q and R?
[Proton number : H = 1, C = 6, N = 7, O = 8, Cl = 17]
Unsur manakah yang diwakili oleh Q dan R?
[*Nombor proton : H = 1, C = 6, N = 7, O = 8, Cl = 17*]

	Q	R
A	Nitrogen *Nitrogen*	Hydrogen *Hidrogen*
B	Carbon *Karbon*	Chlorine *Klorin*
C	Hydrogen *Hidrogen*	Nitrogen *Nitrogen*
D	Chlorine *Klorin*	Carbon *Karbon*

32 Diagram 8 shows the clock for house decoration. It is made up of substance Z which does not rust easily and its looks nicer.
Rajah 8 menunjukkan jam untuk hiasan rumah. Ia diperbuat daripada bahan Z yang tidak mudah berkarat dan ia kelihatan lebih cantik.

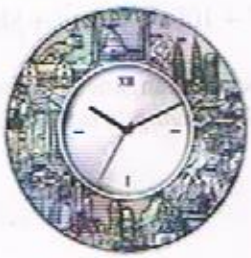
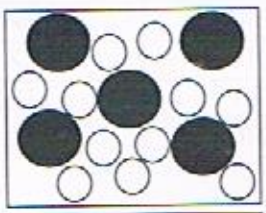


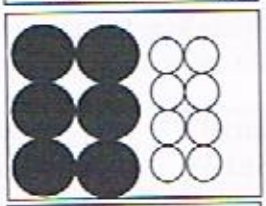
Diagram 8
Rajah 8

Which of the following shows the arrangement of particles in substance Z?
Antara berikut yang manakah menunjukkan susunan zarah dalam bahan Z?

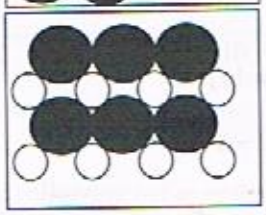
A



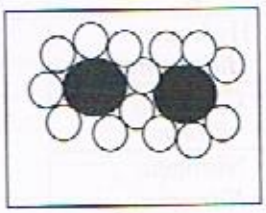
B



C



D



33 A student prepares yogurt by adding 150 cm^3 of lime juce into 350 cm^3 of fresh milk. The temperature of the yogurt rises 3°C.
What is the amount of the heat given out?
[Specific heat capacity of yogurt = y $Jg^{-1o}C^{-1}$, density of yogurt = 1 g cm^{-3}]
Seorang pelajar menyediakan yogurt dengan mencampurkan 150 cm^3 jus limau kepada 350 cm^3 susu segar. Suhu yogurt itu meningkat sebanyak 3°C.
Apakah kuantiti haba yang terbebas?
[Muatan haba tentu yogurt = y J $g^{-1o}C^{-1}$, ketumpatan yogurt =1 g cm^{-3}]

A 450y J
B 600y J
C 1050y J
D 1500y J

34 A student intends to build a simple chemical cell in a school laboratory. Diagram 9 shows the apparatus set-up for the cell.
Which half-equation represents the reaction at the negative terminal?
Seorang pelajar ingin membina sebuah sel kimia ringkas dalam makmal sekolah. Rajah 9 menunjukkan susunan radas bagi sel itu.
Persamaan setengah manakah mewakili tindak balas di terminal negatif?

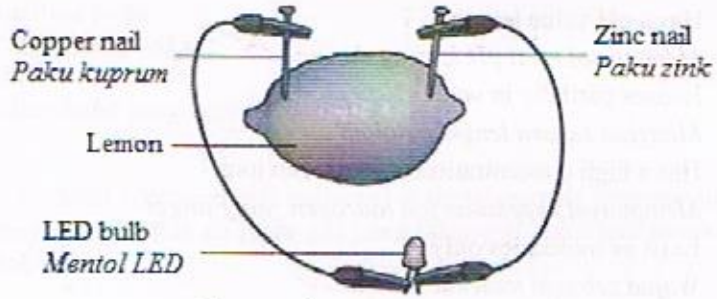


Diagram 9
Rajah 9

A $2H^+ + 2e \rightarrow H_2$
B $Zn \rightarrow Zn^{2+} + 2e$
C $Cu^{2+} + 2e \rightarrow Cu$
D $4OH^- \rightarrow 2H_2O + O_2 + 4e$

35 Diagram 10 shows the electron arrangement of a compound formed between atom P and atom Q. The compound is used by plants for photosynthesis process.
Rajah 10 menunjukkan susunan elektron bagi sebatian yang terbentuk antara atom P dan atom Q. Sebatian itu digunakan oleh tumbuhan untuk proses fotosintesis.

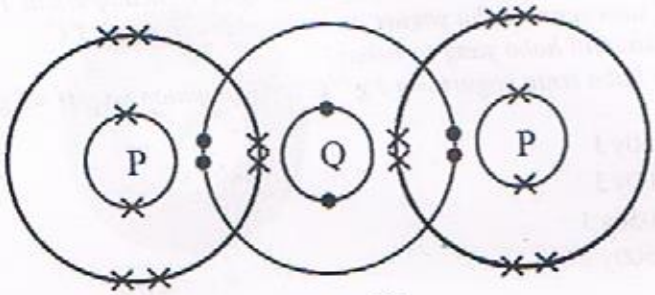


Diagram 10
Rajah 10

Which of the following are correct about the properties of the compound when it is dissolved in water?
Antara berikut manakah yang betul tentang sifat sebatian itu apabila ia dilarutkan dalam air?

I Has a pH value less than 7
Mempunyai nilai pH kurang daripada 7

II Ionises partially in water
Mengion separa lengkap dalam air

III Has a high concentration of hydrogen ions
Mempunyai kepekatan ion hidrogen yang tinggi

IV Exist as molecules only
Wujud sebagai molekul sahaja

A I and II
I dan II

B I and IV
I dan IV

C II dan III
II dan III

D III and IV
III dan IV

36 Diagram 11 shows a famous food in Malaysia called "clay pot chicken rice". The pot used to cook the chicken rice is made of material X.
Rajah 11 menunjukkan sejenis makanan terkenal di Malaysia iaitu "nasi ayam clay pot". Periuk yang digunakan untuk memasak nasi ayam itu diperbuat daripada bahan X.

Diagram 11
Rajah 11

Which of the following is the most suitable property of material X?
Antara berikut yang manakah adalah sifat yang paling sesuai bagi bahan X?

A Hard but brittle
Keras tapi rapuh
B Chemically inert
Lengai secara kimia
C High melting point
Takat lebur yang tinggi
D Good heat conductor
Konduktor haba yang baik

37 Table 2 shows the total volume of gas collected at thirty seconds intervals in a reaction.
Jadual 2 menunjukkan jumlah isi padu gas yang dikumpul pada sela masa tiga puluh saat bagi satu tindak balas.

Time (s) *Masa (s)*	0	30	60	90	120	150	180	210	240
Volume of gas (s) *Isi padu gas (s)*	0.0	5.4	9.5	12.8	15.0	15.9	16.3	16.5	16.5

Table 2
Jadual 2

What is the average rate of reaction in the second minute?
Apakah kadar tindak balas purata dalam minit ke dua?

A $0.036\ cm^3\ s^{-1}$
B $0.078\ cm^3\ s^{-1}$
C $0.092\ cm^3\ s^{-1}$
D $0.125\ cm^3\ s^{-1}$

38 When the temperature of a reacting mixture increases, the rate of reaction increases.
Which statement explains why the rate of reaction increases?
Apabila suhu campuran bahan tindak balas meningkat, kadar tindak balas meningkat.
Pernyataan manakah menerangkan mengapa kadar tindak balas meningkat?

A The total surface area of the reactant particles increases.
Jumlah luas permukaan zarah bahan rindakbalas meningkat

B The total number of the reactant particles per unit volume increases.
Jumlah bilangan zarah bahan tindak balas per unit isipadu meningkat

C The reactant particles move faster and collides more often with one another.
Zarah bahan tindak balas bergerak lebih pantas dan berlanggar lebih kerap antara satu sama lain.

D The reactant particles which collides more often are able to overcome the lower activation energy.
Zarah bahan tindak balas yang berlanggar lebih kerap berupaya mengatasi tenaga pengaktifan yang lebih rendah.

39 Chef Amran is one of the famous celebrity chefs in Malaysia. In an interview, he told his first attempt to make his own mayonnaise. He mixed and blended half cup of olive oil, two eggs and a tea spoon of salt. Then he kept the mayonnaise in a refrigerator for one day. The next day, when he wanted to prepare the sandwich, he found out that the mayonnaise formed two layers.
What is the substance that should be added to the mixture to fix the problem?
Chef Amran merupakan salah seorang daripada chef selebriti yang terkenal di Malaysia. Dalam satu temuramah, dia telah memberitahu percubaan pertamanya untuk membuat mayonis sendiri. Dia telah mencampurkan dan mengisar setengah cawan minyak zaitun, dua biji telur dan sesudu teh garam. Kemudian dia telah menyimpan mayonis itu di dalam peti sejuk selama satu hari. Pada keesokan harinya apabila dia hendak menyediakan sandwich, dia mendapati bahawa mayonis itu membentuk dua lapisan.
Apakah bahan yang harus ditambahkan kepada campuran tersebut untuk mengatasi masalah ini?

A Anthocyanin
Antosianin

B Tocopherol
Tokoferol

C Lecithin
Lesitin

D Pectin
Pektin

40 Fog will form on a mirror when we bathe with a hot shower. It makes a foggy appearance when we look at the mirror.
Which statement is correct to explain this situation?
Kabus terbentuk di cermin apabila kita mandi dengan pancuran air panas. Ia menyebabkan pandangan yang berkabus apabila kita melihat cermin.
Pernyataan manakah yang betul untuk menerangkan situasi ini?

A Water droplets from the shower spattering to the mirror.
Titisan air daripada pancuran terpercik ke cermin.

B Steam released heat to form tiny water droplets on the surface of mirror.
Wap air membebaskan haba untuk membentuk titisan air yang kecil di permukaan cermin.

C Water droplets from the shower absorb heat and form steam on the surface of mirror.
Titisan air daripada pancuran menyerap haba dan membentuk wap air di permukaan cermin.

D Steam particles spread out and fill the empty space between the air particles on the surface of mirror.
Zarah-zarah wap air tersebar dan memenuhi ruang-ruang kosong antara zarah-zarah udara di permukaan cermin.

41 Diagram 12 shows a neutralisation between a strong alkali and a strong acid.
Rajah 12 menunjukkan peneutralan antara satu alkali kuat dan satu asid kuat.

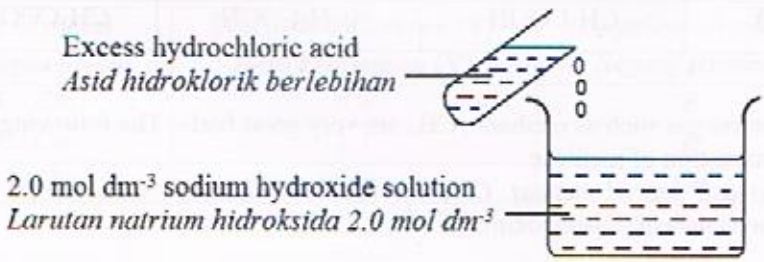


Diagram 12
Rajah 12

What is the volume of the alkali needed to produce 2.34 g of salt?
[Relative atomic mass : H = 1, Na = 23, Cl = 35.5]
Apakah isi padu alkali yang diperlukan untuk menghasilkan 2.34 g garam?
[Jisim atom relatif : H = 1, Na = 23, Cl = 35.5]

A $10\ cm^3$
B $15\ cm^3$
C $20\ cm^3$
D $40\ cm^3$

42 Diagram 13 shows the processes in the production of compound R.
Rajah 13 menunjukkan proses penghasilan sebatian R.

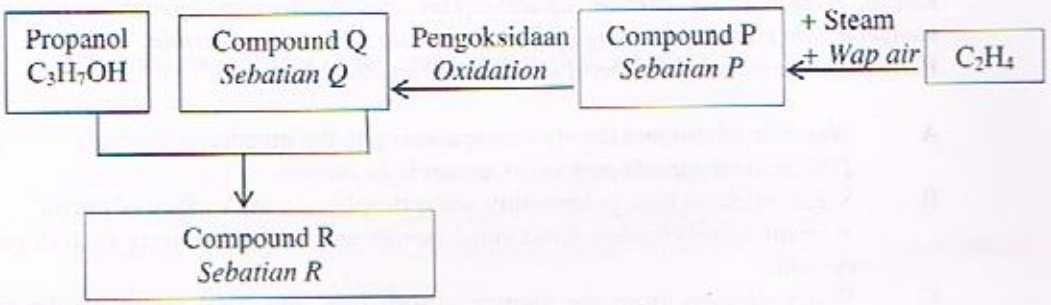


Diagram 13
Rajah 13

What are compounds P, Q and R?
Apakah sebatian P, Q dan R?

	P	Q	R
A	C_2H_5OH	C_2H_5COOH	$CH_3COOC_3H_7$
B	C_2H_5OH	CH_3COOH	$CH_3COOC_3H_7$
C	CH_3COOH	C_2H_5OH	$C_2H_5COOCH_3$
D	CH_3COOH	C_2H_5COOH	$CH_3COOC_3H_7$

43 Natural gas such as methane, CH_4 are very good fuel. The following equation represents a combustion of methane.
Gas asli seperti metana, CH_4 merupakan bahan api yang sangat baik. Persamaan di bawah mewakili pembakaran metana.

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$

What is the mass of products formed when 11.2 g of methane is burnt completely?
[Relative atomic mass : C = 12, H = 1, O = 16]
Berapakah jisim hasil tindak balas yang terbentuk apabila 11.2 g metana dibakar dengan lengkap?
[Jisim atom relatif : C = 12, H = 1, O = 16]

A 11.2 g
B 25.2 g
C 30.8 g
D 56.0 g

44 Which equations represent a redox reaction?
Persamaan manakah mewakili tindak balas redoks?

I $Ag^+ + Cl^- \rightarrow AgCl$

II $MgO + 2HCl \rightarrow MgCl_2 + H_2O$

III $Cl_2 + 2Br^- \rightarrow 2Cl^- + Br_2$

IV $H_2SO_4 + Zn \rightarrow ZnSO_4 + H_2$

A I and II
I *and* II

B I and III
I *dan* III

C II and IV
II *dan* IV

D III and IV
III *dan* IV

45 Table 3 shows the potential difference and the negative terminal when three pairs of metals are used as electrodes in a simple voltaic cell.
Jadual 3 menunjukkan beza keupayaan dan terminal negatif apabila tiga pasangan logam digunakan sebagai elektrod dalam sel voltan ringkas.

Pair of metal *Pasangan logam*	**Potential difference (V)** *Beza keupayaan* (V)	**Negative terminal** *Negatif terminal*
E / Cu	0.4	E
F / Cu	1.7	F
G / Cu	0.5	Cu

Table 3
Jadual 3

What is the potential difference of the cell if pair of metals F and G is used as electrodes?
Apakah beza keupayaan bagi sel itu jika pasangan logam F dan G digunakan sebagai elektrod?

A 0.3 V
B 0.9 V
C 1.2 V
D 2.2 V

46 Diagram 14 shows two steps of experiment to investigate the chemical properties of element Q which is located in Group 1 in The Periodic Table of Elements.
Rajah 14 menunjukkan dua set eksperimen untuk mengkaji sifat kimia bagi unsur Q yang terletak dalam Kumpulan 1 Jadual Berkala Unsur.

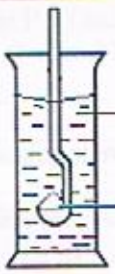
Experiment *Ekperimen*	Set-up of apparatus *Susunan radas*	Observation *Pemerhatian*
Step 1	 Q burnt in oxygen gas *Q terbakar dalam gas oksigen*	White solid formed *Pepejal putih terbentuk*
Step 2	 Water *Air* White solid *Pepejal putih*	White solid dissolved in water. Colourless solution formed. It turned pink when phenolphthalein is added into it *Pepejal putih larut dalam air. Larutan tak berwarna terbentuk. Ia bertukar merah jambu apabila fenolftalein ditambah ke dalamnya*

Diagram 14
Rajah 14

Which statement explains the observation in Step 2?
Pernyataan manakah yang menerangkan pemerhatian dalam Langkah 2?

A The solution is acidic
Larutan itu berasid

B The solution has low pH value
Larutan itu mempunyai pH yang rendah

C The solution contains hydroxide ions
Larutan itu mengandungi ion hidroksida

D The solution has high concentration of hydrogen ions
Larutan itu mempunyai kepekatan ion hydrogen yang tinggi

47 Table 4 shows the proton numbers of atoms of four different elements.
Jadual 4 menunjukkan nombor proton bagi atom empat unsur yang berlainan.

Element *Unsur*	W	X	Y	Z
Proton number *Nombor proton*	6	8	11	17

Table 4
Jadual 4

Which of the following pairs of elements react to form a compound with high melting point?
Antara pasangan unsur berikut, yang manakah bertindak balas untuk membentuk satu sebatian yang mempunyai takat lebur yang tinggi?

I X and Y
X *dan* Y
II Y and Z
Y *dan* Z
III W and X
W *dan* X
IV X and Z
X *dan* Z

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

48 Ali is a sea diver. One day, he was stung by a jellyfish at his hand. A local villager swept a lemon juice into his hand to relief pain.
Ali adalah seorang penyelam. Pada suatu hari, dia telah disengat obor-obor pada tangannya. Seorang penduduk kampung menyapukan jus limau ke tangan Ali untuk meredakan kesakitan.
Which of following best explains why vinegar or lemon juice can be used to treat jellyfish sting?
Antara berikut pernyataan manakah yang terbaik menerangkan mengapa cuka atau jus limau boleh digunakan untuk merawat senggatan obor-obor?

A Both substances neutralises the jellyfish sting.
Kedua-dua bahan meneutralkan sengatan obor-obor.

B Both substances denser than jellyfish sting.
Kedua-dua bahan kurang tumpat dari sengatan obor-obor.

C Both substances oxidise the jellyfish sting.
Kedua-dua bahan mengoksidakan sengatan obor-obor.

D Both substances dilute the jellyfish sting.
Kedua-dua bahan mencairkan sengatan obor-obor.

49 Diagram 15 shows the structural formula of compound X.
Rajah 15 menunjukkan formula struktur bagi sebatian X.

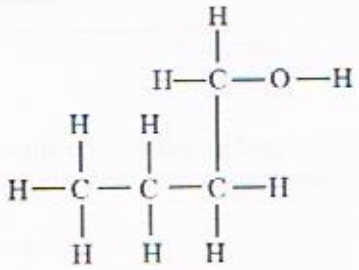


Diagram 15
Rajah 15

Compound X undergoes combustion reaction when it is burnt in oxygen.
How many moles of oxygen needed to react completely with compound X?
Sebatian X menjalani tindak balas pembakaran apabila ia dibakar dalam oksigen.
Berapakah bilangan mol oksigen yang diperlukan untuk bertindak balas lengkap dengan sebatian X?

A 1
B 4
C 6
D 13

50 Culture of drinking tea is a very common among the Chinese. It is consumed regularly in casual or formal occasions. Diagram 16 shows the tea which is boiled in a pot by using a spirit lamp filled with heptane.
Budaya meminum teh adalah biasa dalam kalangan orang Cina. Ia biasanya diminum dalam majlis formal atau tidak formal. Rajah 16 menunjukan teh yang dididih dalam pot dengan menggunakan lampu spirit yang diisi dengan heptana.

Diagram 16
Rajah 16

The following thermochemical equation represents the combustion of heptane.
Persamaan termokimia berikut mewakili pembakaran heptana.

$$C_7H_{16} + 11O_2 \rightarrow 7CO_2 + 8H_2O \qquad \Delta H = -5512 \text{ kJ mol}^{-1}$$

What is the mass of heptane needed to increase the temperature of 1 dm^3 of tea by 60°C?
[Specific heat capacity of water = 4.2 $Jg^{-1}°C^{-1}$, Relative atomic mass : H = 1, C=12]
Apakah jisim heptana yang diperlukan untuk meningkatkan suhu 1dm^3 teh sebanyak 60°C?
[*Muatan haba tentu air = 4.2 $Jg^{-1}°C^{-1}$, Jisim atom relatif : H = 1, C = 12*]

A 46 g
B 4.6 g
C 0.46 g
D 0.046 g

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

PENTAKSIRAN DIAGNOSTIK AKADEMIK SEKOLAH BERASRAMA PENUH 2016

PEPERIKSAAN PERCUBAAN SIJIL PELAJARAN MALAYSIA

CHEMISTRY **4541/2**

Kertas 2

September 2016

2 ½ jam **Dua jam tiga puluh minit**

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

Arahan:

1. *Tuliskan Nama dan Tingkatan pada ruang yang disediakan.*
2. *Jawab semua soalan daripada **Bahagian A**. Tuliskan jawapan anda dalam ruang yang disediakan.*
3. *Jawab satu soalan daripada **Bahagian B** dan satu soalan daripada **Bahagian C***
4. *Anda diminta menjawab dengan lebih terperinci untuk Bahagian B dan Bahagian C. Jawapan mestilah jelas dan logik. Persamaan, gambar rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda boleh digunakan.*
5. *Penggunaan kalkulator saintifik yang tidak boleh diprogramkan adalah dibenarkan.*

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

NAMA : _____

TINGKATAN : _____

Kertas soalan ini mengandungi 25 halaman bercetak.

[Lihat Halaman Sebelah

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

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

1 Table 1 shows the number of proton and the number of neutron of atoms Y and Z
Jadual 1 *menunjukkan bilangan proton dan bilangan neutron bagi atom Y dan Z.*

Atom *Atom*	**Number of proton** *Bilangan proton*	**Number of neutron** *Bilangan neutron*
Y	17	18
Z	20	20

Table 1
Jadual 1

a) Based on Table 1:
Berdasarkan Jadual 1:

(i) Write the electron arrangement of atom Y.
Tulis susunan elektron bagi atom Y.

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

(ii) State the period of Y in the Periodic Table of Element.
Nyatakan kala bagi Y *dalam Jadual Berkala Unsur.*

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

(iii) Give one reason for your answer in 1(a)(ii).
Beri satu sebab bagi jawapan anda dalam 1(a)(ii).

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

(iv) Write the formula of Z ion.
Tuliskan formula bagi ion Z.

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

(v) State the nucleon number of atom Z.
Nyatakan nombor nukleon atom Z.

.....

[1 mark]
[1 *markah*]

b) Pineapple is a tropical plant which consists of many nutrients such as niacin or vitamin B3.
Nenas adalah sejenis tanaman tropika yang mengandungi banyak nutrient seperti niasin atau vitamin B3.

Diagram 1 shows the structural formula of niacin in a pineapple.
Rajah 1 menunjukkan formula struktur bagi niasin yang terdapat dalam nenas.

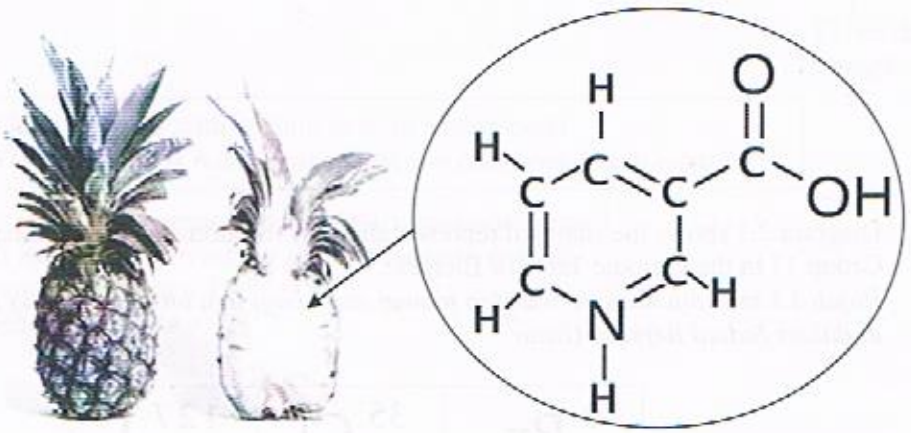


Diagram 1
Rajah 1

(i) What is the molecular formula of niacin?
Apakah formula molekul bagi niasin?

.....

[1 mark]
[1 *markah*]

(ii) State the type of particle in niacin.
Nyatakan jenis zarah dalam niasin.

.....

[1 mark]
[1 *markah*]

(iii) 10.0 kg of pineapple it consists of 5.0 g of niacin.
10.0 kg *nenas mengandungi* 5.0 g *niasin*.
What is the number of mole of niacin in 10 kg of pineapple?
Berapakah bilangan mol niasin dalam 10 kg nenas?
[Relative Atomic Mass: H=1, C=12, N=14, O=16]
[Jisim Atom Relatif: H=1, C=12, N=14, O=16]

[2 marks]
[2 *markah*]

2 Diagram 2.1 shows the standard representation for the atoms of three elements from Group 17 in the Periodic Table of Element.
Rajah 2.1 *menunjukkan perwakilan piawai atom bagi tiga unsur daripada Kumpulan 17 di dalam Jadual Berkala Unsur.*

$^{80}_{35}Br$	$^{35}_{17}Cl$	$^{127}_{53}I$
Bromine *Bromin*	Chlorine *Klorin*	Iodine *Iodin*

Diagram 2.1
Rajah 2.1

a) What is represented by the number 35 in $^{80}_{35}Br$
Apakah yang diwakili oleh nombor 35 *dalam* $^{80}_{35}Br$

.....

[1 mark]
[1 *markah*]

b) State the number of valence electrons of bromine atom?
Nyatakan bilangan elektron valens atom bromin.

.....

[1 mark]
[1 *markah*]

c) (i) Compare the size of the chlorine atom with the bromine atom.
Bandingkan saiz atom klorin dengan atom bromin.

.....

[1 mark]
[1 *markah*]

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

.....

.....

[2 marks]
[2 *markah*]

d)

Chlorine reacts with sodium to form a compound.
Klorin bertindak balas dengan natrium membentuk satu sebatian

Draw the electron arrangement of the compound formed.
Lukis susunan elektron bagi sebatian yang terbentuk.
[Proton number Na = 11]
[*Nombor proton* Na = 11]

[2 marks]
[2 *markah*]

e) Diagram 2.2 shows the reaction occured when iodine dissolve in water. A piece of litmus paper is dipped into the solution formed.
Rajah 2.2 menunjukkan tindakbalas yang berlaku apabila iodin di larutkan ke dalam air. Sekeping kertas litmus dicelupkan ke dalam larutan yang terhasil.

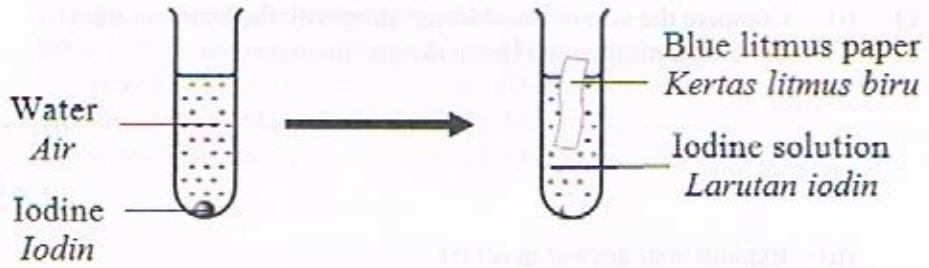


Diagram 2.2
Rajah 2.2

(i) State the observation on the litmus paper
Nyatakan pemerhatian pada kertas litmus.

.....

[1 mark]
[1 *markah*]

(ii) Give a reason for your answer in (e)(i)
Berikan alasan bagi jawapan anda dalam (e)(i)

.....

[1 mark]
[1 *markah*]

3 Diagram 3 shows the set-up of apparatus to purify the impure copper metal by using electrolysis process.
Rajah 3 menunjukkan susunan alat radas untuk menulenkan logam kuprum tak tulen dengan menggunakan kaedah elektrolisis.

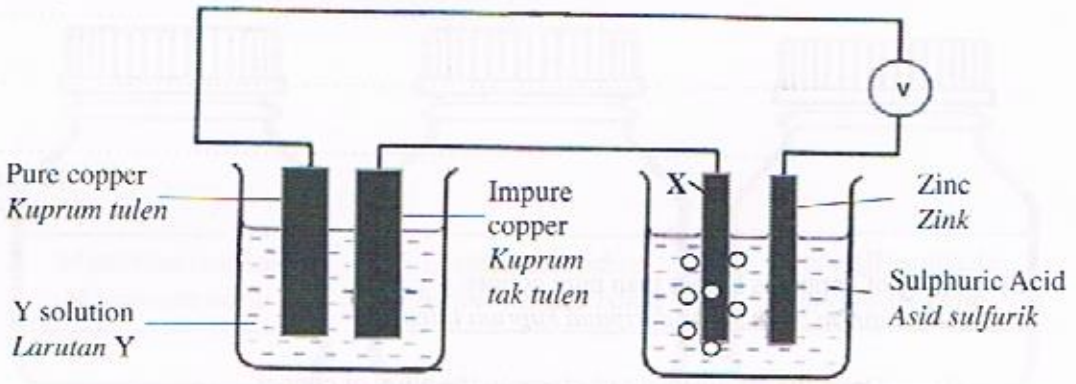


Diagram 3
Rajah 3

a) What is the function of cell Q?
Apakah fungsi sel Q?

.....

[1 mark]
[1 *markah*]

b) Suggest a substance that can be used as
Cadangkan bahan yang boleh digunakan sebagai

Electrode X/ *Elektrod* X: .....

Solution Y/ *Larutan* Y: .....

[2 marks]
[2 *markah*]

c) At cell Q, there are colourless gas bubbles produce at electrode X.
Pada sel Q, terdapat gelembung-gelembung gas tidak berwarna terbebas di elektrod X.

(i) Write the half equation for the formation of the gas.
Tulis persamaan setengah untuk pembentukan gas tersebut.

.....

[1 mark]
[1 *markah*]

(ii) Describe briefly a chemical test to confirm the gas produced.
Huraikan secara ringkas satu ujian kimia bagi mengenalpasti gas yang terhasil.

.....

.....

.....

[2 marks]
[2 *markah*]

d) Alloy of copper is harder than pure copper.
Aloi kuprum lebih keras daripada kuprum tulen.

(i) Draw the arrangement of atoms in the alloy of copper.
Lukis gambarajah susunan atom di dalam aloi kuprum.

[2 marks]
[2 *markah*]

(ii) Explain the hardness of the alloy.
Terangkan kekerasan aloi itu.

.....

.....

[2 marks]
[2 *markah*]

4 Diagram 4 shows three types of salt that is commonly found in school laboratories and widely used in various industries.
Rajah 4 menunjukkan tiga jenis garam yang biasa dijumpai di makmal sekolah dan banyak digunakan dalam pelbagai industri.

Diagram 4
Rajah 4

Based on Diagram 4;
Berdasarkan Rajah 4;

a) (i) State the name of one soluble salt.
Nyatakan nama satu garam terlarutkan.

.....

[1 mark]
[1 *markah*]

(ii) Write the chemical formula of the salt.
Tuliskan formula kimia garam tersebut.

.....

[1 mark]
[1 *markah*]

(iii) What is the colour of the solid salt mention in (a)(i)?
Apakah warna garam pepejal yang dinyatakan dalam (a)(i)?

.....

[1 mark]
[1 *markah*]

b) 26.7 g of the carbonate salt was decomposed when strongly heated.
26.7 g *garam karbonat tersebut telah terurai apabila di panaskan dengan kuat.*

(i) What can be observed after solid carbonate salt is heated?
Apakah yang dapat diperhatikan selepas pepejal garam karbonat dipanaskan?

.....

[1 mark]
[1 *markah*]

(ii) Write a balanced chemical equation to show the decomposition process occurred.
Tuliskan persamaan kimia seimbang untuk menunjukkan proses penguraian yang berlaku.

.....

[1 mark]
[1 *markah*]

(iii) Determine the maximum volume of gas released from the decomposition process.
Tentukan isipadu maksimum gas yang terbebas daripada proses penguraian ini.
[Relative atomic mass: Pb = 207; O = 16; C = 12; 1 mol of gas occupies 24 dm^3 at room conditions]
[*Jisim atom relatif*: Pb = 207; O = 16; C = 12; 1 mol *gas menempati* 24 dm^3 *pada keadaan bilik*]

[2 marks]
[2 *markah*]

c) Describe briefly how you can verify the present of anion in the sulphate salt.
Huraikan secara ringkas bagaimana anda dapat mengesahkan kehadiran anion di dalam garam sulfat tersebut.

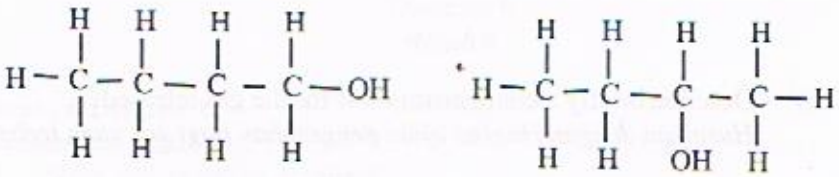
.....

.....

.....

[3 marks]
[3 *markah*]

5 Diagram 5 shows the structural formulae of compound P and compound Q.
Both compound P and compound Q are isomers.
Rajah 5 menunjukkan formula struktur bagi sebatian P *dan sebatian* Q.
Kedua-dua sebatian P *dan sebatian* Q *adalah isomer.*



Compound P
Sebatian P

Compound Q
Sebatian Q

Diagram 5
Rajah 5

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

.....

[1 mark]
[1 *markah*]

(ii) State the name of the compounds by using IUPAC nomenclature.
Nyatakan nama sebatian-sebatian itu dengan menggunakan penamaan IUPAC.

Compound P: .....
Sebatian P

Compound Q: .....
Sebatian Q

[2 marks]
[2 *markah*]

(iii) Draw the structural formula for another isomer of the compound.
Lukiskan formula struktur untuk satu lagi isomer bagi sebatian itu.

[1 mark]
[1 *markah*]

b) Compound P burns in excess oxygen to form a gas and water.
Sebatian P *terbakar di dalam oksigen berlebihan menghasilkan sejenis gas dan air.*

(i) Write a balance chemical equation for the reaction involve.
Tuliskan persamaan seimbang bagi tindak balas yang terlibat.

.....

[2 marks]
[2 *markah*]

(ii) Describe briefly a confirmatory test for the gas released.
Huraikan dengan ringkas ujian pengesahan bagi gas yang terbebas.

.....

.....

[2 marks]
[2 *markah*]

c) Compound Q undergoes a reaction to form compound R.
Compound R contains 85.7% carbon and the rest is hydrogen.
Find the empirical formula of the compound R.
Sebatian Q *mengalami tindak balas membentuk sebatian* R.
Sebatian R *mengandungi* 85.7% *karbon dan selebihnya adalah hydrogen.*
Tentukan formula empiric bagi sebatian R.

[Relative atomic mass: H =1, C =12]
[*Jisim atom relatif*: H =1, C =12]

[3 mark]
[3 *markah*]

6 Diagram 6 shows the apparatus set-up constructed by a student. As the circuit is completed, the needle of galvanometer deflected.
Rajah 6 menunjukkan susunan radas yang dibina oleh seorang pelajar. Apabila litar dilengkapkan, jarum galvanometer telah terpesong.

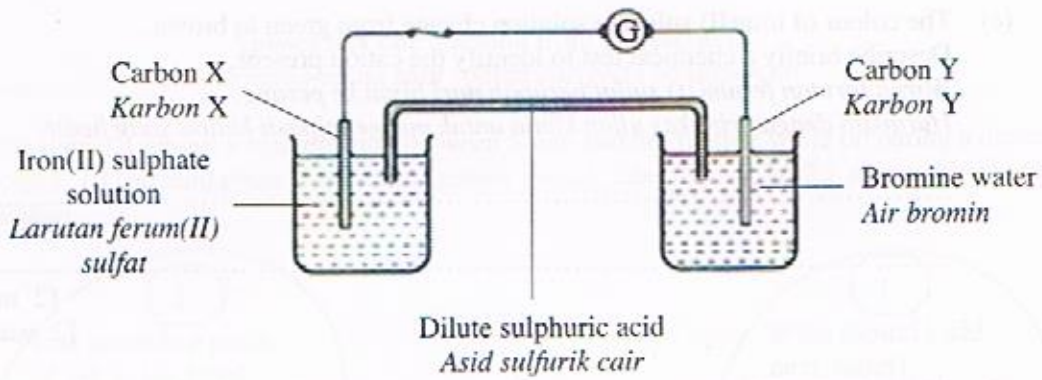


Diagram 6
Rajah 6

a) Based on Diagram 6;
Berdasarkan Rajah 6;

(i) State the negative terminal.
Nyatakan terminal negatif.

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

(ii) State the role of bromine water.
Nyatakan peranan air bromin.

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

(iii) Explain your answer in (a)(ii).
Terangkan jawapan anda di (a)(ii).

.....

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

(b) On Diagram 6, draw the arrows to show the direction of electron flow.
Pada Rajah 6, lukiskan anak panah bagi menunjukkan arah pengaliran elektron.
[1 mark]
[1 *markah*]

(c) The colour of iron(II) sulphate solution change from green to brown.
Describe briefly a chemical test to identify the cation present.
Warna larutan ferum(II) *sulfat berubah dari hijau ke perang.*
Huraikan dengan ringkas ujian kimia untuk mengenalpasti kation yang hadir.

.....

.....

[2 marks]
[2 *markah*]

(d) Write the overall ionic equation for the reaction occured.
Tuliskan persamaan ion keseluruhan bagi tindak balas yang berlaku.

.....

[2 marks]
[2 *markah*]

(e) Draw a labelled diagram for the apparatus set-up used to show the electron transfer at a distance by using another suitable materials.
Lukiskan satu gambarajah berlabel bagi susunan radas untuk menunjukkan pemindahan elektron pada suatu jarak dengan menggunakan bahan-bahan lain yang sesuai.

[2 marks]
[2 *markah*]

Section B
Bahagian B

[20 marks]
[*20 markah*]

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

7. Diagram 7.1 shows a conversation between Sarah and her mother while preparing a dinner.
Rajah 7.1 *menunjukkan perbualan antara Sarah dan ibunya ketika menyediakan makan malam.*

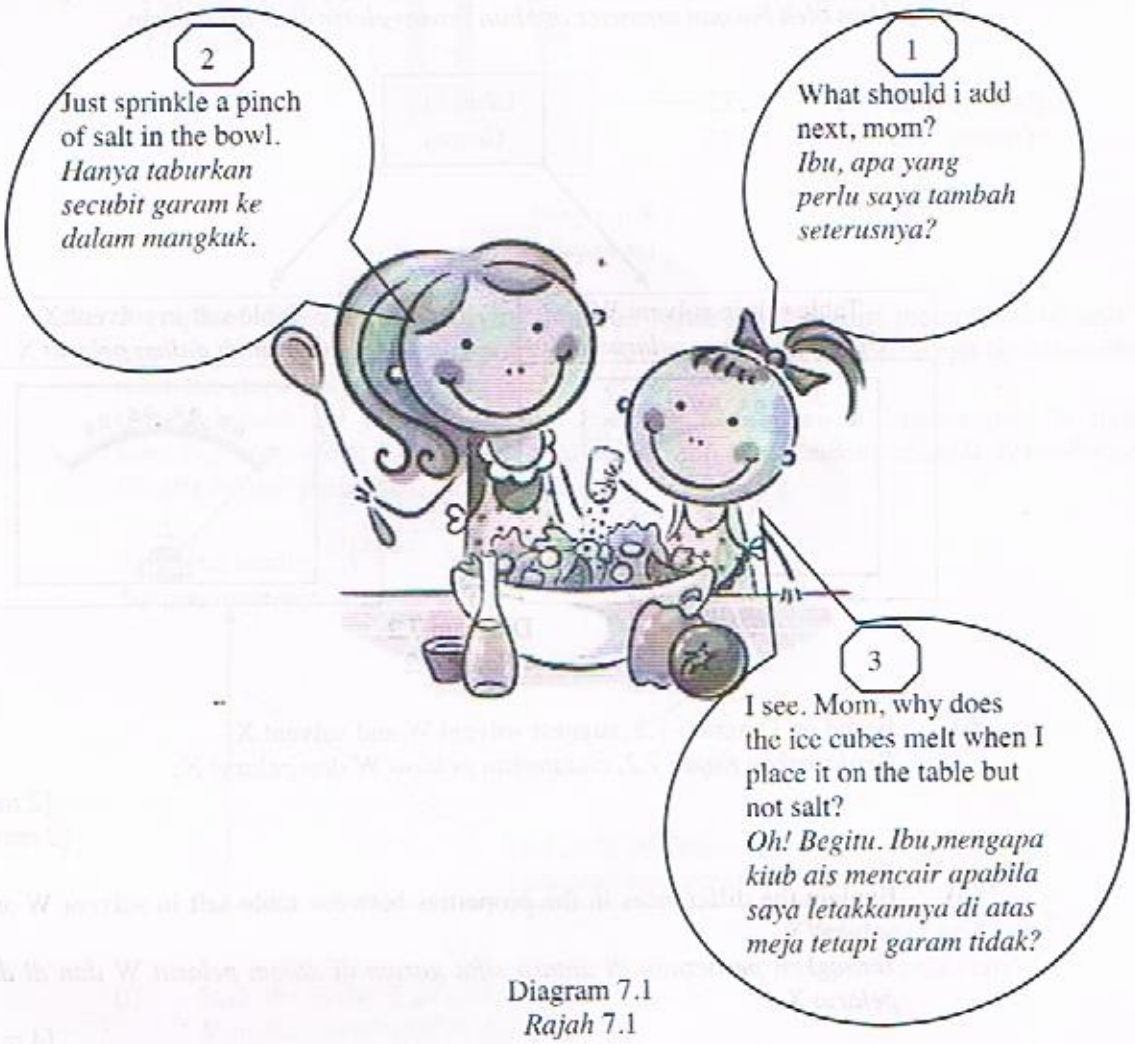


Diagram 7.1
Rajah 7.1

(a) Based on the conversation in Diagram 7.1, explain the differences of the physical properties of ice cubes and salt.
Berdasarkan perbualan dalam Rajah 7.1, *jelaskan perbezaan sifat fizik kiub ais dan garam.*

[4 marks]
[4 *markah*]

[Lihat Halaman Sebelah

(b) Name the type of bond for the compounds mentioned in Diagram 7.1.
Explain the formation of the compounds.
Namakan jenis ikatan bagi sebatian-sebatian yang dinyatakan dalam Rajah 7.1.
Terangkan pembentukan sebatian-sebatian tersebut.

[10 marks]
[10 *markah*]

(c) Diagram 7.2 shows an observation when table salt is added in two different solvents, solvent W and solvent X. The property of the salt in the solvents is shown by ammeter reading when electrolysis process is conducted.
Rajah 7.2 menunjukkan pemerhatian apabila garam ditambah ke dalam dua pelarut yang berbeza, pelarut W *dan pelarut* X. *Sifat garam dalam pelarut-pelarut itu ditunjukkan oleh bacaan ammeter apabila proses elektrolisis dijalankan.*

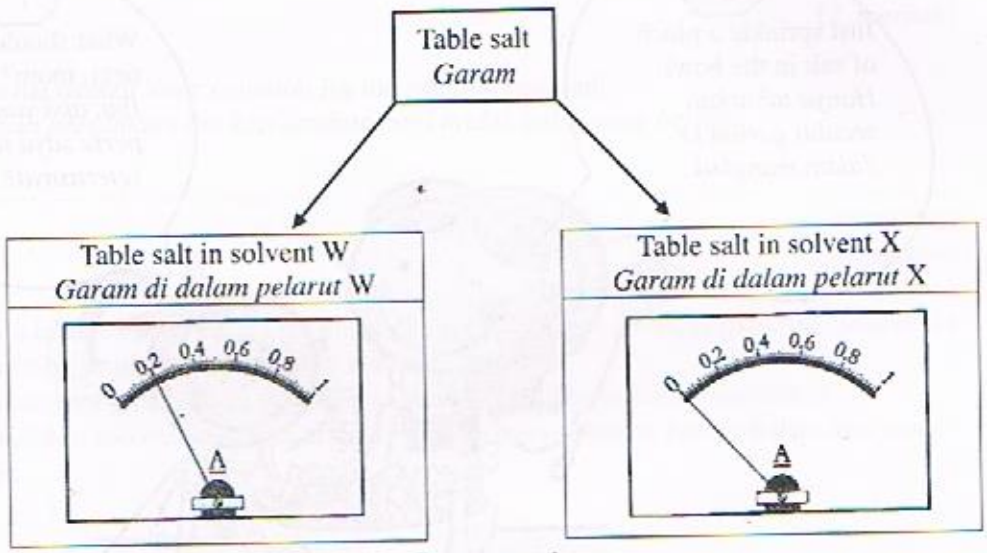


Diagram 7.2
Rajah 7.2

(i) Based on Diagram 7.2, suggest solvent W and solvent X.
Berdasarkan Rajah 7.2, cadangkan pelarut W *dan pelarut* X.

[2 marks]
[2 *markah*]

(ii) Explain the differences in the properties between table salt in solvent W and in solvent X.
Terangkan perbezaan di antara sifat garam di dalam pelarut W *dan di dalam pelarut* X.

[4 marks]
[4 *markah*]

8. Diagram 8.1 shows an apparatus set-up to determine the end point of titration through electrical conductivity method. 25 cm^3 1.0 mol dm^{-3} of alkali Y is neutralised by 1.0 mol dm^{-3} of acid X.
Rajah 8.1 *menunjukkan satu susunan radas bagi menentukan takat akhir pentitratan melalui kaedah kekonduksiaan elektrik*. 25 cm^3 1.0 mol dm^{-3} *alkali* Y *dineutralkan oleh* 1.0 mol dm^{-3} *asid* X.

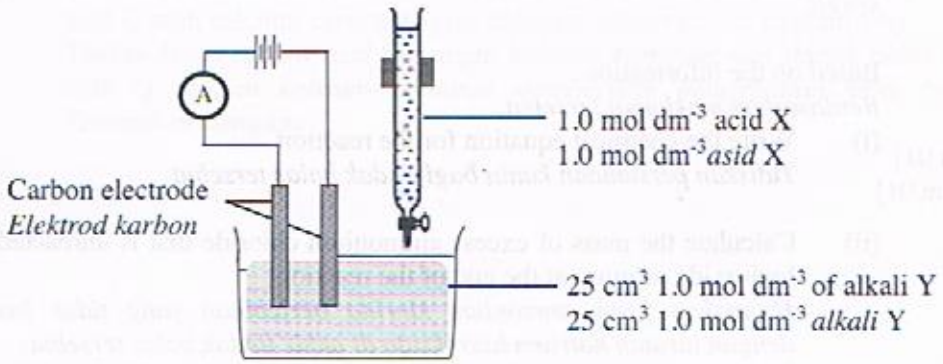
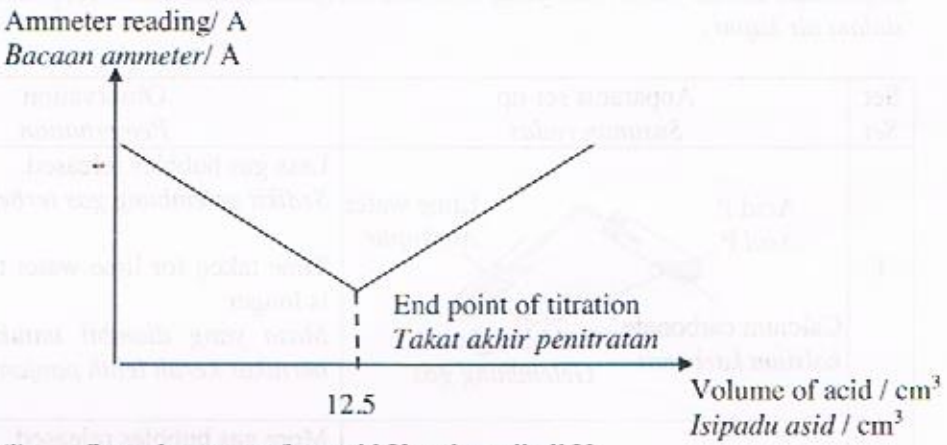


Diagram 8.1
Rajah 8.1

(a) A graph of electrical conductivity, ammeter reading (A) against the volume of acid X (cm^3) is then plotted. The end point of titration during neutralisation can be determined when the electrical conductivity is at the lowest.
Graf kekonduksian elektrik, bacaan ammeter (A) *melawan isipadu asid* X (cm^3) *kemudian diplotkan. Takat akhir pentitratan boleh ditentukan apabila kekonduksian elektrik berada pada takat paling rendah.*



(i) State the name of an acid X and an alkali Y.
Nyatakan nama asid X *dan alkali* Y.

(ii) At the end point of titration, ammeter still gives the reading. Explain why.
Pada takat akhir pentitratan, ammeter masih lagi memberikan bacaan. Terangkan mengapa.

[4 marks]
[4 *markah*]

(b) A student poured 25 cm^3 of 0.1 mol dm^{-3} sodium hydroxide solution into conical flask that contained 3.0 g of solid ammonium chloride. This reaction produced chloride salt, water and a pungent colourless gas.
Seorang pelajar telah menuangkan 25 cm^3 0.1 mol dm^{-3} *larutan natrium hidroksida ke dalam kelalang kon yang mengandungi* 3.0 g *pepejal ammonium klorida. Tindak balas ini telah menghasilkan garam klorida, air dan gas tak berwarna yang berbau sengit.*

Based on the information,
Berdasarkan maklumat tersebut,

(i) Write the chemical equation for the reaction.
Tuliskan persamaan kimia bagi tindak balas tersebut.

(ii) Calculate the mass of excess ammonium chloride that is unreacted with sodium hydroxide solution at the end of the reaction.
Hitungkan jisim ammonium klorida berlebihan yang tidak bertindak balas dengan larutan natrium hidroksida di akhir tindak balas tersebut.
[Relative atomic mass: N = 14, H = 1, Cl = 35.5, Na = 23, O = 16]
[*Jisim atom relatif*: N = 14, H = 1, Cl = 35.5, Na = 23, O = 16]

[6 marks]
[6 *markah*]

(c) Diagram 8.2 shows two sets of experiment for the reaction between two different acids with excess calcium carbonate. The concentration and the volume of the acids used are same. The gas that produced from the reaction is channeled into lime water.
Rajah 8.2 *menunjukkan dua set eksperimen bagi tindak balas antara dua asid yang berbeza dengan kalsium karbonat berlebihan. Kepekatan dan isipadu asid-asid yang digunakan adalah sama. Gas yang terbebas daripada tindak balas tersebut dialirkan ke dalam air kapur.*

Set *Set*	Apparatus set-up *Susunan radas*	Observation *Pemerhatian*
1		Less gas bubbles released. *Sedikit gelembung gas terbebas.* Time taken for lime water turns chalky is longer *Masa yang diambil untuk air kapur bertukar keruh lebih panjang*
2		More gas bubbles released. *Banyak gelembung gas terbebas.* Time taken for lime water turns chalky is shorter. *Masa yang diambil untuk air kapur bertukar keruh lebih singkat.*

Diagram 8.2
Rajah 8.2

Based on information in Diagram 8.2,
Berdasarkan maklumat dalam Rajah 8.2,

(i) Suggest the name of acid P and acid Q.
Cadangkan nama bagi asid P *dan asid* Q.

(ii) The reaction between acid P with calcium carbonate and the reaction between acid Q with calcium carbonate give different observations. Explain why.
Tindak balas antara asid P *dengan kalsium karbonat dan tindak balas antara asid* Q *dengan kalsium karbonat memberikan pemerhatian yang berbeza. Terangkan mengapa.*

[10 marks]
[10 *markah*]

Section C
Bahagian C

[20 marks]
[*20 markah*]

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

9. (a) The thermochemical equation for the complete combustion of ethanol is shown below:
Persamaan termokimia bagi pembakaran lengkap etanol ditunjukkan di bawah:

$C_2H_5OH(l) + 3O_2(g) \rightarrow 2CO_2(g) + 3H_2O(l)$; $\Delta H = -1376$ kJmol^{-1}
$C_2H_5OH(ce) + 3O_2(g) \rightarrow 2CO_2(g) + 3H_2O(ce)$; $\Delta H = -1376$ kJmol^{-1}

Calculate the mass of ethanol needed to burn completely in excess oxygen in order to raise the temperature of 200 cm^3 of water by 50°C. Assume that there is no heat lost to the surrounding.
Hitungkan jisim etanol yang diperlukan untuk membakar dengan lengkap dalam oksigen berlebihan supaya menaikkan suhu 200 cm^3 air sebanyak 50°C. Anggapkan tidak ada haba yang hilang ke persekitaran.

[Specific heat capacity of water= 42 Jg^{-1}°C^{-1}; density of water= 1 g cm^{-3}; Molar mass of ethanol = 46 g mol^{-1}]
[*Muatan haba tentu air* = 42 Jg^{-1}°C^{-1}; *Ketumpatan air* = 1 g cm^{-3}; *Jisim molar etanol* = 46 g mol^{-1}]

[4 marks]
[4 *markah*]

(b) Diagram 9 shows two experiments carried out by a student to study the heat change in chemical reactions.
Rajah 9 menunjukkan dua eksperimen yang dijalankan oleh seorang pelajar untuk mengkaji perubahan haba dalam tindak balas kimia.

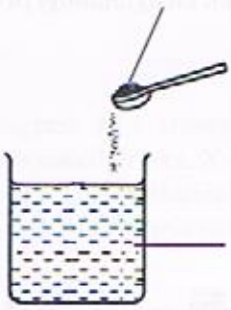
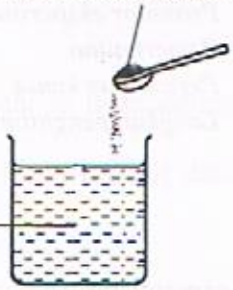
Experiment I *Eksperimen I*	**Experiment II** *Eksperimen II*
2 g of copper(II) oxide, CuO powder. 2 g *serbuk kuprum*(II) *oksida*, CuO.	2 g of sodium hydrogen carbonate, $NaHCO_3$ powder. 2 g *serbuk natrium hidrogen karbonat* $NaHCO_3$.
	
20 cm^3 of 0.2 mol dm^{-3} sulphuric acid, H_2SO_4 20 cm^3 0.2 mol dm^{-3} *asid sulfurik*, H_2SO_4.	
Beaker become hot. *Bikar menjadi panas.*	Beaker become cold. *Bikar menjadi sejuk.*

Diagram 8
Rajah 8

(i) Compare Experiment I and Experiment II. In your answer, include:
- Type of reaction based on the heat change
- Total energy contents of the products and the reactants.

Bandingkan Experimen I dan Eksperimen II. Dalam jawapan anda, sertakan:
- *Jenis tindak balas berdasarkan perubahan haba.*
- *Jumlah kandungan tenaga bahan tindak balas dan hasil tindak balas.*

[4 marks]
[4 *markah*]

(ii) Draw an energy level diagram for the reaction in Experiment I.
Lukis gambar rajah aras tenaga bagi tindak balas dalam Eksperimen I.

[2 marks]
[2 *markah*]

(c) An experiment is being repeated by using the same acid as in Diagram 8. By using a suitable substance, describe an experiment to determine the heat of precipitation of calcium sulphate. Your answer should consist of the following:

- Procedure of the experiment
- Observations
- Chemical equation
- Steps of calculation.

Satu eksperimen diulang dengan menggunakan asid yang sama seperti dalam Rajah 8. Dengan menggunakan bahan yang sesuai, huraikan satu eksperimen untuk menentukan haba pemendakan kalsium sulfat. Jawapan anda mestilah mengandungi perkara berikut:

- *Prosedur eksperimen*
- *Pemerhatian*
- *Persamaan kimia*
- *Langkah penghitungan*

[10 marks]
[10 *markah*]

10 Two sets of experiments were conducted to study the factor affected the rate of reaction between metal Q and nitric acid. Table 10.1 shows the reactants and condition in each set of experiment.
Dua set eksperimen telah dijalankan untuk mengkaji faktor yang mempengaruhi kadar tindak balas antara logam Q dan asid nitrik. Jadual 10.1 menunjukkan bahan tindak balas dan keadaan bagi setiap set eksperimen.

Set *Set*	**Reactants** *Bahan tindak balas*	**Condition of reaction** *Keadaan tindak balas*
I	Excess metal Q powder and 25 cm^3 of 0.5 mol dm^{-3} nitric acid *Serbuk logam* Q *berlebihan dan* 25 cm^3 0.5 mol dm^{-3} *asid nitrik*	Room temperature *Suhu bilik*
II	Excess metal Q powder and 25 cm^3 of 1.0 mol dm^{-3} nitric acid *Serbuk logam* Q *berlebihan dan* 25 cm^3 1.0 mol dm^{-3} *asid nitrik*	Room temperature *Suhu bilik*

Table 10.1
Jadual 10.1

(a) (i) Suggest a suitable metal Q.
Cadangkan logam Q *yang sesuai.*

[1 mark]
[1 *markah*]

(ii) Compare the rate of reaction between Set I and Set II.
By using the collision theory, explain your answers.
Bandingkan kadar tindak balas antara Set I *dan Set* II.
Dengan menggunakan teori perlanggaran, terangkan jawapan anda.

[5 marks]
[5 *markah*]

(iii) Describe an experiment to compare the rate of reaction in both Set I and Set II. In your description include:

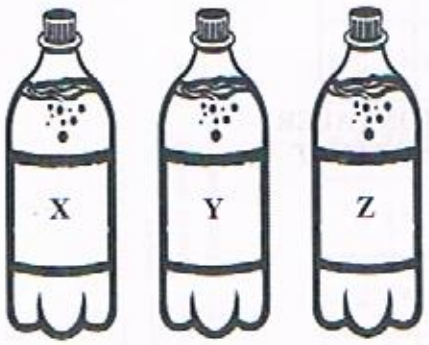
- The procedure of the experiment.
- A graph of the maximum volume of gas released against time obtained in both sets.

Huraikan satu eksperimen untuk membandingkan kadar tindak balas bagi kedua-dua Set I *dan Set* II. *Dalam penerangan anda, sertakan:*

- *Prosedur eksperimen*
- *Graf isi padu maksimum gas terbebas melawan masa bagi kedua-dua set.*

[10 marks]
[10 *markah*]

(b) Diagram 10.1 shows a label of ingredients present in three different bottles of carbonated drinks, X, Y and Z.
Rajah 10.1 *menunjukkan label bagi kandungan yang terdapat dalam tiga botol minuman berkarbonat yang berbeza,* X, Y *dan* Z.



Ingredients:
Water, carbon dioxide, sugar and lemonade.

Kandungan:
Air, karbon dioksida, gula dan perisa lemon.

Diagram 10.1
Rajah 10.1

5 g of egg shells powder is added into each carbonated drink which has the same volume. Table 10.2 shows the time taken to dissolve all egg shells powder.
5 g *serbuk kulit telur ditambah ke dalam setiap minuman berkarbonat yang mempunyai isi padu yang sama. Jadual* 10.2 *menunjukkan masa yang diambil untuk melarutkan semua serbuk kulit telur.*

Label *Label*	**Time taken (s)** *Masa diambil (s)*
X	45.0
Y	30.0
Z	15.0

Table 10.2
Jadual 10.2

(i) Based on Table 10.2, which of the carbonated drink is the most unhealthy to our stomach if it is taken regularly? State your reason.
Berdasarkan Jadual 10.2, *minuman berkarbonat manakah yang paling tidak sihat jika kerap diambil? Nyatakan alasan anda.*

[2 marks]
[2 *markah*]

(ii) What are the side effects of drinking too much carbonated drink to our health?
Apakah kesan-kesan sampingan pengambilan minuman berkarbonat secara berlebihan kepada kesihatan kita?

[2 marks]
[2 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

(i) Based on Table 10.2, which of the carbonated drink is the most unhealthy to our stomach if it is taken regularly? State your reason.
Berdasarkan Jadual 10.2, minuman berkarbonat manakah yang paling tidak sihat jika kerap diambil? Nyatakan alasan anda.

[2 marks]
[2 *markah*]

(ii) What are the side effects of drinking too much carbonated drink to our health?
Apakah kesan-kesan sampingan pengambilan minuman berkarbonat secara berlebihan kepada kesihatan kita?

[2 marks]
[2 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

PERIODIC TABLE OF THE ELEMENTS

1 H Hydrogen 1																	2 He Helium 4
3 Li Lithium 7	4 Be Beryllium 9											5 B Boron 11	6 C Carbon 12	7 N Nitrogen 14	8 O Oxygen 16	9 F Fluorine 19	10 Ne Neon 20
11 Na Sodium 23	12 Mg Magnesium 24											13 Al Aluminium 27	14 Si Silicon 28	15 P Phosphorus 31	16 S Sulfur 32	17 Cl Chlorine 35.5	18 Ar Argon 40
19 K Potassium 39	20 Ca Calcium 40	21 Sc Scandium 45	22 Ti Titanium 48	23 V Vanadium 51	24 Cr Chromium 52	25 Mn Manganese 55	26 Fe Iron 56	27 Co Cobalt 59	28 Ni Nickel 59	29 Cu Copper 64	30 Zn Zinc 65	31 Ga Gallium 70	32 Ge Germanium 73	33 As Arsenic 75	34 Se Selenium 79	35 Br Bromine 80	36 Kr Krypton 84
37 Rb Rubidium 85	38 Sr Strontium 88	39 Y Yttrium 89	40 Zr Zirconium 91	41 Nb Niobium 93	42 Mo Molybdenum 96	43 Tc Technetium 98	44 Ru Ruthenium 101	45 Rh Rhodium 103	46 Pd Palladium 106	47 Ag Silver 108	48 Cd Cadmium 112	49 In Indium 115	50 Sn Tin 119	51 Sb Antimony 122	52 Te Tellurium 128	53 I Iodine 127	54 Xe Xenon 131
55 Cs Cesium 133	56 Ba Barium 137	57 La Lanthanum 139	72 Hf Hafnium 179	73 Ta Tantalum 181	74 W Tungsten 184	75 Re Rhenium 186	76 Os Osmium 190	77 Ir Iridium 192	78 Pt Platinum 195	79 Au Gold 197	80 Hg Mercury 201	81 Tl Thallium 204	82 Pb Lead 207	83 Bi Bismuth 209	84 Po Polonium 210	85 At Astatine 210	86 Rn Radon 222
87 Fr Francium 223	88 Ra Radium 226	89 Ac Actinium 227	104 Unq Unnil-quadium 253	105 Unp Unnil-pentium 260	106 Unh Unnil-hexium 263	107 Uns Unnil-septium 262	108 Uno Unnil-octium 265	109 Une Unnil-ennium 266									

Proton number
Symbol
Name of element
Relative atomic mass

10 Ne Neon 20

58 Ce Cerium 140	59 Pr Praseo-dymium 141	60 Nd Neodymium 144	61 Pm Promethium 147	62 Sm Samarium 150	63 Eu Europium 152	64 Gd Gadolinium 157	65 Tb Terbium 159	66 Dy Dysprosium 163	67 Ho Holmium 165	68 Er Erbium 167	69 Tm Thulium 169	70 Yb Ytterbium 173	71 Lu Lutetium 175
90 Th Thorium 232	91 Pa Protactinium 231	92 U Uranium 238	93 Np Neptunium 237	94 Pu Plutonium 244	95 Am Americium 243	96 Cm Curium 247	97 Bk Berkelium 247	98 Cf Californium 249	99 Es Einsteinium 254	100 Fm Fermium 253	101 Md Mendele-vium 256	102 No Nobelium 254	103 Lr Lawrencium 257

PENTAKSIRAN DIAGNOSTIK AKADEMIK SEKOLAH BERASRAMA PENUH 2016

PEPERIKSAAN PERCUBAAN SIJIL PELAJARAN MALAYSIA

CHEMISTRY **4541/3**

Kertas 3

September 2016

1 ½ jam **Satu jam tiga puluh minit**

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

Arahan:

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.*

Untuk Kegunaan Pemeriksa		
Soalan	**Markah Penuh**	**Markah Diperoleh**
1	33	
2	17	
JUMLAH	50	

NAME : _____

TINGKATAN : _____

Kertas soalan ini mengandungi 11 halaman bercetak.

[Lihat Halaman Sebelah

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of two questions. Answer **all** questions.
   Kertas soalan ini mengandungi dua soalan. Jawab **semua** *soalan.*

2. Write your answers for **Question 1** in the spaces provided in the question paper.
   Tuliskan jawapan bagi **Soalan 1** *dalam ruang yang disediakan dalam kertas soalan.*

3. Write your answers for **Question 2** on the answer sheet provided. You may use equations, diagrams, tables, graphs and any other suitable methods to explain your answer.
   Tuliskan jawapan bagi **Soalan 2** *pada helaian jawapan yang dibekalkan. Anda boleh menggunakan persamaan, gambar rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda.*

4. Show your working. It may help you to get marks.
   Tunjukkan kerja mengira, ini membantu anda mendapatkan markah.

5. If you wish to change your answer, neatly cross out the answer you have done. Then write down the new answer.
   Sekiranya anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.

6. Diagrams in the questions are not drawn to scale unless stated.
   Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan sebaliknya.

7. Marks allocated for each question or part questions are shown in brackets.
   Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.

8. Time suggested for answering **Question 1** is 60 minutes and **Question 2** is 30 minutes.
   Masa yang dicadangkan untuk menjawab **Soalan 1** *ialah 60 minit dan* **Soalan 2** *ialah 30 minit.*

9. You may use a non-programmable scientific calculator.
   Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.

10. Hand in this question paper at the end of the examination.
    Serahkan semua kertas jawapan anda di akhir peperiksaan.

Marks awarded:

Mark	Description
3	**Excellent:** The best response
2	**Satisfactory** : An average answer
1	**Weak** : An inaccurate response
0	No response or wrong response

Pemberian markah:

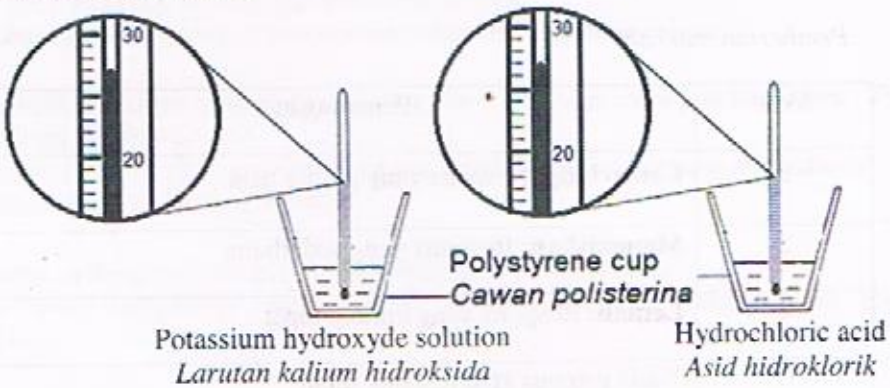
Skor	Penerangan
3	**Cemerlang:** Respons yang paling baik
2	**Memuaskan**: Respons yang sederhana
1	**Lemah**: Respons yang kurang tepat
0	Tiada respons atau respons salah

Answer all question
Jawab semua soalan

1. Diagram 1.1 and Diagram 1.2 show two experiments carried out by a student to determine the heat of neutralisation for the reaction between alkali and two different types of acid.
Rajah 1.1 *dan Rajah* 1.2 *menunjukkan dua eksperimen yang dijalankan oleh seorang pelajar untuk menentukan haba peneutralan bagi tindak balas antara alkali dan dua jenis asid yang berlainan.*

Experiment I
Reaction between 50 cm^3 of 2.0 mol dm^{-3} potassium hydroxide solution, KOH and 50 cm^3 of 2.0 mol dm^{-3} hydrochloric acid, HCl.
***Eksperimen* I**
Tindak balas antara 50 cm^3 *larutan kalium hidroksida,* KOH 2.0 mol dm^{-3} *dan* 50 cm^3 *asid hidroklorik,* HCl 2.0 mol dm^{-3}.

Before the solutions mixed
Sebelum larutan dicampurkan



After the solutions mixed
Selepas larutan dicampurkan

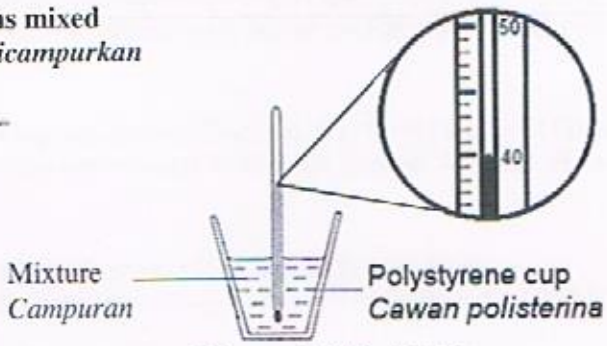


Diagram 1.1/ *Rajah* 1.1

Initial temperature of hydrochloric acid : .....
Suhu awal asid hidroklorik:

Inititial temperature of potassium hydroxide : .....
Suhu awal kalium hidroksida:

Highest temperature of the mixture : .....
Suhu tertinggi campuran:

Temperature change : .....
Perubahan suhu:

Experiment II

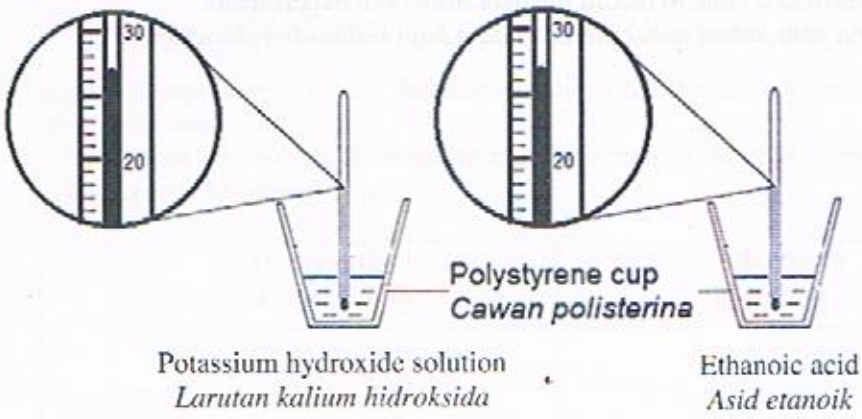
Reaction between 50 cm^3 of 2.0 mol dm^{-3} potassium hydroxide solution, KOH and 50 cm^3 of 2.0 mol dm^{-3} ethanoic acid, CH_3COOH.

***Eksperimen* II**

Tindak balas antara 50 cm^3 *larutan kalium hidroksida,* KOH 2.0 mol dm^{-3} *dan* 50 cm^3 *asid etanoik,* CH_3COOH 2.0 mol dm^{-3}.

Before the solutions mixed

Sebelum larutan dicampurkan



After the solutions mixed

Selepas larutan dicampurkan

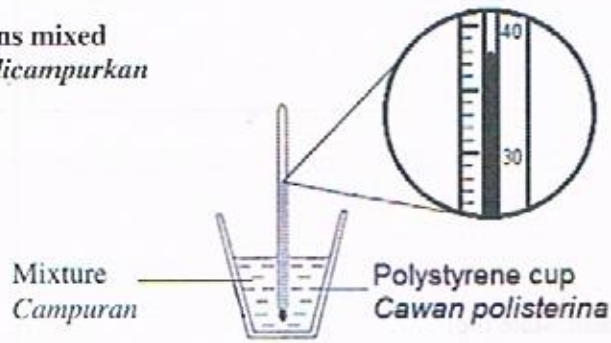


Diagram 1.2/ *Rajah* 1.2

Initial temperature of ethanoic acid : .....
Suhu awal asid etanoik:

Inititial temperature of potassium hydroxide : .....
Suhu awal kalium hidroksida:

Highest temperature of the mixture : .....
Suhu tertinggi campuran:

Temperature change : .....
Perubahan suhu:

[Lihat Halaman Sebelah

(a) Record the initial temperature of the solutions, the highest temperature of the mixture and the temperature change for experiments in Diagram 1.1 and Diagram 1.2 in the spaces provided.
Rekodkan suhu awal larutan, suhu tertinggi campuran dan perubahan suhu untuk eksperimen dalam Rajah 1.1 *dan Rajah* 1.2 *dalam ruangan yang disediakan.*

[3 marks]

1(a) 3

(b) Construct a table to record the data from both experiments.
Bina satu jadual untuk merekod data bagi kedua-dua eksperimen.

1(b) 3

[3 marks]

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

(i) Manipulated variable:
Pembolehubah dimanipulasikan:

.....

(ii) Responding variable:
Pembolehubah bergerak balas:

.....

1(c) 3

(iii) Constant variable:
Pembolehubah dimalarkan:

.....

[3 marks]

For Examiner's Use

(d) State **one** hypothesis for this experimet.
*Nyatakan **satu** hipotesis bagi eksperimen ini.*

.....

.....

.....

[3 marks]

1(d)
3

(e) Based on experiment II, state **three** observations and **three** respective inferences for the experiment.
Berdasarkan eksperimen II, *nyatakan **tiga** pemerhatian dan **tiga** inferens yang sepadan bagi eksperimen ini.*

	Observations *Pemerhatian*	**Inferences** *Inferens*
1	.....	.....
	.....	.....
	.....	.....
2	.....	.....
	.....	.....
	.....	.....
3	.....	.....
	.....	.....
	.....	.....

[6 marks]

1(c)
6

(f) Calculate the heat of neutralization for the reaction in experiment I.
[Specific heat capacity of a solution = 4.2 J g^{-1} $°C^{-1}$, density of solutions = 1.0 g cm^{-3}]
Hitung haba peneutralan untuk tindak balas dalam eksperimen I.
[Muatan haba tentu larutan = 4.2 J g^{-1} $°C^{-1}$, ketumpatan larutan = 1.0 g cm^{-3}]

1(f) 3

[3 marks]

(g) State the operational definition for the heat of neutralization for this experiment.
Nyatakan definisi secara operasi untuk haba peneutralan bagi eksperimen ini.

.....

.....

.....

.....

1(g) 3

[3 marks]

(h) State the relationship between type of acid and value of heat of neutralization.
Nyatakan hubungan antara jenis asid dan nilai haba peneutralan.

.....

.....

.....

1(h) 3

[3 marks]

For Examiner's Use

(i) The experiment is repeated by using solution P and solution Q as shown in Diagram 1.3.
Eksperimen diulangi dengan menggunakan larutan P dan larutan Q seperti yang ditujukkan dalam Rajah 1.3.

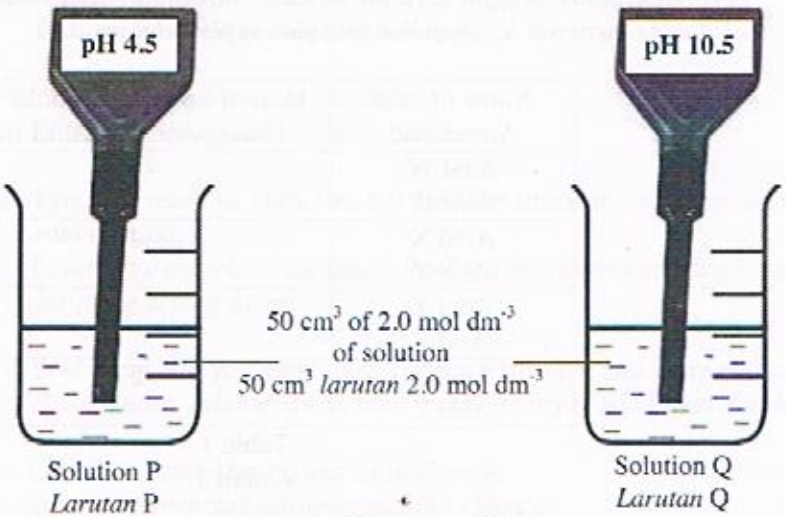


Diagram 1.3
Rajah 1.3

Predict the temperature change when the solutions are mixed?
Ramalkan perubahan suhu apabila kedua-dua larutan dicampurkan.

.....

 [3 marks]

1(i)

3

(j) Table 1 shows the theoritical value of heat of neutralisation of some acids when react with potassium hydroxide solution. Classify the following acids into acids that ionise completely and partially in water.
Jadual 1 menunjukkan nilai teori haba peneutralan bagi beberapa asid apabila bertindak balas dengan larutan kalium hidroksida. Kelaskan asid berikut kepada asid yang mengion lengkap dan mengion separa dalam air.

Name of acid *Nama asid*	Heat of neutralization/ kJ mol^{-1} *Haba peneutralan*/ kJ mol^{-1}
Acid W *Asid W*	- 57.0
Acid X *Asid X*	- 12.0
Acid Y *Asid Y*	- 50.5
Acid Z *Asid Z*	-57.2

Table 1
Jadual 1

1(j)

3

[3 marks]

2.

Intan	:	Teacher, why are rubber bands sticky when exposed to heat and break easily when stretched? *Cikgu, kenapa gelang getah melekit apabila terdedah kepada haba dan senang putus apabila diregang?*
Cikgu Noraini	:	What is rubber band made of? *Gelang getah diperbuat daripada apa?*
Salwa	:	Latex, from rubber tree, teacher. *Lateks daripada pokok getah, cikgu.*
Intan	:	Tyres are made of latex too, but they are stronger and more elastic than rubber band. *Tayar juga diperbuat daripada lateks, tetapi lebih kuat dan kenyal daripada gelang getah.*
Cikgu Noraini	:	Yes! Intan. Do you know why tyres are stronger and more elastic? *Betul! Intan. Adakah awak tahu mengapa tayar lebih kuat dan kenyal?*
Salwa	:	I need to search the answer from Google. *Saya perlu mencari jawapan melalui Google.*
Intan	:	Based on what stated in Wikipedia, tyres are made of vulcanised rubber while rubber bands are made of unvulcanised rubber. *Berdasarkan apa yang dinyatakan di dalam Wikipedia, tayar diperbuat daripada getah tervulkan manakala gelang getah diperbuat daripada getah tak tervulkan.*

Based on the above conversation, plan an experiment to compare the elasticity of unvulcanised rubber and vulcanised rubber.
Berdasarkan perbualan di atas, rancang satu eksperimen untuk membandingkan kekenyalan getah tak tervulkan dan getah tervulkan.

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

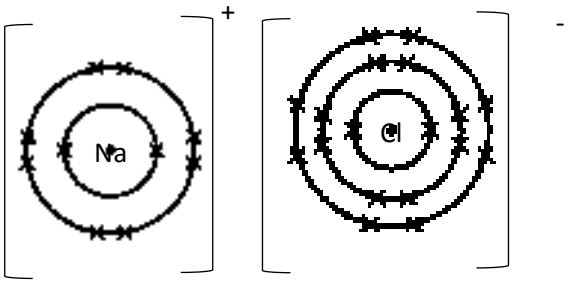
END OF QUESTION PAPER
KERTAS SOALAN TAMAT

PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2016
SKEMA KERTAS 1
CHEMISTRY 4541/1
https://cikguadura.wordpress.com

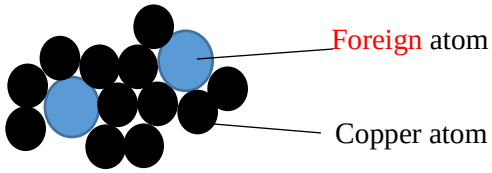
1	D		**26**	C
2	A		**27**	B
3	A		**28**	A
4	B		**29**	A
5	C		**30**	C
6	C		**31**	A
7	D		**32**	D
8	A		**33**	D
9	A		**34**	B
10	D		**35**	A
11	C		**36**	C
12	D		**37**	C
13	B		**38**	C
14	C		**39**	C
15	C		**40**	B
16	A		**41**	C
17	D		**42**	B
18	B		**43**	D
19	B		**44**	D
20	A		**45**	D
21	D		**46**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

PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2016
SKEMA KERTAS 2
CHEMISTRY 4541/2

Question			Answer	Mark
1	(a)	(i)	[*Able to write the electron arrangement of atom Y correctly*] **Answer:** 2.8.7/ 2,8,7 (***r***: 2:8:7)	1
		(ii)	[*Able to state the period of atom Y correctly*] **Answer:** Period 3	1
		(iii)	[*Able to give a reason correctly*] **Sample answer;** Have 3 shell occupied electrons	1
		(iv)	[*Able to write the formula of Z ion correctly*] **Answer:** Z^{2+}	1
		(v)	[*Able to state the nucleon number of atom Z correctly*] **Answer:** 40	1
	(b)	(i)	[*Able to write the molecular formula of niacin correctly*] **Answer:** C_5H_5NCOOH/ $C_6H_6NO_2$	1
		(ii)	[*Able to state the type of particle in niacin correctly*] **Answer:** molecule	1
		(iii)	[*Able to calculate the number of mole of niacin correctly*] **Answer;** Molar mass/ Relative molecular mass of niacin = 12(6) + 1(6) + 14 + 1(2) = **124** Mol of niacin = $\frac{5}{124}$ = **0.04 mol**	1 1
			Total	**9**

Question			Answer	Mark
2	a)		[*Able to define number 35 as proton number correctly*] **Answer:** Proton number // Number of proton	1
	b)		[*Able to state the number of valence electron correctly*] **Answer:** 7	1
	c)	i)	[*Able to compare the size of chlorine atom and bromine atom correctly*] **Sample answer:** Size of bromine atom is bigger than chlorine	1
		iii)	[*Able to explain why bromine atom is bigger than chlorine atom correctly*] **Sample answer:** 1. Proton number of bromine atom is bigger than chlorine 2. The number of shell occupied with electron in bromin atom is more than chlorine atom	1 1
	d)		[*Able to draw the electron arrangement of the compound correctly*] **Answer:**  • *Correct number of shell and electrons for both ions* • *Correct symbol and charge*	1 1
	e)	(i)	[*Able to state the observation correctly*] **Sample answer:** Blue litmus paper turns **to red**	1

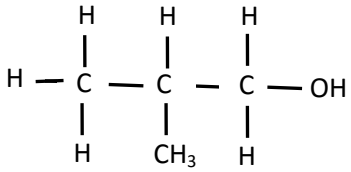
		(ii)	[*Able to give a reason correctly*] **Sample answer:** Acidic solution is formed	 1
			Total	**9**

Question			**Answer**	**Mark**
3	a)		[*Able to state the function of cell Q correctly*] **Sample answer:** As a power supply//batteries// chemical cell	 1
	b)		[*Able to suggest the substance X and solution Y correctly*] **Sample answer:** X : Copper/Silver (any metal less electropositive than zinc) Y : Copper(II) sulphate/ Copper(II) nitrate/ copper(II) chloride	 1 1
	c)	(i)	[*Able to write half-equation correctly*] **Answer:** $2H^+ + 2e \rightarrow H_2$	 1
		(ii)	[*Able to describe briefly a chemical test to confirm the gas produce correctly*] **Sample answer:** 1. Place the lighted wooden splinter at the mouth of the test tube 2. 'pop' sound produced	 1 1
	d)	(i)	[*Able to draw the arrangement of atoms in the alloy of copper correctly*] **Answer:**  • *Correct arrangement of atoms* • *Correct label*	 1 1

		(ii)	[*Able to explain the hardness of the alloy correctly*] **Sample answer:** 1. Zinc/Tin atom and copper atom have different size 2. Zinc/Tin atom disrupts the orderly arrangement of copper atom// The layer of copper atoms not easy to slide over each other	 1 1
			Total	**10**

Question			**Answer**	**Mark**
4	a)	(i)	[*Able to state the soluble salt correctly*] **Answer:** Magnesium nitrate// copper(II) sulphate	 1
		(ii)	[*Able to write chemical formula of the soluble salt correctly*] **Answer:** $Mg(NO_3)_2$ /$CuSO_4$	 1
		(iii)	[*Able to state the colour of the soluble salt correctly*] **Answer:** White // Blue	 1
	(c)	(i)	[*Able to state the observation correctly*] **Answer:** Brown solid when hot and yellow when cold is formed	 1
		(ii)	[*Able to write the chemical equation correctly*] **Answer:** $PbCO_3 \rightarrow PbO + CO_2$	 1
		(iii)	[*Able to calculate the volume of CO_2 released correctly*] **Answer:** Mol $PbCO_3$ = 26.7/267 = 0.1 Based on equation; 1 mole of $PbCO_3$ produced 1mol of CO_2 0.1 mole of $PbCO_3$ will produce 0.1 mole of CO_2 Volume of CO_2 = 0.1 x 24 = 2.4 dm^3 // 2400 cm^3	 1 1

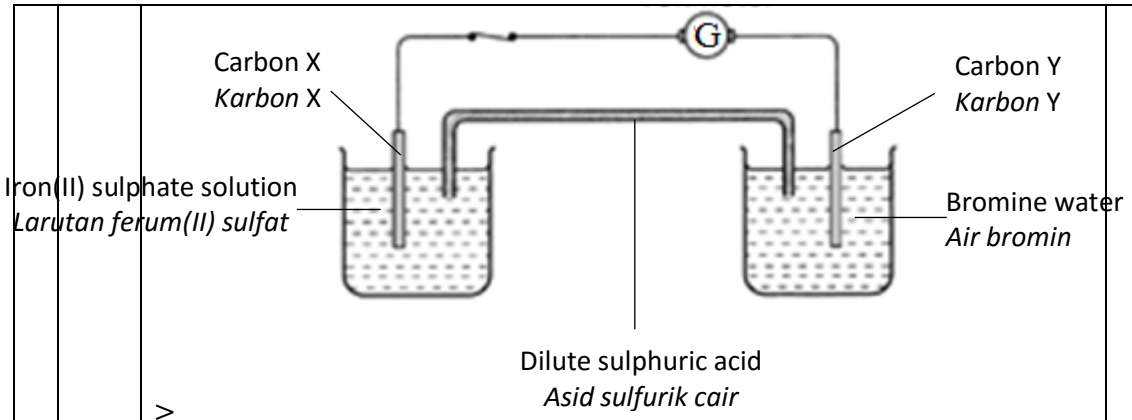
	(d)	[*Able to describe briefly the verification of anion present in sulphate salt correctly*] **Answer:** • Dissolve copper(II) sulphate in water//Pour 2 cm^3 copper(II) sulphate solution into a test tube • Add barium nitrate/barium chloride solution into the test tube • White precipitate is formed	 1 1 1
		Total	**10**

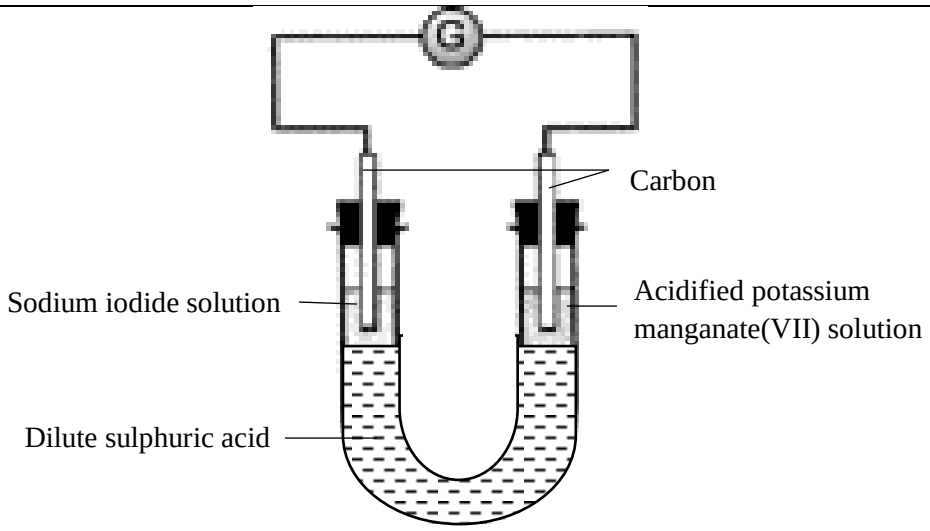
Question			Answer	Mark
5	(a)	(i)	[*Able to state the meaning of isomer correctly*] **Sample answer:** Isomers are compounds with the same molecular formula but different structural formula	 1
		(ii)	[*Able to state the name of the compounds by using IUPAC nomenclature correctly*] **Answer:** P: Butan-1-ol Q: Butan-2-ol	 1 1
		(iii)	[*Able to draw the structural formula for another isomer of the carbon compound correctly*] **Answer:** 	 1
	(b)	(i)	[*Able to write a balance chemical equation for the reaction involve correctly*] **Answer:** $C_4H_9OH + 6O_2 \rightarrow 4CO_2 + 5H_2O$ 1. Correct chemical formula for reactants and products	 1

			2. Balance chemical equation	1
		(ii)	[*able to describe briefly a confirmatory test for the gas released correctly*] **Sample answer:** 1. Flow the gas into lime water 2. Lime water turns chalky//cloudy	 1 1
	c)	[*able to calculate the empirical formula of compound R correctly*] Answer: Element | C | H Mass, % | 85.7 | 14.3 Number of mole | 85.7/12 =7.14 | 14.3/1 =14.1 Ratio | 1 | 2 Empirical formula of R = CH_2	 1 1 1
			Total	**11**

Question			Answer	Mark
6	(a)	(i)	[*Able to state the negative terminal correctly*] **Sample answer:** Carbon X	 1
		(ii)	[*Able to state the role of bromine water correctly*] **Answer:** Oxidising agent	 1
		(iii)	[*Able to explain why bromine water act as oxidising agent correctly*] **Sample answer:** 1. Bromine undergoes reduction 2. Oxidation number of bromine decreased from 0 to -1 //Bromine atom receive electron to form bromide ion	 1 1
	(b)		[*Able to draw the arrow to show the direction of electron flow correctly*] **Sample answer:**	

>

		 >	1
	c)	[*able to describe briefly a chemical test to identify cation present correctly*] **Sample answer:** 1. Add NaOH solution // ammonia aqueous in excess// add potassium hexacyanoferrate(III)//potassium thiocyanate solution 2. Brown precipitate which cannot dissolve in excess NaOH/ NH3(aq)// Dark blue precipitate// Blood red coloration	1 1
	d)	[*able to write the overall ionic equation correctly*] **Answer:** $2Fe^{2+} + Br_2 \rightarrow 2Fe^{3+} + 2Br^-$ • Correct formula reactants and products • Balanced equation	1 1 1
	e)	[A*ble to draw a labelled diagram for the apparatus set-up to show the electron transfer at a distance correctly*] **Sample answer;**	

		 • Functional diagram • Correct label	1 1
		https://cikguadura.wordpress.com **Total**	**11**

MARKING SCHEME CHEMISTRY PAPER 2

SECTION B

Question			Answer	Sub	Total
7	(a)		[***able to give explanation on given situation correctly***] **Sample answer;** P1: Ice cube has low melting and point// molecules in ice cube are held by weak intermolecular force of attraction. P2: Less heat energy needed to overcome the weak force of attraction. P3: Salts has high melting point// ions in salt are attracted by a strong electrostatic force of attraction. P4: Lots of heat energy needed to overcome the strong force of attraction.	 1 1 1 1	 **4**
	(b)		[***able to name the type of bond for the compounds in Diagram 7 and explain the formation of the compound correctly***] **Sample answer;** P1: Ice cube: covalent bond P2: Salt: ionic bond P3: Electron arrangement of hydrogen atom is 1, P4: Electron arrangement of oxygen atom is 2.6 P5: Two hydrogen atoms share a pair of electron with one oxygen atom// one oxygen atom shares two pairs of electron with two hydrogen atoms P6: to achieve stable duplet// octet electron arrangement P7: Sodium atom has the electron arrangement of 2.8.1. P8: Electron arrangement of chlorine atom is 2.8.7 P9: Sodium atom releases one electron to form sodium ion/ Na^+. P10: Chlorine atom receives one electron to form chloride ion/ Cl^-. P11: to achieve stable octet electron arrangement P12: Sodium ion/ Na^+ and chloride ion/ Cl^- are attracted by a strong electrostatic force of attraction.	 1 1 1 1 1 1 1 1 1 1 1 1	 **Max: 10**
	(c)	i.	[***able to suggest solvent W and solvent X correctly***] **Sample answer;** Solvent W: water Solvent X: tetrachloromethane/ methylbenzene/ diethyl eter/ cyclohexane [***a***: suitable organic solvent]	 1 1	 **2**
		ii.	[***able to explain the differences in the properties of the salt in solvent W and solvent X***] **Sample answer;** PI: Table salt/ sodium chloride can conduct electricity in solvent W P2: Table salt/ sodium chloride in solvent W exists as free moving ions P3: Table salt/ sodium chloride in solvent X cannot conduct electric. P4: Table salt/ sodium chloride in solvent X has no free moving ions/ ions in a fix position/Table salt cannot dissolve in solvent X	 1 1 1 1	 **4**
			https://cikguadura.wordpress.com **Total**		**20**

8	(a)	i.	[***able to state the name of acid X and alkali Y correctly***] **Sample answer;** Acid X: Sulphuric acid Alkali Y: Sodium hydroxide // potassium hydroxide	 1 1	 **2**
		ii.	[***able to explain why at the end point of titration, ammeter still give the reading correctly***] **Sample answer;** P1: still have free moving ions in the beaker P2: the ions carried the electric current	 1 1	 **2**
	(b)	i.	[***able to write the chemical equation for the reaction correctly***] **Answer;** $NaOH + NH_4Cl \rightarrow NaCl + H_2O + NH_3$ • Correct formula of reactants • Correct formula of products	 1 1	 **2**
		ii.	[***able to calculate the mass of ammonium chloride correctly***] **Sample answer;** P1: mol NaOH = $\frac{(0.1)(25)}{1000}$ = 0.0025 mol P2: Mol of NH_4Cl = $\frac{3}{53.5}$ = 0.056 mol P3: From the equation: 1 mol NaOH react with 1 mol NH_4Cl 0.0025 mol mol NaOH react with 0.0025 mol NH_4Cl P3: Mol of NH_4Cl that has not been reacted: 0.056 – 0.0025 = 0.0535 mol P4: Mass of NH_4Cl that has not been reacted: 0.0535 x 53.5 = 2.862 gram	 1 1 1 1 1	 **Max 4**
	(c)	i.	[***able to state the name of acid P and acid Q correctly***] **Sample answer;** Acid P : ethanoic acid (any name of weak acid) Acid Q : hydrochloric acid // nitric acid // sulphuric acid (any name of strong acid)	 1 1	 **2**

		ii.	[***able to explain why the reaction between acid P with calcium carbonate and the reaction between acid Q with calcium carbonate give different observations correctly***] **Sample answer;** P1: Acid P/ ethanoic acid is a weak acid/ ionises partially in water P2: produce low concentration of hydrogen ions/ H^+. P3: release low volume of carbon dioxide gas P4: Low rate of reaction P5: Acid Q/ Nitric acid/ hydrochloric is a strong acid// ionises completely in water P6: produce high concentration of hydrogen ions/ H^+. P7: release more volume of carbon dioxide gas P8: High rate of reaction	 1 1 1 1 1 1 1 1	**8**
			Total		**20**

SECTION C

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Sub</th><th>Total</th></tr>
<tr><td>9</td><td>(a)</td><td colspan="2">[able to calculate the mass of ethanol correctly]

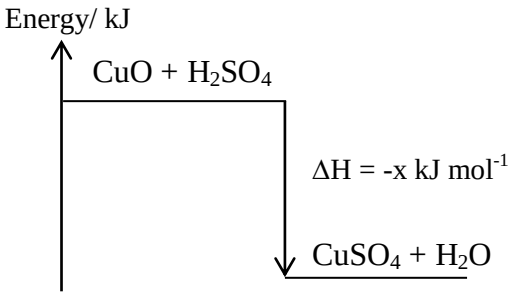
Sample answer;
P1: Heat released = 200g × 4.2 $Jg^{-1o}C^{-1}$ × 50^oC
P2: = 42 000 J // 42 kJ
P3: Number of moles of ethanol = 42÷1376
= 0.0305
P4: Mass of ethanol = 0.0305 × 46 g// = 1.403//1.4 g</td><td>1
1

1
1</td><td>4</td></tr>
<tr><td></td><td>(b)</td><td>i.</td><td>[able to state the differences between Experiment I and Experiment II in terms of type of reaction and energy contents correctly]

Sample answer;

<table><tr><th></th><th>Experiment I</th><th>Experiment II</th></tr><tr><td>Type of reaction</td><td>Exothermic</td><td>Endothermic</td></tr><tr><td>Energy contents</td><td>Total energy contents of products is lower than total energy content of reactants.</td><td>Total energy contents of products is higher than total energy content of reactants.</td></tr></table></td><td>1+1

1+1</td><td>4</td></tr>
<tr><td></td><td></td><td>ii.</td><td>[Able to draw the energy level diagram correctly]

Answer;
 

P1: correct energy level of reactants and products
P2: Correct chemical equation and ΔH</td><td>1
1</td><td>2</td></tr>
</table>

[***able to describe the experiment to determine the heat of precipitation of barium sulphte correctly***]

Sample answer;

Procedure:

1. 50 cm^3 of 0.5 mol dm^{-3} **sulphuric acid** solution is measured and poured into a polystyrene cup. 1
2. 50 cm^3 of 0.5 mol dm^{-3} **calcium nitrate** solution is measured and poured into another polystyrene cup. 1
3. The initial temperature of **sulphuric acid** and calcium nitrate solution is measured and recorded after few minutes. 1
4. Calcium nitrate solution is poured into **sulphuric acid** solution quickly 1
5. The mixture is stirred with a thermometer. 1
6. The highest temperature achieved by the mixture is recorded. 1

Observation:

White precipitate/solid is formed 1

Chemical equation:

$Ca(NO_3)_2$ + H_2SO_4 → $2HNO_3$ + $CaSO_4$ 1

Results:

Initial temperature of silver nitrate solution (^oC)	T_1
Highest temperature of the reaction mixture(^OC)	T_2
Temperature change (^oC)	T_2-T_1= T_d

1

Calculation:

P1: Number of moles of Cu atoms formed = number of moles of H_2SO_4

$$= 0.5 \times \frac{50}{1000} = 0.025\text{mol}$$ 1

P2: Heat given out in the reaction $= mc\theta$

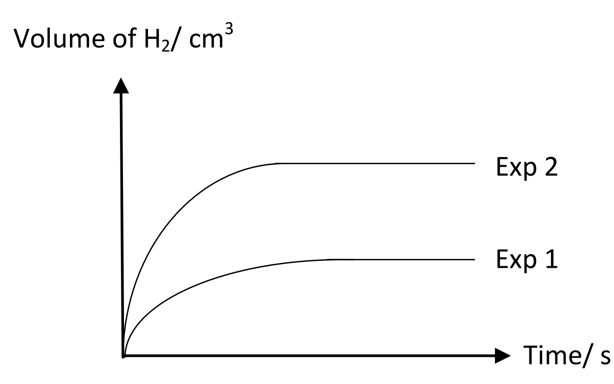
$= 50\text{g} \times 4.2\ \text{Jg}^{-1}{}^{o}\text{C}^{-1} \times T_d$

= Q kJ 1

P3: The heat of displacemet of copper by magnesium, $\Delta H = -\frac{Q}{0.025}$ / -XkJmol^{-1} 1

Max: 10

			Total		**20**

10	(a)	i.	[***able to identify metal Q correctly***] **Answer;** Q: Magnesium/ Mg// Zinc/ Zn// Aluminium / Al// Iron/ Fe	 1	 **1**
		ii.	[***able to explain the difference in rate of reaction for Experiment I and Experiment II based on collision theory correctly***] **Sample answer;** P1: Experiment in set II has higher rate of reaction than set I. P2: The concentration of nitric acid is higher. P3: The number of hydrogen ions per unit volume of acid is higher. P4: The frequency of collision between hydrogen ions and Q atoms is higher. P5: The frequency of effective collision is higher. [or vice-versa]	 1 1 1 1 1	 **5**
		iii.	[***able to describe the experiment to compare the rate of reaction of Experiment I and Experiment II correctly]*** **Sample answer;** **Procedure:** 1. Fill water half-full in a basin. Fill water in a burette and invert it over water in a basin. 2. Record the initial burette reading. 3. Measure 25 cm^3 of 0.5 mol dm^{-3} nitric acid and pour into a conical flask. 4. Weigh 5 g of metal Q powder and quickly put in a conical flask. 5. Connect the stopper with a delivery tube immediately into the burette. 6. At the same time start the stopwatch and shake the conical flask. 7. Record the burette reading at interval of 30 seconds until the reaction complete. 8. The experiment is repeated by using 25 cm^3 of 1.0 mol dm^{-3} nitric acid. **Interpreting data: Graph of volume of hydrogen gas against time**  P1: Correct label of axes with unit. P2: Correct curve for Set/ Experiment I and Set/ Experiment II with label.	 1 1 1 1 1 1 1 1 1 1	 **10**

	(b)	i.	[***able to identify the most unhealthy carbonated drink and state the reason correctly***] **Sample answer;** P1: Z P2: Concentration of acid // hydrogen ions is the highest / lemonade contains acid	 1 1	 **2**
		ii.	[***able to state two effects of consuming carbonated drink to our health correctly***] **Sample answer;** 1. Diabetes 2. Tooth decay 3. Stomach ulcer [any two correct answers]	 1 1 1	 **Max 2**
			https://cikguadura.wordpress.com **Total**		**20**

PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2016
SKEMA KERTAS 3
CHEMISTRY 4541/3

Q	RUBRIC	SCORE
1(a)	**[Record reading]** **Able to record all the temperature accurately with one decimal place and correct unit.** ***Berupaya merekodkan semua suhu dengan jitu dengan satu titik perpuluhan dan unit yang betul.*** Sample answer : Experiment 1 Initial temperature of hydrochloric acid/ *suhu awal asid hidroklorik* = 27.0^{o}C Initial temperature of potassium hydroxide solution/ *suhu awal larutan kalium hidroksida* = 27.0^{o}C Highest temperature of mixture / *suhu tertinggi campuran* = 40.0 ^{o}C Temperature change / *perubahan suhu* = 13.0 ^{o}C Experiment II Initial temperature of ethanoic acid/ *suhu awal asid etanoik* = 27.0^{o}C Initial temperature of potassium hydroxide solution/ *suhu awal larutan kalium hidroksida* = 27.0^{o}C Highest temperature of mixture / *suhu tertinggi campuran* = 38.0 ^{o}C Temperature change / *perubahan suhu* = 11.0 ^{o}C	3
	Able to record all the temperature accurately with one decimal place without unit// **Able to record all the temperature with a correct unit but without one decimal place** ***Berupaya merekodkan semua suhu dengan jitu dengan satu tempat perpuluhan tanpa unit//*** ***Berupaya merekodkan semua suhu dengan unit yang betul tetapi tanpa satu tempat perpuluhan.***	2
	Able to record four temperatures correctly. ***Berupaya merekodkan empat suhu dengan betul.***	1
	No response or wrong response ***Tiada jawapan atau jawapan salah*** 	0

<table>
<tr><td></td><td>RUBRIC</td><td>SCORE</td></tr>
<tr><td>1(b)</td><td>
[Tabulating data]
Able to construct a table accurately with with the following aspects:
(i) Three columns with correct quantities and unit;
(ii) Correct all reading of temperature with one decimal place
Berupaya membina jadual dengan jitu mengikut aspek berikut :
(i) Tiga lajur dengan kuantiti dan unit yang betul
(ii) Semua bacaan suhu betul dengan satu titik perpuluhan

Sample answer :
<table>
<tr><td>Experiment
Eksperimen</td><td>I</td><td>II</td></tr>
<tr><td>Initial temperature of acid, ^{o}C
Suhu awal asid, ^{o}C</td><td>27.0</td><td>27.0</td></tr>
<tr><td>Initial temperature of potassium hidroxide solution, ^{o}C</td><td>27.0</td><td>27.0</td></tr>
<tr><td>Highest temperature of mixture, ^{o}C
Suhu tertinggi campuran, ^{o}C</td><td>40.0</td><td>38.0</td></tr>
<tr><td>Change of temperature, ^{o}C
Perubahan suhu, ^{o}C</td><td>13.0</td><td>11.0</td></tr>
</table>
</td><td>3</td></tr>
<tr><td></td><td>
Able to construct a less accurate table that contain:
1 Titles without unit
2 All readings
Berupaya untuk membina jadual kurang tepat yang mengandungi :
1. Tajuk tanpa unit
2. Semua bacaan suhu

Sample answer:
<table>
<tr><td>Experiment
Eksperimen</td><td>I</td><td>II</td></tr>
<tr><td>Initial temperature of acid
Suhu awal asid</td><td>27</td><td>27</td></tr>
<tr><td>Initial temperature of potassium hidroxide solution</td><td>27</td><td>27</td></tr>
<tr><td>Highest temperature of mixture
Suhu tertinggi campuran</td><td>40</td><td>38</td></tr>
<tr><td>Change of temperature
Perubahan suhu</td><td>13</td><td>11</td></tr>
</table>
</td><td>2</td></tr>
<tr><td></td><td>Able to construct a table with at least two title
Berupaya membina jadual dengan sekurang-kurangnya dua tajuk</td><td>1</td></tr>
<tr><td></td><td>No response or wrong response.
Tiada jawapan atau jawapan salah.</td><td>0</td></tr>
</table>

Q	RUBRIC	SCORE
1(c)	**[Identify variables]** ***Able to state all three variables correctly*** ***Berupaya menyatakan ketiga-tiga pemboleh ubah dengan betul*** **Sample answer:** Manipulated variable : type of acids *Pemboleh ubah dimanipulasi : Jenis asid* Responding variable *:* heat of neutralisation *Pemboleh ubah bergerakbalas : haba peneutralan* Constant variable *:* size of polystyrene cup// polystyrene cup // concentration and volume of potassium hydroxide solution *Pemboleh ubah dimalarkan : saiz cawan polistrene// cawan polistirena // kepekatan dan isipadu larutan kalium hidroksida*	3
	Able to state any two variables correctly ***Berupaya menyatakan mana-mana dua pemboleh ubahh dengan betul***	2
	Able to state any one variables correctly ***Berupaya menyatakan mana-mana satu pemboleh ubah dengan betul***	1
	No response or wrong response ***Tiada jawapan atau jawapan salah***	0

	RUBRIC	SCORE
1(d)	**[Making hypothesis]** **Able to state the relationship between manipulated variable and responding variable with direction correctly** ***Berupaya untuk menyatakan perhubungan antara pemboleh ubah dimanipulasi dan pemboleh ubah bergerakbalas dengan arah yang betul*** Sample answer : The reaction between a strong acid and strong alkali produce a greater heat of neutralization than the reaction between a weak acid and strong alkali.// *Tindak balas antara asid kuat dan alkali kuat menghasilkan haba peneutralan yang lebih tinggi daripada tindak balas di antara asid lemah dan alkali kuat//* The reaction between hydrochloric acid and potassium hydroxide produce a greater heat of neutralization than the reaction between ethanoic acid and potassium hydroxide// *Tindak balas antara asid hidroklorik dan kalium hidroksida menghasilkan haba peneutralan yang lebih tinggi daripada tindak balas di antara asid etanoik dan kalium hidroksida//*	3
	Able to state the relationship between one type of acid with the responding variable// **Able to state the relationship between the type of acid with the heat of neutralisation correctly but in a wrong direction.** ***Berupaya menyatakan perhubungan di antara satu jenis asid dengan pemboleh ubah bergerakbalas//*** ***Berupaya menyatakan hubungan antara jemis asid dan haba peneutralan tetapi pada arah yang salah.*** Sample answer : The reaction between a strong acid and strong alkali produce a greater heat of neutralization// *Tindak balas antara asid kuat dan alkali kuat menghasilkan haba peneutralan yang lebih tinggi //* The reaction between hydrochloric acid and potassium hydroxide produce a greater heat of neutralization// *Tindak balas antara asid hidroklorik dan kalium hidroksida menghasilkan haba peneutralan yang lebih tinggi //* The heat of neutralization between a strong acid and a strong alkali is greater than the heat of neutralization between a weak acid and a strong alkali// *Haba peneutralan antara asid kuat dan alkali kuat lebih tinggi daripada haba peneutralan antara asid lemah dan alkali kuat.*	2
	Able to state an idea of the hypothesis ***Berupaya menyatakan idea hipotesis*** Sample answer : Heat of neutralization changes / increase *Haba peneutralan berubah / meningkat*	1
	No response or wrong response	0

	Tiada jawapan atau jawapan salah	

<table>
<tr><td></td><td>RUBRIC</td><td>SCORE</td></tr>
<tr><td>1(e)</td><td>[Making observations and inferences]
Able to state 3 observations and its respective inferences correctly
Berupaya menyatakan 3 pemerhatian dan 3 inferens yang sepadan dengan betul

<table>
<tr><td></td><td>Observations
Pemerhatian</td><td>Inferences
Inferens</td></tr>
<tr><td>1</td><td>Temperature increase// polystyrene cup becomes warmer
Suhu meningkat// Cawan polistirena menjadi panas</td><td>Exothermic reaction// heat released
Tindak balas eksotermik// Haba dibebaskan</td></tr>
<tr><td>2</td><td>The vinegar smell of ethanoic acid disappear
Bau cuka asid etanoik hilang</td><td>Ethanoic acid is neutralised
Asid etanoic telah dineutralkan</td></tr>
<tr><td>3</td><td>A colourless mixture of solution is obtained
Campuran larutan tidak berwarna terbentuk</td><td>Salt solution ad water is formed
Larutan garam dan air terbentuk</td></tr>
</table></td><td>6</td></tr>
<tr><td></td><td>Able to state 3 observations and 2 respective inferences correctly
Berupaya menyatakan 3 pemerhatian dan mana-mana 2 inferens yang sepadan dengan betul</td><td>5</td></tr>
<tr><td></td><td>Able to state 3 observations and 1 respective inference correctly//
Able to state any 2 observations and 2 respective inferences correctly
Berupaya menyatakan 3 pemerhatian dan 1 inferens yang sepadan dengan betul//
Berupaya menyatakan mana-mana 2 pemerhatian dan 2 inferens yang sepadan dengan betul</td><td>4</td></tr>
<tr><td></td><td>Able to state 3 observations correctly//
Able to state any 2 observations and 1 respective inference correctly
Berupaya menyatakan 3 pemerhatian dengan betul//
Berupaya menyatakan mana-mana 2 pemerhatian dan 1 inferens yang sepadan dengan betul</td><td>3</td></tr>
<tr><td></td><td>Able to state any 2 observations correctly//
Able to state any 1 observation and 1 respective inference correctly
Berupaya menyatakan mana-mana 2 pemerhatian dengan betul// Berupaya menyatakan mana-mana 1 pemerhatian dan 1 inferens yang sepadan dengan betul</td><td>2</td></tr>
<tr><td></td><td>Able to state any 1 observation correctly
Berupaya menyatakan mana-mana 1 pemerhatian dengan betul</td><td>1</td></tr>
<tr><td></td><td>No response or wrong response
Tiada jawapan atau jawapan salah</td><td>0</td></tr>
</table>

	RUBRIC	SCORE
1(f)	**[Interpreting data]** **Able to calculate the heat of neutralisation for experiment I correctly with unit** ***Berupaya menghitung haba peneutralan bagi eksperimen I dengan betul dan berunit*** **Sample answer :** **Step 1** : Heat released = mcΘ = 100 x 4.2 x 13 = 5460 J **Step 2** : Number of mole of sodium hydroxide = MV/1000 = (2.0 x 50)/1000 = 0.1 mol **Step 3** : 0.1 mol of water formed releases 5460 J heat energy **Step 4** : 1.0 mol of water formed releases = heat released / number of mole = 5460 J / 0.1 mol = 54600 J **Step 5** : Heat of neutralisation = - 54.60 $kJmol^{-1}$	3
	Able to calculate the heat of neutralisation for experiment I correctly with the following steps : Step 1, 2 and 5 ***Berupaya mengira haba peneutralan untuk eksperimen 1 dengan betul mengikut langkah-langkah berikut : Langkah 1,2 dan 5***	2
	Able to state the idea of calculation of heat of neutralization(any 2 steps) ***Berupaya menyatakan idea pengiraan haba peneutralan (Mana-mana 2 langkah)***	1
	No response or wrong response ***Tiada jawapan atau jawapan salah***	0

	RUBRIC	SCORE
1(g)	**[Define operationally]** **Able to state the operational definition for the heat of neutralisation correctly. Able to describe the following criteria** **(i) What do you do: Acid is added into alkali solution to produce 1 mol of water** **(ii) What do you observed: temperature rises** ***Berupaya menyatakan definasi secara operasi bagi haba peneutralan dengan betul.*** ***Berupaya menghuraikan kriteria berikut:*** ***(i) Apa yang anda lakukan : Acid ditambahkan ke dalam arutan alkali untuk menghasilkan1 mol air*** ***(ii) Apa yang anda perhatikan: Suhu meningkat*** Sample answer : The temperature rises when acid is added into alkali solution to produce 1 mol of water *Suhu meningkat apabila asid dimasukkan ke dalam larutan alkali untuk menghasilkan 1 mol air*	3
	Able to state the operational defination incompletely// ***Able to state the either criteria (i) or (ii)*** ***Berupaya menyatakan definasi secara operasi dengan tidak lengkap//*** ***Berupaya menyatakan salah satu kritiria (i) atau (ii)*** *Sample answer:* Temperature rises when acid is added into alkali solution// Temperature rises// Acid is added into alkali solution *Suhu meningkat apabila asid dimasukkan ke dalam larutan alkali //* *Suhu meningkat//* *Asid dimasukkan ke dalam larutan alkali*	2
	Able to state the idea of the heat of neutralization ***Berupaya menyatakan idea haba peneutralan*** *Sample answer :* Heat changes// reaction between acid and alkali *Perubahan haba//* *tindak balas antara asid dan alkali*	1
	No response or wrong response ***Tiada jawapan atau jawapan salah***	0

	RUBRIC	SCORE
1(h)	**[State the relationship]** **Able to state the relationship between type of acid and heat of neutralization correctly.** ***Berupaya menyatakan hubungan di antara jenis asid dan haba peneutralan dengan betul.*** Sample answer : The heat of neutralization of weak acid (ethanoic acid) and strong alkali (potassium hydroxide) is less than the heat of neutralization of strong acid (hydrochoric acid) and strong alkali (potassium hydroxide)// The heat of neutralization of strong acid (hydrochoric acid) and strong alkali (potassium hydroxide) is higher than the heat of neutralization of weak acid (ethanoic acid) and strong alkali (potassium hydroxide). *Haba peneutralan asid lemah (asid etanoik) dan alkali kuat (kalium hidroksida) kurang daripada haba peneutralan asid kuat (asid hidroklorik) dan alkali kuat (kalium hidroksida)//* *Haba peneutralan asid kuat (asid hidroklorik) dan alkali kuat (kalium hidroksida) lebih tinggi daripada haba peneutralan asid lemah (asid etanoik) dan alkali kuat (kalium hidroksida).*	3
	Able to state the relationship between one type of acid with heat of neutralization. ***Berupaya menyatakan perhubungan di antara satu jenis asid dengan haba peneutralan.*** Sample answer : The heat of neutralization of weak acid (ethanoic acid) and strong alkali (potassium hydroxide) is lesser// The heat of neutralization of strong acid(Hydrochoric acid) and strong alkali (potassium hydroxide) is greater. *Haba peneutralan asid lemah (asid etanoik) dan alkali kuat (kalium hidroksida)lebih rendah//* *Haba peneutralan asid kuat (asid hidroklorik) dan alkali kuat (kalium hidroksida) lebih tinggi.*	2
	Able to state the idea of the relationship between type of acid and heat of neutralisation. ***Berupaya menyatakan idea bagi hunbungan atara jenis asid dengan haba peneutralan.***	1
	No response or wrong response ***Tiada jawapan atau jawapan salah***	0

	RUBRIC	SCORE
1(i)	**[Predict]** **Able to predict the temperature change accurately with a correct unit** ***Berupaya meramalkan perubahan suhu dengan tepat dengan unit yang betul*** Sample answer : [9.0 – 10.0]^{o}C	3
	Able to predict the temperature change accurately without unit. ***Berupaya meramalkan perubahan suhu dengan tepat tanpa unit.*** Sample answer : 9.0 – 10.0// Less than 11.0^{o}C// *Kurang daripada 11.0*^{o}C	2
	Able to give an idea to predict the temperature. ***Berupaya untuk memberi idea untuk meramalkan suhu.*** Sample answer : [<9.0]^{o}C// <9.0 [reject: 7.0^{o}C and below]	1
	No response or wrong response ***Tiada jawapan atau jawapan salah***	0

	RUBRIC	SCORE
1(j)	**[Classify]** **Able to classify the acids into acid ionise completely in water and acid ionise prtially in water.** ***Berupaya mengelaskan asid kepada asid yang mengurai dengan lengkap dan asid yang mengurai dengan separa dalam air*** Sample answer : Acid ionise completely / *Asid mengurai dengan lengkap*: W, Z Acid ionise partially / *Asid mengurai dengan separa*: X, Y # Score 1 if classification is reverse # *Skor 1 jika pengelasan terbalik*	3
	Able to classify at least 3 acids correctly ***Berupaya mengelaskan sekurang-kurangnya 3 asid dengan betul***	2
	Able to classify at least 2 acids correctly ***Berupaya mengelaskan sekurang-kurangnya 2 asid dengan betul***	1
	No response or wrong response	0

	Tiada jawapan atau jawapan salah	

	Rubric https://cikguadura.wordpress.com	Score
2 (a)	**Able to state the problem statement correctly.** ***Dapat menyatakan pernyataan masalah dengan betul*** Sample answer: Does vulcanised rubber is more elastic than unvulcanised rubber?// Does unvulcanised rubber is less elastic than vulcanised rubber? *Adakah getah tervulkan lebih kenyal berbanding getah tak tervulkan //* *Adakah getah tak tervulkan kuran kenyal berbanding getah tervulkan tervulkan?*	3
	Able to state the problem statement incompletely or state the aim of experiment correctly. ***Dapat menyatakan pernyataan masalah dengan kurang lengkap atau menyataka tujuan eksperimen dengan betul.*** Sample answer: Does vulcanised rubber is more elastic?// Does unvulcanised rubber less elastic?// To compare the elasticity of vulcanised rubber and unvulcanised rubber *Adakah getah tervulkan lebih kenyal?//* *Adakah getah tak tervulkan kurang kenyal?//* *Membandingkan sifat kekenyalan getah tervulkan dengan getah tak tervulkan.*	2
	Able to give an idea of problem statement. ***Dapat menyatakan idea tentang pernyataan masalah.*** Sample answer: Vulcanised rubber is more elastic// Unvulcanised rubber is less elastic *Getah tervulkan lebih kenyal// Getah tak tervulkan kurang kenyal*.	1
	No response or wrong response. Tiada jawapan atau jawapan salah.	0

	Rubric	Score
2 (b)	**Able to state all the variables correctly**. ***Dapat menyatakan semua pemboleh ubah dengan betul.*** Sample answer: Manipulated variable : Type of rubber// Vulcanised rubber and unvulcanised rubber *Pemboleh ubah dimanipulasikan: Jenis getah// Getah tervulkan dan getah tak tervulkan* Responding variable : Elasticity of rubber *Pemboleh ubah bergerak balas : Kekenyalan getah.* Fixed variable : Length of rubber/ Mass of weight. *Pemboleh ubah dimalarkan : Panjang jalur getah/ Jisim pemberat .*	3
	Able to state any two variables correctly. ***Berupaya menyatakan mana-mana dua pemboleh ubah dengan betul.***	2
	Able to state any one variable correctly. ***Berupaya menyatakan mana-mana satu pemboleh ubah dengan betul.***	1
	No response or wrong response. ***Tiada jawapan atau jawapan salah.***	0

	Rubric	Score
2 (c)	**Able to state the relationship between the manipulated variable and the responding variable with direction correctly.** ***Dapat menyatakan hubungan antara pemboleh ubah manipulasi dan pemboleh ubah bergerak balas mengikut arah yang betul.*** Sample answer Vulcanised rubber is more elastic than unvulcanised rubber// Unvulcanised rubber is less elastic than vulcanised rubber. *Getah tervulkan lebih kenyal daripada getah tak tervulkan//* *Getah tak tervulkan kurang kenyal daripada getah tervulkan.*	3
	Able to state the relationship between the manipulated variable and the responding variable incompletely. ***Dapat menyatakan hubungan antara pemboleh ubah manipulasi dan pemboleh ubah bergerak balas dengan tidak lengkap.*** Sample answer: Vulcanised rubber is more elastic// Unvulcanised rubber is less elastic. *Getah tervulkan lebih kenyal// Getah tak tervulkan kurang kenyal.*	2
	Able to give an idea of hypotheis. ***Dapat menyatakan idea tentang hipotesis.*** Sample answer: Elasticity of vulcanised rubber// Unvulcanised rubber is more elastic than vulcanised rubber. *Kekenyalan getah tervulkan//*	1

	Getah tak tervulkan adalah lebih kenyal daripada getah tervulkan.	
	No response or wrong response. ***Tiada jawapan atau jawapan salah.***	0

	Rubric	Score
2 (d)	**Able to list all the materials and apparatus correctly** ***Dapat menyenaraikan bahan dan radas dengan betul.*** Sample answer: <u>Bahan / Materials:</u> 1. Vulcanised rubber strip/ *Jalur getah tervulkan* 2. Unvulcanised rubber strip/ *Jalur getah tak tervulkan* <u>Radas / Apparatus:</u> 1. Retort stand with clamp /*Kaki retort dengan pengapit* 2. Meter ruler/ *Pembaris meter* 3. Clip/ *Klip* 4. [50 - 100]g Weight/ *Pemberat*	3
	Able to list the following materials and apparatus. ***Dapat menyenaraikan bahan dan radas yang berikut.*** *Sample answer:* <u>Bahan / *Materials:*</u> 1. Vulcanised rubber strip / *Jalur getah tervulkan* 2. Unvulcanised rubber strip / *Jalur getah tak tervulkan* <u>Radas / *Apparatus:*</u> 1. Retort stand with clamp / *Kaki retort dengan pengapit* 2. Weight / *Pemberat*	2
	Able to list the following materials and apparatus. ***Dapat menyenaraikan bahan dan radas yang berikut.*** *Sample answer:* <u>Materials / Bahan :</u> 1. Unvulcanised/ vulcanised rubber strip *Jalur getah tervulkan/ tak tervulkan* <u>Radas / Apparatus:</u> 1. Retort stand/ *Kaki retort* 2. Weight/ *Pemberat*	1
	No response or wrong response. ***Tiada jawapan atau jawapan salah.***	0

	Rubric	Score
2(e)	**Able to list all the steps of procedure correctly.** ***Dapat menyenaraikan semua langkah prosedur dengan betul.*** Sample answer: 1. Measure and cut vulcanised rubber strip into [10 - 15] cm length. *Potongkan jalur getah tervulkan kepada [10-15]cm panjang.* 2. Record the initial length of the rubber strip. *Rekodkan panjang asal jalur getah.* 3. Hang the vulcanised rubber strip at 50 cm height. *Gantung jalur getah tervulkan pada ketinggian 50 cm.* 4. Hang [50-100] g weight at the rubber strip. *Gantung pemberat [50-100] g pada jalur getah.* 5. Measure and record the length of the rubber after stretched/ with weight. *Ukur dan rekodkan panjang getah selepas diregangkan/ dengan pemberat.* 6. Remove the weight, measure and record the length of rubber strip. *Tanggalkan pemberat, ukur dan rekodkan panjang jalur getah.* *7.* Repeat steps 1 to 6 by using unvulcanised rubber strip. *Ulang langkah 1 hingga 6 dengan menggunakan jalur getah tak tervulkan.*	3
	Able to list steps 2,3,4 and 5 correctly. ***Dapat menyenaraikan langkah-langkah 2, 3, 4 dan 5 dengan betul.***	2
	Able to list steps 4 and 5 only. ***Dapat menyenaraikan langkah-langkah 4 dan 5 sahaja.***	1
	No response or wrong response. ***Tiada jawapan atau jawapan salah.***	0

<table>
<tr>
<td>2(f)</td>
<td>Able to tabulate the data with the following aspects .
Dapat membina jadual data dengan aspek-aspek yang berikut.

1. Correct headings/ Tajuk betul
2. List of rubbers/ Senarai jalur getah

Sample answer:

<table>
<tr><td>Type of rubber strips
Jenis jalur getah</td><td>Initial length (cm)
Panjang asal (cm)</td><td>Length after weight is removed (cm)
Panjang selepas pemberat dialihkan (cm)</td></tr>
<tr><td>Vulcanised rubber/
Getah tervulkan</td><td></td><td></td></tr>
<tr><td>Unvulcanised rubber/
Getah tak tervulkan</td><td></td><td></td></tr>
</table>
</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Able to tabulate the data with the following aspects .
Dapat membina jadual data dengan aspek-aspek yang berikut.

1. Correct headings/ Tajuk betul
2. List of rubbers/ Senarai jalur getah

Sample answer:

<table>
<tr><td>Rubber strips/ Jalur getah</td><td>Observation/ Pemerhatian</td></tr>
<tr><td>Vulcanised rubber
Getah tervulkan</td><td></td></tr>
<tr><td>Unvulcanised rubber
Getah tak tervulkan</td><td></td></tr>
</table>
</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No response or wrong response.
Tiada jawapan atau jawapan salah.
</td>
<td>0</td>
</tr>
</table>