



KEMENTERIAN
PENDIDIKAN
MALAYSIA

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BAHAGIAN PENGURUSAN SEKOLAH BERASRAMA PENUH
DAN SEKOLAH KECEMERLANGAN

PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2014
PERCUBAAN SIJIL PELAJARAN MALAYSIA

CHEMISTRY

Kertas 1

Satu jam lima belas minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

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.

- 1 The electron arrangement of atom X is 2.8.4.
What is the number of valence electron of atom X?
Susunan elektron bagi atom X ialah 2.8.4.
Apakah bilangan elektron valens bagi atom X?
- A 2
B 3
C 4
D 14
- 2 What is the chemical formula of uranium(VI) oxide?
Apakah formula kimia bagi uranium(VI) oksida?
- A UO
B UO₂
C UO₃
D UO₆
- 3 Which substance is an ionic compound?
Bahan manakah ialah satu sebatian ion?
- A Ethyl ethanoate
Etil etanoat
B Bromine water
Air bromin
C Zinc chloride
Zink klorida
D Palm oil
Minyak kelapa sawit
- 4 Which ion is responsible for the alkaline properties in ammonia solution?
Ion manakah yang menyebabkan sifat alkali dalam larutan ammonia?
- A H₃O⁺
B NH₄⁺
C NO₃⁻
D OH⁻

- 5 Diagram 1 shows a standard representation of an atom of element Z.
Rajah 1 menunjukkan perwakilan piawai bagi satu atom unsur Z.

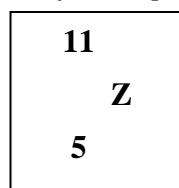


Diagram 1
Rajah 1

Which of the following is the position of element Z in the Periodic Table of Elements?

Antara berikut, yang manakah kedudukan unsur Z dalam Jadual Berkala Unsur?

| | <u>Group</u> <u>Kumpulan</u> | <u>Period</u> <u>Kala</u> |
|---|---------------------------------|------------------------------|
| A | 1 | 3 |
| B | 3 | 2 |
| C | 11 | 3 |
| D | 13 | 2 |

- 6 Diagram 2 shows the set-up of apparatus of electrolysis of molten lead(II) bromide.
Rajah 2 menunjukkan susunan radas bagi elektrolisis leburan plumbum(II) bromida.

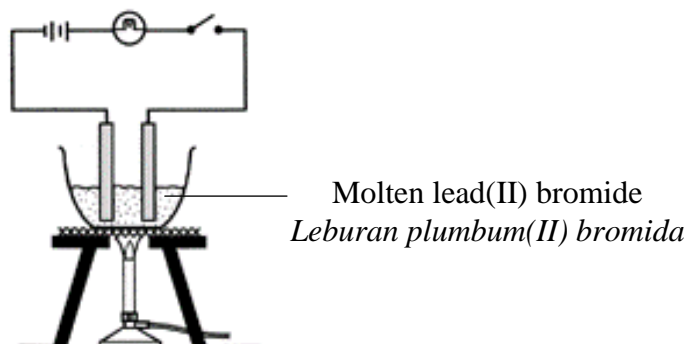


Diagram 2
Rajah 2

Brown gas is released at the anode. What is the product formed?

Gas perang terbebas di anod. Apakah hasil tindak balas yang terbentuk?

- A Oksigen
Oksigen
- B Hydrogen
Hidrogen
- C Bromine
Bromin
- D Nitrogen dioksida
Nitrogen dioksida

- 7 Diagram 3 shows a National Monument which is made of alloy X.
Rajah 3 menunjukkan Tugu Negara yang diperbuat daripada aloi X.



Alloy X
Aloi X

Diagram 3
Rajah 3

What is alloy X?
Apakah aloi X?

- A Duralumin
Duralumin
 - B Brass
Loyang
 - C Steel
Keluli
 - D Bronze
Gangsa
- 8 Which of the following is an insoluble salt?
Antara berikut, yang manakah garam tak terlarutkan?
- A Barium sulphate
Barium sulfat
 - B Calcium chloride
Kalsium klorida
 - C Silver nitrate
Argentum nitrat
 - D Sodium carbonate
Natrium karbonat

- 9 Which reaction has the highest rate of reaction?
Tindak balas manakah mempunyai kadar tindak balas yang paling tinggi?
- A Fermentation of glucose to produce ethanol
Penapaian glukosa untuk menghasilkan etanol
 - B Photosynthesis in green plant in the presence of sunlight
Fotosintesis dalam tumbuhan hijau dengan kehadiran cahaya matahari
 - C Formation of stalactites and stalagmites in a limestone cave
Pembentukan stalaktit dan stalagmit dalam gua batu kapur
 - D Burning of methane in excess oxygen to boil the water
Pembakaran metana dalam oksigen berlebihan untuk mendidihkan air
- 10 A compound is formed when ethanol is reacted with acidified potassium manganate(VII) solution.
What is the compound formed?
Satu sebatian terbentuk apabila etanol ditindak balaskan dengan larutan kalium manganat(VII) berasid.
Apakah sebatian yang terbentuk?
- A Ethane
Etana
 - B Ethene
Etena
 - C Ethanoic acid
Asid etanoik
 - D Ethyl ethanoate
Etil etanoat
- 11 Which substance is used in cold packs?
Bahan yang manakah digunakan dalam pek sejuk?
- A Aluminium chloride
Aluminium klorida
 - B Calcium chloride
Kalsium klorida
 - C Magnesium nitrate
Magnesium nitrate
 - D Potassium nitrate
Kalium nitrat

- 12 Diagram 4 shows an electrolysis process of aluminium from aluminium oxide.
Rajah 4 menunjukkan satu proses elektrolisis aluminium daripada aluminium oksida.

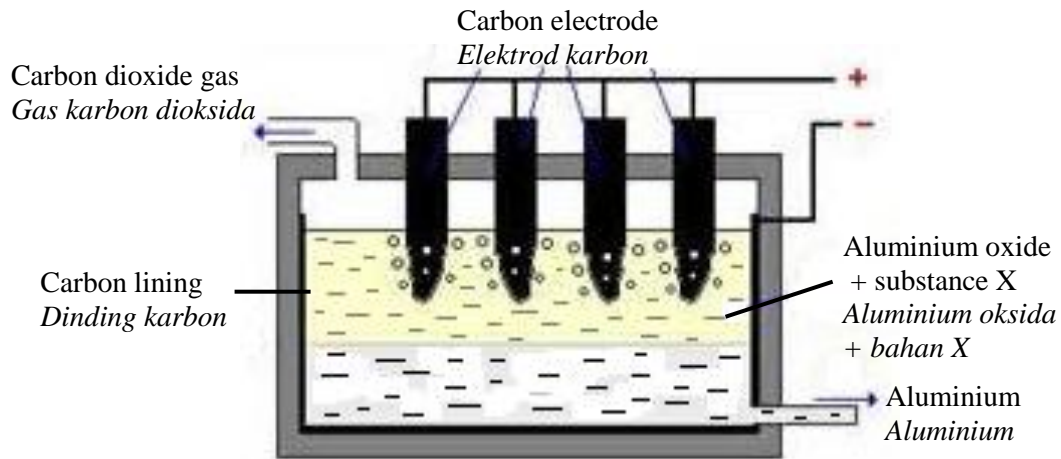


Diagram 4
Rajah 4

What is substance X?

Apakah bahan X?

- A Calcium chloride
Kalsium klorida
 B Limestone
Batu kapur
 C Coke
Arang karbon
 D Cryolite
Kriolit

- 13 Substance Q is a liquid at room temperature.
 Which of the following is the melting point and boiling point of Q?
Bahan Q adalah cecair pada suhu bilik.
Antara berikut, yang manakah takat lebur dan takat didih bagi Q?

| | <u>Melting point/°C</u> <u>Takat lebur/°C</u> | <u>Boiling point/°C</u> <u>Takat didih/°C</u> |
|---|--|--|
| A | -4 | 48 |
| B | -20 | -5 |
| C | 32 | 80 |
| D | 405 | 900 |

- 14 Linda is baking a cake for her mother's birthday that will be celebrated next week. What food additives should be added so that the texture of the cake is smooth and last longer?

Linda sedang membuat kek bagi hari jadi ibunya yang akan disambut pada minggu hadapan.

Apakah bahan tambah makanan yang perlu ditambahkan supaya tekstur kek tersebut lembut dan tahan lebih lama?

| | <u>To smoothen the texture</u> <u>Untuk melembutkan tekstur</u> | <u>To keep it last longer</u> <u>Untuk menjadikan tahan lebih lama</u> |
|---|--|---|
| A | Pectin <i>Pektin</i> | Sodium benzoate <i>Natrium benzoat</i> |
| B | Lecithin <i>Lesitin</i> | Ascorbic acid <i>Asid askorbik</i> |
| C | Aspartame <i>Aspartam</i> | Pectin <i>Pektin</i> |
| D | Azo compound <i>Sebatian azo</i> | Sulphur dioxide <i>Sulfur dioksida</i> |

- 15 Which of the following statement is correct about alkali?

Antara pernyataan berikut, yang manakah tentang bagi alkali?

- A Alkali reacts with zinc to release hydrogen gas
Alkali bertindak balas dengan zink membebaskan gas hidrogen
- B Alkali reacts with acid to form salt and water
Alkali bertindak balas dengan asid menghasilkan garam dan air
- C Alkali ionises in water to form hydroxonium ions
Alkali mengion dalam air menghasilkan ion hidroksonium
- D Alkali reacts with carbonate to release carbon dioxide gas
Alkali bertindak balas dengan karbonat membebaskan gas karbon dioksida

- 16 Which substances are suitable be used to prepare copper(II) sulphate?

Bahan-bahan manakah yang sesuai digunakan untuk menyediakan kuprum(II) sulfat?

- A Copper(II) carbonate and sulphuric acid
Kuprum(II) karbonat dan asid sulfurik
- B Copper(II) nitrate and sodium sulphate
Kuprum(II) nitrat dan natrium sulfat
- C Copper(II) oxide and sodium sulphate
Kuprum(II) oksida dan kalium sulfat
- D Copper and sulphuric acid
Kuprum dan asid sulfurik

- 17 Diagram 5 shows the structural formula of vitamin C.
Rajah 5 menunjukkan formula struktur bagi vitamin C.

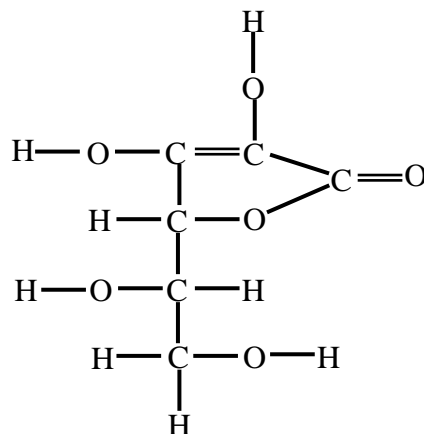


Diagram 5
Rajah 5

What is the empirical formula of vitamin C?
Apakah formula empirik bagi vitamin C?

- A $C_6H_8O_6$
 B $C_5H_8O_5$
 C $C_4H_5O_4$
 D $C_3H_4O_3$
- 18 Element W is located in the same group as potassium in the Periodic Table of Elements.
Which of the following is correct about element W?
Unsur W terletak dalam kumpulan yang sama dengan kalium dalam Jadual Berkala Unsur.
Antara berikut, yang manakah betul tentang unsur W?
- A Reacts with chlorine to produce a colourless gas
Bertindak balas dengan klorin untuk menghasilkan satu gas tak berwarna
- B Reacts with oxygen to produce a black solid
Bertindak balas dengan oksigen untuk menghasilkan satu pepejal hitam
- C Reacts with water to produce an alkaline solution
Bertindak balas dengan air untuk menghasilkan satu larutan beralkali
- D Reacts with sodium hydroxide solution to produce an acidic solution
Bertindak balas dengan larutan natrium hidroksida untuk menghasilkan satu larutan berasid

- 19 Substance X has the following properties.
Bahan X mempunyai sifat-sifat berikut.

- Dissolves in ethanol
Larut dalam etanol
- Has melting point of 80°C
Mempunyai takat lebur 80°C
- Cannot conduct electricity in molten state
Tidak mengkonduksi elektrik dalam keadaan lebur

What is substance X?
Apakah bahan X?

- A Carbon
Karbon
- B Mercury
Merkuri
- C Naphthalene
Naftalena
- D Sodium chloride
Natrium klorida

- 20 Substance Y has the following properties:
Bahan Y mempunyai ciri-ciri berikut:

- Hard and opaque
Keras dan tak lutcahaya
- Good insulator of heat and electricity
Penebat haba dan elektrik yang baik
- Inert toward chemical
Lengai terhadap bahan kimia

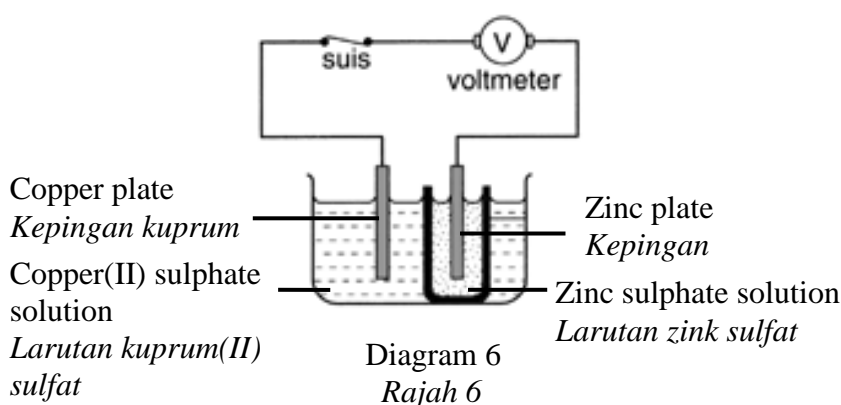
What is substance Y?
Apakah bahan Y?

- A Ceramic
Seramik
- B Polymer
Polimer
- C Glass
Kaca
- D Metal
Logam

- 21 Catalyst is used in Contact process to increase the production of sulphuric acid in industries.
Which equation represents the reaction that uses a catalyst in Contact process?
Mangkin digunakan dalam proses Sentuh untuk meningkatkan penghasilan sulfurik asid dalam industri.
Persamaan manakah mewakili tindak balas yang menggunakan mangkin dalam proses Sentuh?

- A $S + O_2 \rightarrow SO_2$
 B $2SO_2 + O_2 \rightarrow 2SO_3$
 C $SO_3 + H_2SO_4 \rightarrow H_2S_2O_7$
 D $H_2S_2O_7 + H_2O \rightarrow 2H_2SO_4$

- 22 Diagram 6 shows the set-up of apparatus for a chemical cell.
Rajah 6 menunjukkan susunan radas bagi satu sel kimia.



What is the most suitable way to produce higher potential difference?
Apakah kaedah yang paling sesuai untuk menghasilkan beza upaya yang lebih tinggi?

- A Replace the zinc plate with magnesium ribbon and zinc ion solution to a solution of magnesium ion.
Menggantikan kepingan zink dengan kepingan magnesium dan larutan ion zink kepada larutan ion magnesium
- B Raising the temperature of the copper(II) sulphate solution and zinc sulphate solution
Meningkatkan suhu larutan kuprum(II) nitrat dan larutan zink nitrat
- C Replace copper(II) sulphate solution to molten copper(II) nitrate
Menukarkan larutan kuprum(II) nitrat kepada leburan kuprum(II) nitrat
- D Raising the concentration of copper(II) sulphate solution
Meningkatkan kepekatan larutan kuprum(II) sulfat

- 23 P, Q and R are located in the same period of the Periodic Table of Elements. P is a non-metal, Q is a metal and R is a semi-metal. Which of the following shows the elements in ascending order of the proton number in the Periodic Table?

P, Q and R berada pada kala yang sama dalam Jadual Berkala Unsur. P adalah bukan logam, Q adalah logam dan R adalah separa logam.

Antara berikut, yang mana menunjukkan turutan unsur mengikut pertambahan nombor proton dalam Jadual Berkala?

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

- 24 Diagram 7 shows the apparatus set-up for an experiment to determine the rate of reaction.

Rajah 7 menunjukkan susunan radas bagi satu eksperimen untuk menentukan kadar tindak balas.

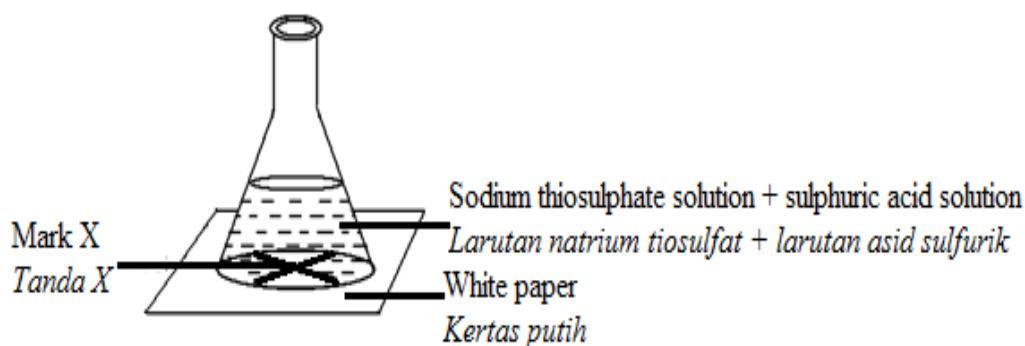


Diagram 7

Rajah 7

Which technique is the most suitable to determine the rate of reaction?

Teknik manakah yang sesuai untuk menentukan kadar tindakbalas?

- A Record the time as soon as the bubbles of gas released
Catat masa sebaik sahaja gelembung gas terbebas
- B Record the time as soon as the mark X invisible from sight
Catat masa sebaik sahaja tanda X hilang dari pandangan
- C Record the time taken to obtain the maximum mass of the mixture
Catat masa yang diambil untuk mendapat jisim maksimum campuran
- D Record the time taken for the change of the pH value until a fixed pH value is obtained
Catat masa bagi perubahan nilai pH sehingga nilai pH yang tetap diperolehi

- 25 The equation represents the reaction between Ag^+ and Cl^- ions.
Persamaan mewakili tindak balas antara ion Ag^+ dan ion Cl^- .



Which of the following is true about the equation ?
Antara berikut, yang manakah betul tentang persamaan itu?

- A Endothermic reaction occurs
Tindakbalas endotermik berlaku
- B Heat is released to the surroundings
Haba dibebaskan ke persekitaran
- C The temperature of the product decreases
Suhu hasil tindakbalas berkurang.
- D 65 kJ of heat absorbed when 1 mole of silver chloride is formed
65 kJ haba diserap apabila 1 mol argentum klorida terbentuk
- 26 Diagram 8 shows the structural formulae of four organic compounds.
Rajah 8 menunjukkan formula struktur bagi empat sebatian organik.

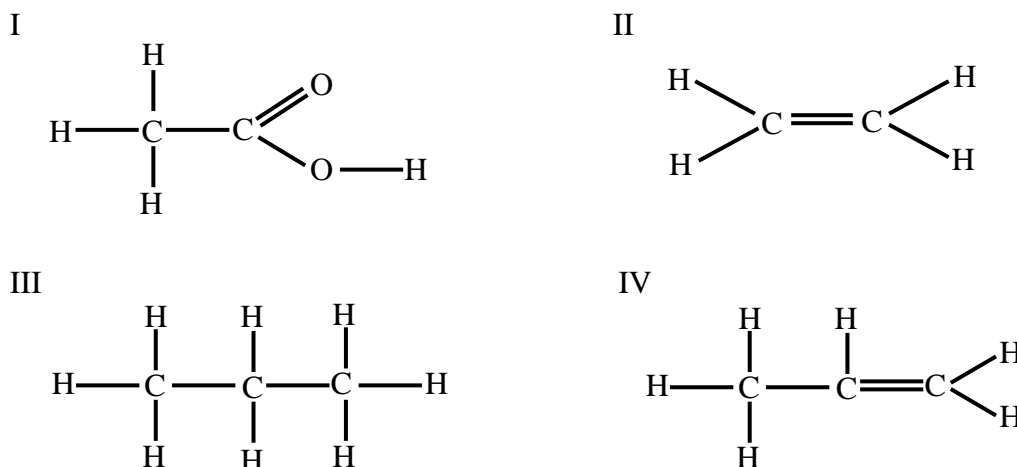


Diagram 8
Rajah 8

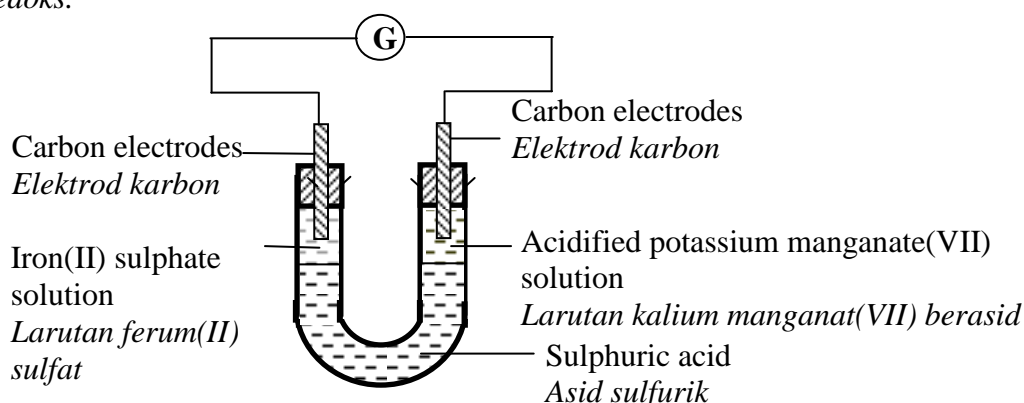
Which compounds decolourise bromine water?
Sebatian manakah yang menyahwarnakan air bromin?

- 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

27 Which substance has the weakest attractive forces between its particles?
Bahan manakah mempunyai daya tarikan antara zarah yang paling lemah?

- A Iron
Besi
- B Water
Air
- C Oxygen gas
Gas oksigen
- D Sodium chloride solution
Larutan natrium klorida

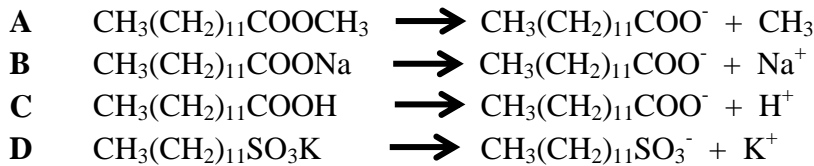
28 Diagram 9 shows a set-up of apparatus of an experiment to study a redox reaction.
Rajah 9 menunjukkan susunan radas bagi satu eksperimen untuk mengkaji tindak balas redoks.



What is the change in the oxidation number of iron and manganese in the reaction?
Apakah perubahan nombor pengoksidaan bagi ferum dan mangan dalam tindak balas itu?

| | <u>Iron</u> <u>Ferum</u> | <u>Manganese</u> <u>Mangan</u> |
|---|-----------------------------|-----------------------------------|
| A | +2 → 0 | +7 → +3 |
| B | +2 → +3 | +7 → +2 |
| C | +2 → +1 | +4 → +7 |
| D | +3 → +2 | +2 → +7 |

- 29 Alia is having tea with her family. She accidentally spilled the tea which contains tannic acid onto a table cloth. She wants to clean the table cloth. Which of the following shows the ionisation of the suitable cleaning agent in water? *Alia sedang minum petang bersama keluarganya. Secara tidak sengaja dia telah tertumpahkan air teh yang mengandungi asid tannik ke atas alas meja. Dia ingin mencuci alas meja itu. Antara berikut, yang manakah menunjukkan pengionan bahan pencuci yang sesuai untuk menghilangkan kotoran tersebut?*



- 30 Halim is a young executive at a company. He loves to travel overseas and spends lots of money on luxury items. *Halim adalah seorang eksekutif muda di sebuah syarikat. Dia suka melancong ke luar negara dan membelanjakan wang yang banyak untuk membeli barangan mewah.*



After several years of overspending, he got a serious financial problem. He started to avoid having conversation with his family, going out with colleagues for lunch and isolated himself at his workplace.

Which medicine is suitable to treat Halim?

Setelah beberapa tahun bersikap boros, dia mengalami masalah kewangan yang serius. Halim mula menjauhi ahli keluarganya, tidak keluar makan dengan rakan sekerja dan memencilkan diri di tempat kerjanya.

Ubat manakah sesuai untuk merawat Halim?

- A Aspirin
Aspirin
 B Codeine
Kodeina
 C Penisilin
Penisilin
 D Tranquiliser
Trankuilizer

- 31 Which pair of ions has the same number of electrons?
 [Proton number : O = 8, Na = 11, Mg = 12, Al = 13, Cl = 17, Ca = 20]
Antara pasangan ion berikut, yang manakah mempunyai bilangan elektron yang sama?
 [Nombor proton : O = 8, Na = 11, Mg = 12, Al = 13, Cl = 17, Ca = 20]
- A Na⁺ and Al³⁺
Na⁺ dan Al³⁺
- B Cl⁻ and O²⁻
Cl⁻ dan O²⁻
- C Na⁺ and Ca²⁺
Na⁺ dan Ca²⁺
- D Mg²⁺ and Cl⁻
Mg²⁺ dan Cl⁻
- 32 Diagram 10 shows the set-up of apparatus of an electrolytic cell.
Rajah 10 menunjukkan susunan radas bagi satu sel elektrolitik.

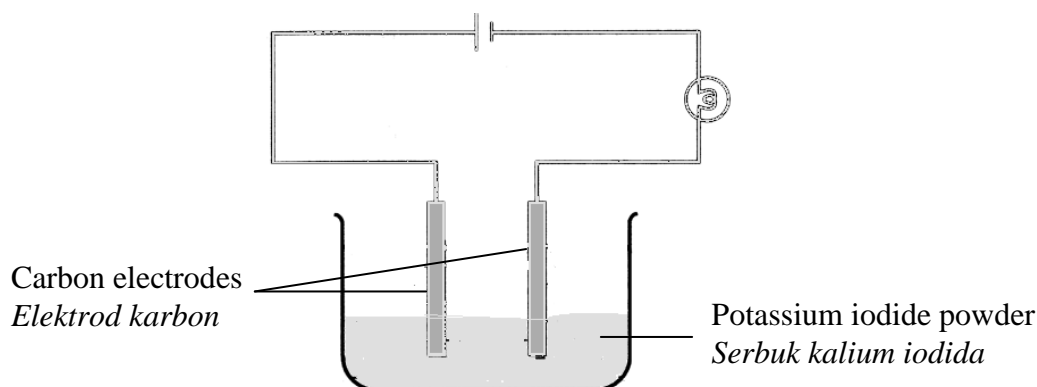


Diagram 10
 Rajah 10

It was found that the bulb is not light up when potassium iodide powder is used in the cell.

What should be done to make the bulb to light up?

Didapati bahawa mentol tidak menyala apabila serbuk kalium iodida digunakan dalam sel itu.

Apakah yang perlu dilakukan supaya mentol itu menyala?

- A Heat potassium iodide strongly
Panaskan kalium iodida dengan kuat
- B Increase the number of batteries
Tingkatkan bilangan bateri
- C Add methylbenzene into the beaker
Tambahkan metilbenzena ke dalam bikar
- D Replace carbon electrodes with copper electrodes
Gantikan elektrod karbon dengan elektrod kuprum

- 33 When the concentration of a reactant increases, the rate of reaction increases. Which statement explains why the rate of reaction increases?
Apabila kepekatan bahan tindak balas meningkat, kadar tindak balas meningkat. Pernyataan manakah yang menerangkan mengapa kadar tindak balas meningkat?
- A The total surface area of the reactant particles increases
Jumlah luas permukaan zarah-zarah bahan tindak balas bertambah
- B The total number of the reactant particles per unit volume increases
Jumlah bilangan zarah-zarah bahan tindak balas per unit isi padu bertambah
- C The reactant particles move faster and collide more often with one another.
Zarah-zarah bahan tindak balas bergerak lebih cepat dan berlanggar lebih kerap antara satu sama lain
- D The reactant particles which collide more often are able to overcome the lower activation energy.
Zarah-zarah bahan tindak balas yang berlanggar lebih kerap boleh mengatasi tenaga pengaktifan yang lebih rendah
- 34 Diagram 11 shows the set-up of apparatus used by the students of Sekolah Menengah Lingkaran 4 to electroplate an iron spoon with silver.
Rajah 11 menunjukkan susunan radas yang digunakan oleh pelajar-pelajar Sekolah Menengah Lingkaran 4 untuk menyadurkan sudu besi dengan argentum.

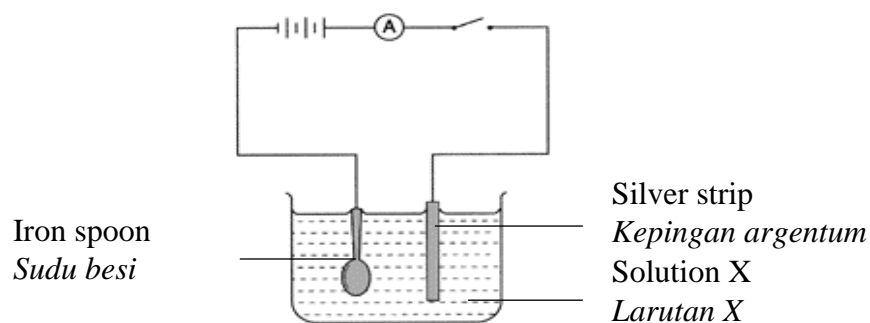


Diagram 11
 Rajah 11

What is X?
 Apakah X?

- A Silver chloride
Argentum klorida
- B Silver nitrate
Argentum nitrat
- C Iron(II) chloride
Ferum(II) klorida
- D Iron(II) carbonate
Ferum(II) karbonat

- 35 The equation represents the combustion of propane in excess oxygen.
Persamaan mewakili pembakaran propana dalam oksigen berlebihan.



What is the volume of carbon dioxide gas released when 0.1 mol of propane gas is burnt completely?

[Molar volume of gas = $24 \text{ dm}^3 \text{ mol}^{-1}$ at room conditions]

Berapakah isi padu gas karbon dioksida yang terbebas apabila 0.1 mol gas propana terbakar dengan lengkap?

[*Isi padu molar gas = $24 \text{ dm}^3 \text{ mol}^{-1}$ pada keadaan bilik*]

- A 0.1 dm^3
B 0.3 dm^3
C 2.4 dm^3
D 7.2 dm^3
- 36 A substance has the following properties:
Satu bahan mempunyai sifat-sifat berikut:
- Reacts with marble to release carbon dioxide gas
Bertindak balas dengan marmar untuk membebaskan gas karbon dioksida
 - Conducts electricity
Mengkonduksikan arus elektrik

Which substance exhibits the properties?

Bahan yang manakah menunjukkan sifat-sifat itu?

- I Sodium hydroxide in water
Natrium hidroksida dalam air
- II Ammonia in water
Larutan ammonia dalam air
- III Ethanoic acid in water
Asid etanoik dalam air
- IV Sulphur dioxide in water
Sulfur dioksida dalam air
- 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

- 37 Elements X, Y and Z have consecutive proton numbers in the Periodic Table of Elements.
What is the electron arrangement of atom Z if element X is a halogen?
Unsur-unsur X, Y dan Z mempunyai nombor proton yang berturutan dalam Jadual Berkala Unsur.
Apakah susunan elektron bagi atom Z jika unsur X adalah halogen?

- A 2.8.1
B 2.8.6
C 2.8.7
D 2.8.8

- 38 Diagram 12 shows the polymerisation reaction of substance Y.
Rajah 12 menunjukkan tindak balas pempolimeran bagi bahan Y.

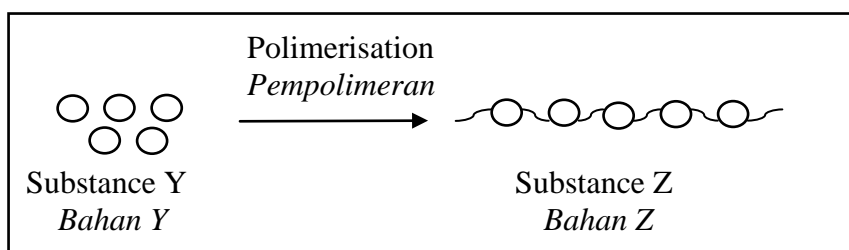


Diagram 12
Rajah 12

What are substances Y and Z?
Apakah bahan-bahan Y dan Z?

- | | <u>Substance Y</u>
<u>Bahan Y</u> | <u>Substance Z</u>
<u>Bahan Z</u> |
|---|--|--------------------------------------|
| A | Starch <i>Kanji</i> | Glucose <i>Glukosa</i> |
| B | Amino acid <i>Asid amino</i> | Fatty acid <i>Asid lemak</i> |
| C | Glycerol <i>Gliserol</i> | Fat <i>Lemak</i> |
| D | Vinyl chloride <i>Vinil klorida</i> | PVC <i>PVC</i> |

- 39 Table 1 shows the steps taken to identify the ions present in substance X.
Jadual 1 menunjukkan langkah-langkah yang diambil untuk mengenalpasti ion-ion yang terdapat dalam bahan X.

| Step <i>Langkah</i> | Observation <i>Pemerhatian</i> |
|---|---|
| Sodium hydroxide solution is added drop by drop into a test tube containing solution X until excess. <i>Larutan natrium hidroksida ditambah setitik demi setitik ke dalam tabung uji yang mengandungi larutan X sehingga berlebihan.</i> | White precipitate formed and soluble in excess sodium hydroxide solution. <i>Mendakan putih terbentuk dan larut dalam larutan natrium hidroksida berlebihan.</i> |
| Hydrochloric acid is added into a test tube containing solution X <i>Asid hidroklorik ditambah ke dalam tabung uji yang mengandungi larutan X.</i> | White precipitate formed. <i>Mendakan putih terbentuk.</i> |
| Small amount of solid X is heated in a test tube. A glowing wooden splinter is inserted into the test tube. <i>Sedikit pepejal X dipanaskan dalam sebuah tabung uji. Kayu uji berbara dimasukkan ke dalam tabung uji.</i> | Brown gas released and glowing wooden splinter ignited. <i>Gas berwarna perang terbebas dan kayu uji berbara bernyala.</i> |

Table 1
Jadual 1

What is substance X?
Apakah bahan X?

- A** Zinc nitrate
Zink nitrate
- B** Lead(II) nitrate
Plumbum(II) nitrat
- C** Potassium bromide
Kalium bromida
- D** Aluminium bromide
Aluminium bromida

- 40 Excess calcium carbonate powder reacts with acid X to produce carbon dioxide gas. Which acid produces the highest rate of reaction?

Serbuk kalsium karbonat berlebihan bertindak balas dengan asid X untuk menghasilkan gas karbon dioksida.

Asid manakah yang menghasilkan kadar tindak balas paling tinggi?

- A 50 cm³ of 0.5 mol dm⁻³ nitric acid
50 cm³ asid nitrik 0.5 mol dm⁻³
- B 50 cm³ of 0.5 mol dm⁻³ ethanoic acid
50 cm³ asid etanoik 0.5 mol dm⁻³
- C 50 cm³ of 0.5 mol dm⁻³ sulphuric acid
50 cm³ asid sulfurik 0.5 mol dm⁻³
- D 50 cm³ of 0.5 mol dm⁻³ hydrochloric acid
50 cm³ asid hidroklorik 0.5 mol dm⁻³

- 41 A team of Geologists from University Malaya have discovered X metal ore. Earlier studies found that metal X is more reactive than aluminium.

What should be done by the scientists to obtain the X metal from its ore?

Sekumpulan ahli Geologi dari Universiti Malaya telah menemui sejenis bijih bagi logam X. Kajian awal mendapati bahawa logam X lebih reaktif daripada aluminium.

Apakah yang perlu dilakukan oleh saintis itu bagi mendapatkan logam X tersebut daripada bijihnya?

- A Melting X metal ore with coke
Meleburkan bijih logam X dengan arang kok
- B Flowing hot hydrogen gas on the ore
Mengalirkan gas hidrogen panas ke atas bijih tersebut
- C Conducting the electrolysis of the molten ore using carbon electrodes
Menjalankan proses elektrolisis ke atas leburan bijih tersebut menggunakan elektrod karbon
- D Heating the ore of X with magnesium
Memanaskan bijih logam X dengan magnesium

- 42 What is the oxidation number of W in WO₄²⁻ ?

Apakah nombor pengoksidaan bagi W dalam WO₄²⁻ ?

- A + 6
- B - 6
- C + 2
- D - 2

- 43 Diagram 13 shows an energy profile for a reaction.
Rajah 13 menunjukkan profil tenaga bagi satu tindak balas.

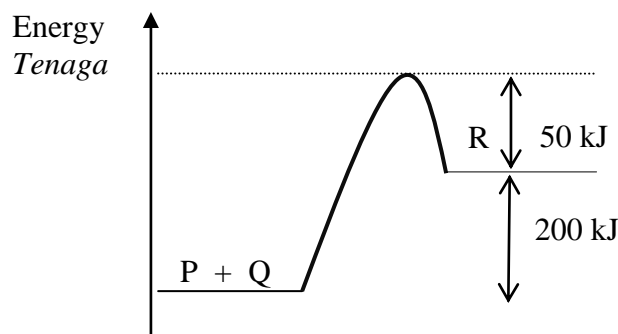


Diagram 13
Rajah 13

What is the activation energy and the type of reaction?
Apakah tenaga pengaktifan dan jenis tindak balas itu?

| | <u>Activation energy / kJ</u> <u>Tenaga pengaktifan / kJ</u> | <u>Type of reaction</u> <u>Jenis tindak balas</u> |
|---|---|--|
| A | 250 | Exothermic Eksotermik |
| B | 250 | Endothermic Endotermik |
| C | 200 | Exothermic Eksotermik |
| D | 50 | Endothermic Endotermik |

- 44 The equation represents the reaction between lead(II) nitrate solution and sodium iodide solution.
Persamaan mewakili tindak balas antara larutan plumbum(II) nitrat dengan larutan natrium iodida.



What is the mass of lead(II) iodide formed when 20 cm³ of 1.0 mol dm⁻³ lead(II) nitrate solution reacts with excess sodium iodide solution?

[Relative atomic mass: [I = 127, Pb = 207]

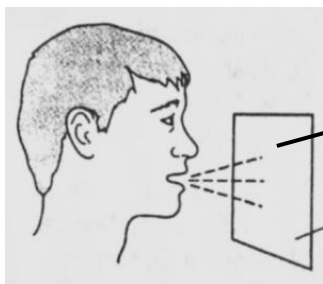
Berapakah jisim plumbum(II) iodida terbentuk apabila 20 cm³ larutan plumbum(II) nitrat 1.0 mol dm⁻³ bertindak balas dengan larutan natrium iodida berlebihan?

[Jisim atom relatif: I = 127, Pb = 207]

- A 6.68 g
B 9.22 g
C 10.82 g
D 13.36 g

- 45 Acidified potassium dichromate(VI) solution is used to detect the presence of ethanol vapour in the breath of a person who has consumed alcohol.

Larutan kalium dikromat(VI) berasid digunakan untuk mengesan kehadiran wap etanol dalam pernafasan seseorang yang minum minuman beralkohol.



Filter paper moistened with acidified potassium dichromate(VI) solution

Kertas turas yang dilembap dengan larutan kalium dikromat(VI) berasid

The colour of a filter paper will change from orange to green when ethanol is present.

What is the reaction that occurs on ethanol?

Warna kertas turas akan berubah daripada jingga ke hijau apabila etanol hadir. Apakah tindak balas yang berlaku pada etanol?

- A Reduction
Penurunan
- B Oxidation
Pengoksidaan
- C Neutralisation
Peneutralan
- D Esterification
Pengesteran

- 46 Diagram 15 shows an iron nail coiled with tin strip in a test tube.
Rajah 15 menunjukkan sebatang paku besi dililit dengan kepingan stanum di dalam sebuah tabung uji.

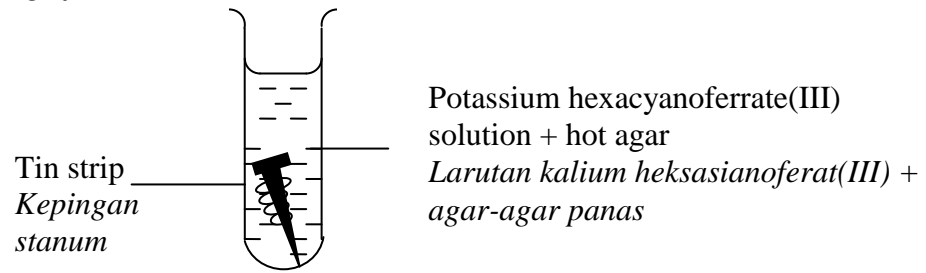


Diagram 15
Rajah 15

Which substance should be added into the test tube to increase the intensity of the blue colour formed?

Bahan manakah yang perlu dicampurkan ke dalam tabung uji itu supaya keamatan warna biru bertambah?

- A Phenolphthalein
Fenolftalein
- B Glucose solution
Larutan glukosa
- C Distilled water
Air suling
- D Sea water
Air laut

- 47 Diagram 16 shows the apparatus set-up for an experiment. A sample of 80 cm^3 of chlorine gas is trapped in a syringe P. The gas is slowly passed over heated iron in a combustion tube until there is no change in volume in syringe P. The product formed is iron(III) chloride, FeCl_3 .

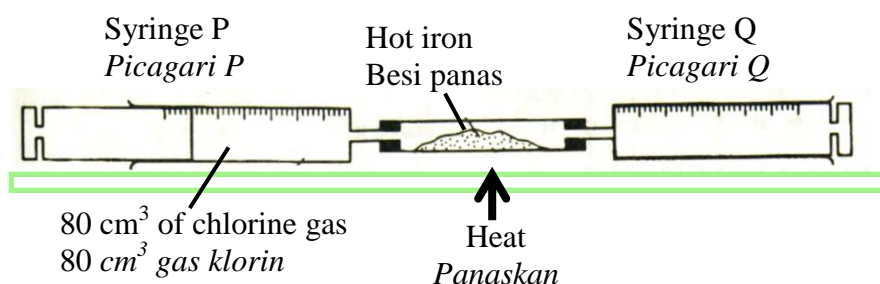
Rajah 16 menunjukkan susunan radas bagi satu eksperimen. Sampel 80 cm^3 gas klorin dikumpulkan di dalam picagari P. Kemudian, gas ini dialirkan perlahan-lahan ke atas besi yang dipanaskan dalam tabung pembakaran sehingga tiada perubahan isi padu dalam picagari P. Hasil yang terbentuk ialah ferum(III) klorida, FeCl_3 .

Before heating:

Sebelum pemanasan:

80 cm^3 of chlorine gas is collected in syringe P at room conditions.

80 cm^3 gas klorin dikumpulkan dalam picagari P pada keadaan bilik.



After heating:

Selepas pemanasan:

65.6 cm^3 of chlorine gas is collected in syringe Q at room conditions.

65.6 cm^3 gas klorin dikumpulkan dalam picagari Q pada keadaan bilik.

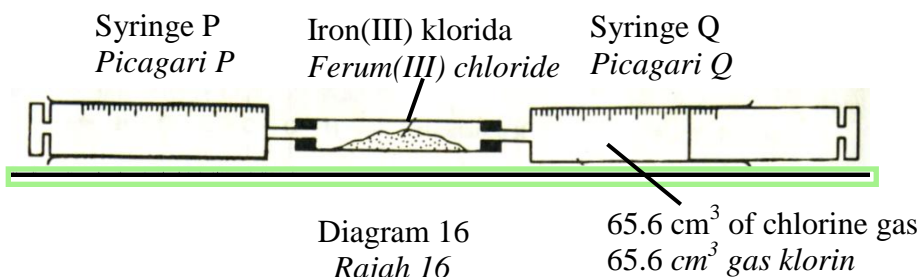


Diagram 16
Rajah 16

65.6 cm^3 of chlorine gas
 65.6 cm^3 gas klorin

What is the mass of iron(III) chloride, FeCl_3 obtained?

Berapakah jisim ferum(III) oksida, FeCl_3 diperolehi?

[Relative atomic mass : Cl = 35.5, Fe = 56; Molar volume of gas = $24 \text{ dm}^3 \text{ mol}^{-1}$ at room conditions]

[Jisim atom relatif : Cl = 35.5, Fe = 56; Isi padu molar gas = 24 dm^3 pada keadaan bilik]

- A 0.065 g
- B 0.098 g
- C 0.146 g
- D 0.195 g

- 48 Diagram 17 shows the set-up of apparatus for the reaction between metal X and oxygen gas.
Rajah 17 menunjukkan susunan radas bagi tindak balas antara logam X dan gas oksigen.

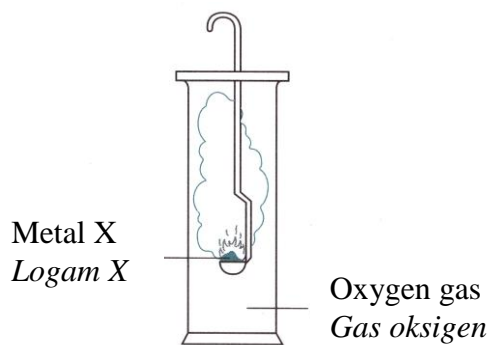


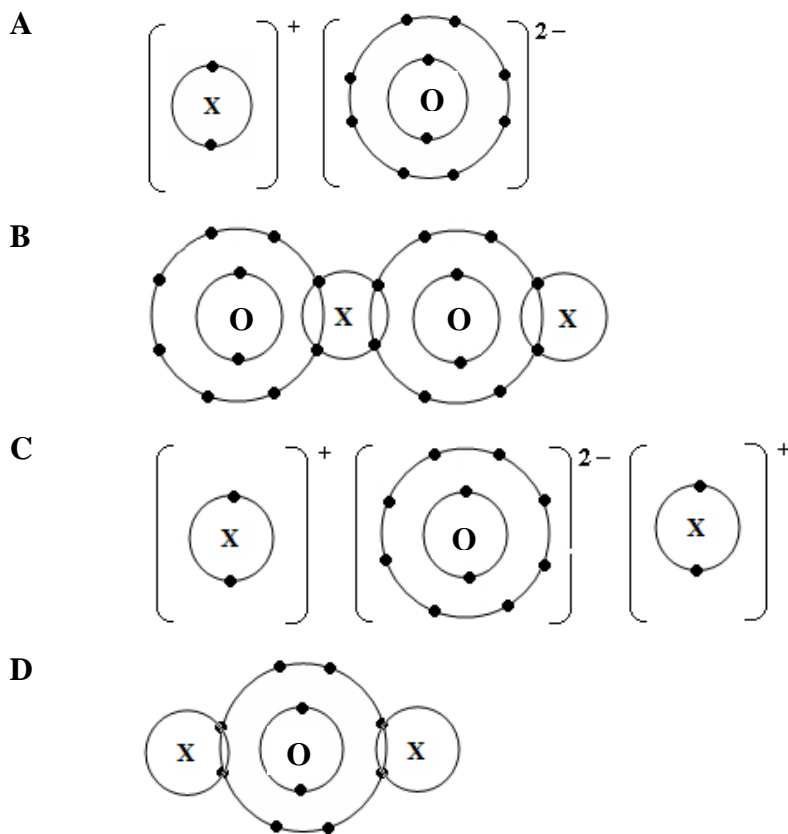
Diagram 17
Rajah 17

Which diagram shows the electron arrangement for the product formed in the reaction?

Rajah manakah menunjukkan susunan elektron bagi hasil tindak balas yang terbentuk?

[Proton number : X = 3, O = 8]

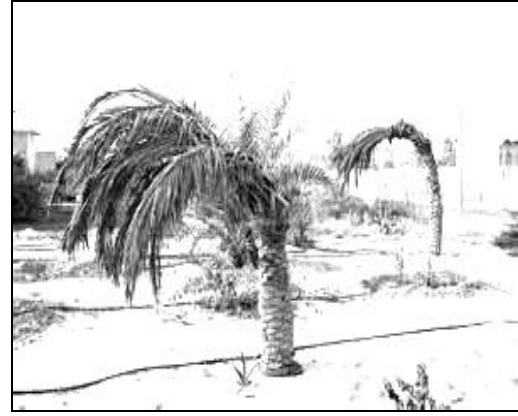
[*Nombor proton* : X = 3, O = 8]



- 49** Pak Ahmad works as a settler and plants a new palm oil farm. Last January, he planted the palm oil trees. After a few months he found that the palm trees infertile.
Pak Ahmad bekerja sebagai peneroka dan mengusahakan ladang kelapa sawit yang baru dibuka. Pada bulan Januari yang lepas, dia menanam anak pokok kelapa sawit. Beberapa bulan kemudian, dia mendapati pokok kelapa sawitnya tidak subur.



June
Jun



July
Julai

He sprinkled the calcium oxide powder (quick lime) on the soil for a week. After 2 months, he found that the growth of palm oil trees become much better.
Dia telah menabur serbuk kalsium oksida (batu kapur) pada tanah ladangnya selama seminggu. Selepas 2 bulan, dia mendapati pertumbuhan pokok kelapa sawit menjadi lebih baik.



The difference after 2 month
Perubahan yang berlaku selepas 2 bulan.

Which of the following explains why calcium oxide (quick lime) is used by Pak Ahmad ?

Antara berikut, yang manakah menjelaskan mengapa kalsium oksida (batu kapur) digunakan oleh Pak Ahmad?

- A To produce fertile leaves of the palm oil trees
Untuk menghasilkan daun kelapa sawit yang lebih subur
- B To kill the termites in the soil
Untuk membunuh anai-anai dalam tanah
- C To neutralise the acidic soil
Untuk meneutralkan tanah yang berasid.
- D To strengthen the roots of palm oil trees
Untuk menguatkan akar pokok kelapa sawit

- 50 Diagram 18 shows an energy level of a displacement reaction.
Rajah 18 menunjukkan rajah aras tenaga bagi satu tindak balas penyusunan.

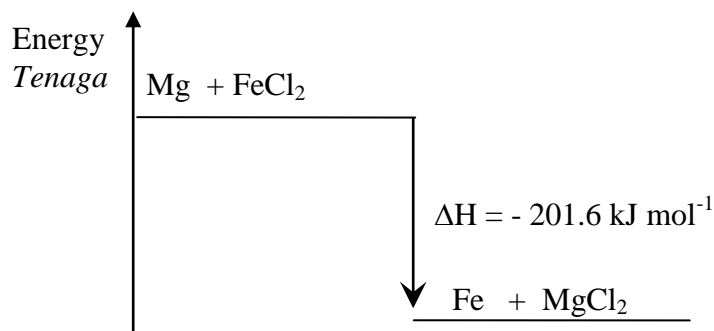


Diagram 18
Rajah 18

What is the increase in temperature when 50 cm³ of 0.25 mol dm⁻³ iron(II) chloride solution is reacted with excess magnesium powder?

[Specific heat capacity of the solution = 4.2 J g⁻¹ °C⁻¹]

Berapakah kenaikan suhu jika 50 cm³ larutan ferum(II) klorida 0.25 mol dm⁻³ ditindak balaskan dengan serbuk magnesium berlebihan?

[Muatan haba tentu larutan = 4.2 J g⁻¹ °C⁻¹]

- A 12 °C
- B 16 °C
- C 22 °C
- D 24 °C

<http://cikguadura.wordpress.com/>

END OF QUESTION PAPER
KERTAS SOALAN TAMAT



BAHAGIAN PENGURUSAN SEKOLAH BERASRAMA PENUH
DAN SEKOLAH KECEMERLANGAN

PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2014
PERCUBAAN SIJIL PELAJARAN MALAYSIA

CHEMISTRY

Kertas 2

2 jam 30 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 | | |
| | 2 | | |
| | 3 | | |
| | 4 | | |
| | 5 | | |
| | 6 | | |
| B | 7 | | |
| | 8 | | |
| C | 9 | | |
| | 10 | | |
| Jumlah | | | |

Kertas soalan ini mengandungi 25 halaman bercetak.

Section A
Bahagian A

[60 marks]

[60 markah]

<http://cikguadura.wordpress.com/>

Answer all questions in this section.

Jawab semua soalan dalam bahagian ini.

- 1 Diagram 1 shows the atomic structure of sodium atom.
Rajah 1 menunjukkan struktur bagi atom natrium.

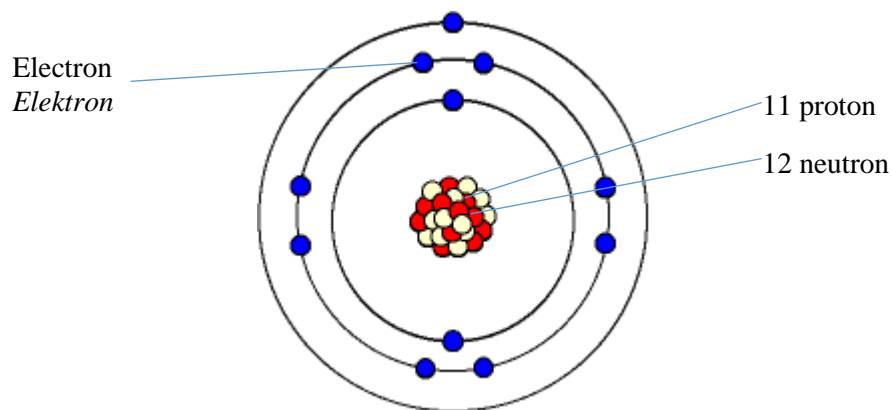


Diagram 1/ *Rajah 1*

- a) Sodium atoms have three subatomic particles namely protons, electrons and neutrons.
Atom natrium mempunyai 3 zarah subatom iaitu proton, elektron dan neutron.

Name the lightest subatomic particle.

Namakan zarah subatom yang paling ringan.

.....
[1 mark]

- b) Write the electron arrangement of sodium ion.
Tuliskan susunan elektron bagi ion natrium.

.....
[1 mark]

- c) Potassium has proton number 19 and nucleon number 39.
Atom kalium mempunyai nombor proton 19 dan nombor nukleon 39.

- i) Why the element of potassium is more reactive than sodium?
Mengapakah unsur kalium lebih reaktif berbanding natrium?

.....
.....
.....

[3 marks]

- ii) State two observations when potassium is placed in a basin filled with water.
Nyatakan dua pemerhatian apabila kalium dimasukkan ke dalam sebuah besen yang berisi air.

.....
.....

[2 mark]

- d) Sodium-24 is an isotope of sodium.
Natrium-24 adalah isotop natrium.

- i) What is meant by isotopes?
Apakah maksud isotop?

.....

[1 mark]

- ii) State the use of sodium-24.
Nyatakan kegunaan natrium-24.

.....

[1 mark]

- 2 a) i) One mole of a substance is defined as the quantity of a substance that contains the same number of particles as in n g of element **A**.

What are n and **A**?

*Satu mol bahan ditakrifkan sebagai kuantiti bahan yang mengandungi bilangan zarah yang sama seperti yang terdapat dalam n g unsur **A**.*

*Apakah n dan **A**?*

$n =$

A =

[2 marks]

- ii) What is the number of atoms in 0.5 mole of methane gas, CH_4 ?

[Avogadro constant = $6.02 \times 10^{23} \text{ mol}^{-1}$]

Berapakah bilangan atom dalam 0.5 mol gas methane, CH_4 ?

[Pemalar Avogadro = $6.02 \times 10^{23} \text{ mol}^{-1}$]

[2 marks]

- b) Diagram 2 shows an experiment to determine the empirical formula of magnesium oxide.

Rajah 2 menunjukkan satu eksperimen untuk menentukan formula empirik magnesium oksida.

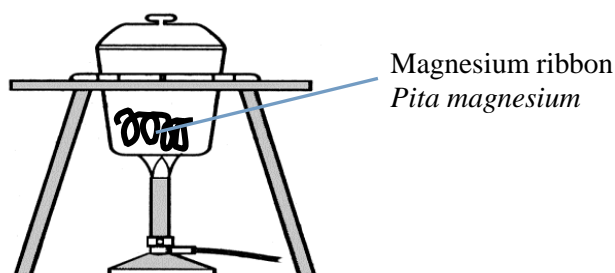


Diagram 2/Rajah 2

- i) When carrying out the experiment, why does the crucible lid need to be opened once a while?

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

.....

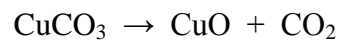
[1 mark]

- ii) Why this method not suitable to determine the empirical formula of lead(II) oxide?

Mengapakah kaedah ini tidak sesuai untuk menentukan formula empirik plumbum(II) oksida?

.....
[1 mark]

- c) Copper(II) carbonate, CuCO_3 is heated strongly to produce copper(II) oxide and carbon dioxide gas. The reaction is given by chemical equation below;
Kuprum(II) karbonat, CuCO_3 dipanaskan dengan kuat menghasilkan kuprum(II) oksida dan gas karbon dioksida. Tindakbalas ditunjukkan oleh persamaan kimia di bawah;



6.2 g copper(II) carbonate, CuCO_3 is heated during an experiment.

Calculate the volume of gas released.

[Relative atomic mass: Cu=64; C=12, O=16; 1 mole of gas occupies 24 dm^3 at room conditions]

6.2 g kuprum(II) karbonat, CuCO_3 di panaskan dalam suatu eksperimen.

Hitungkan isipadu gas yang dibebaskan.

[Jisim atom relatif: Cu=64; C=12, O=16; 1 mol gas menempati 24 dm^3 pada keadaan bilik]

[3 marks]

- 3 Diagram 3.1 shows the symbol of copper and tin.
Rajah 3.1 menunjukkan simbol unsur-unsur kuprum dan stanum.

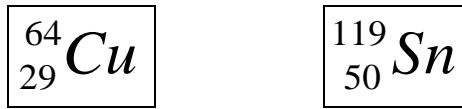


Diagram 3.1
Rajah 3.1

- (a) Copper and tin combine together to form an alloy Z.
Unsur X dan unsur Y bergabung untuk membentuk aloi Z.

- (i) Identify alloy Z?
Kenal pasti aloi Z?

.....
[1 mark]

- (ii) Draw the arrangement of atoms in alloy Z.
Lukiskan susunan atom dalam aloi Z.



[2 marks]

- (iii) State **one** aim of making alloy Z.
*Nyatakan **satu** tujuan pembuatan aloi Z.*

.....
[1 mark]

- (iv) Diagram 3.2 shows the uses of duralumin in our daily life.
Rajah 3.2 menunjukkan kegunaan duralumin dalam kehidupan seharian.



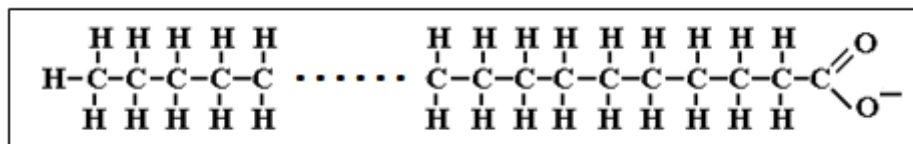
Diagram 3.2
Rajah 3.2

State two characteristics of duralumin.
Nyatakan 2 ciri duralumin.

.....

[2 marks]

- (b) Diagram 3.3 shows the structural formula of cleaning agent A.
Rajah 3.3 menunjukkan formula struktur bahan pencuci A.



Cleaning agent A
Bahan pencuci A

Diagram/Rajah 3.3

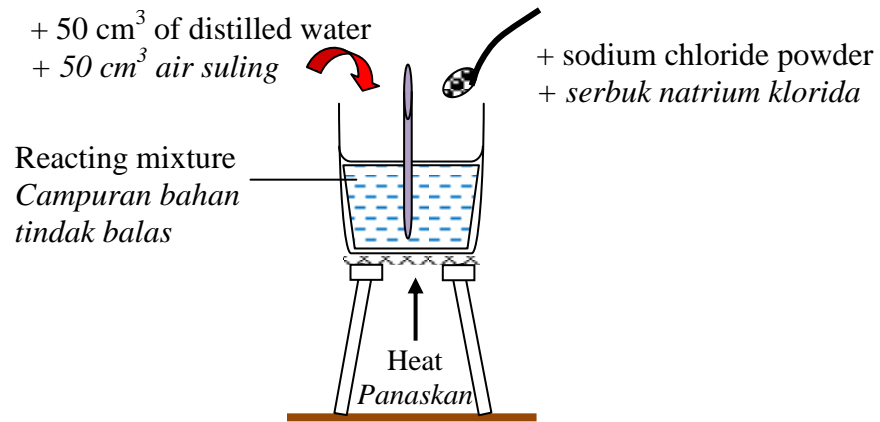
- (i) State the name of the reaction to prepare cleaning agent A.
Nyatakan nama tindak balas penyediaan bahan pencuci A.

.....
 [1 mark]

- (ii) Suggest **two** main reactants needed to prepare cleaning agent A,
*Cadangkan **dua** bahan tindak balas utama yang diperlukan bagi menyediakan agen pencuci A.*

.....
 [2 marks]

- iii) Diagram 3.4 shows the apparatus set-up for the reaction in 3(b)(i).
Rajah 3.4 menunjukkan susunan radas bagi tindak balas di 3(b)(i).



Diagram/Rajah 3.4

Why sodium chloride powder is added to the reacting mixture?
Mengapa serbuk natrium klorida di tambah ke dalam campuran bahan tindak balas?

.....
[1 mark]

- 4 a) Diagram 4.1 shows the extraction of iron from hematite in a blast furnace. Hematite is heated with limestone and substance X.
Rajah 4.1 menunjukkan pengekstrakan ferum dari hematit dalam relau bagas. Hematit dipanaskan dengan batu kapur dan bahan X.

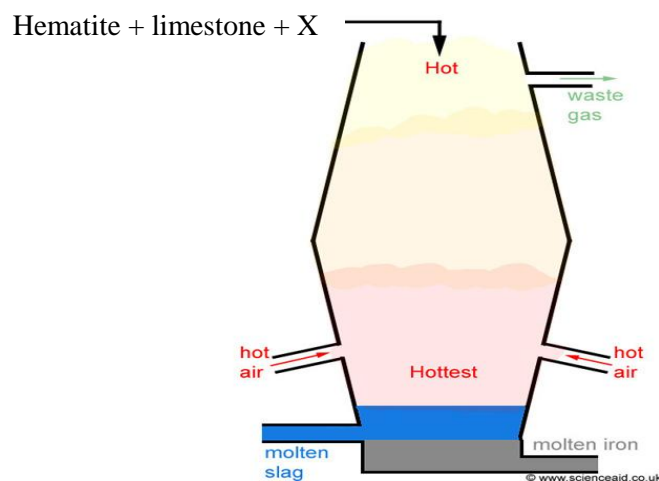


Diagram 4.1/ *Rajah 4.1*

- i) The main component of hematite is iron oxide, Fe_2O_3 .
 What is the oxidation number of iron in Fe_2O_3 ?
*Komponen utama hematit adalah besi oksida, Fe_2O_3 .
 Apakah nombor pengoksidaan bagi ferum dalam Fe_2O_3 ?*

..... [1 mark]

- ii) Name substance X.
Namakan bahan X.

..... [1 mark]

- iii) What is the function of substance X?
Apakah fungsi bahan X?

..... [1 mark]

- iv) Write the chemical equation for the reaction.
Tuliskan persamaan kimia bagi tindak balas.

..... [2 marks]

- b) Diagram 4.2 shows the changes when chlorine water is added into the test tube that contain sodium bromide solution and 1,1,1-trichloroethane.
Rajah 4.2 menunjukkan perubahan yang berlaku apabila air klorin ditambah ke dalam tabung uji yang mengandungi larutan natrium bromida dan 1,1,1-trikloroetana.

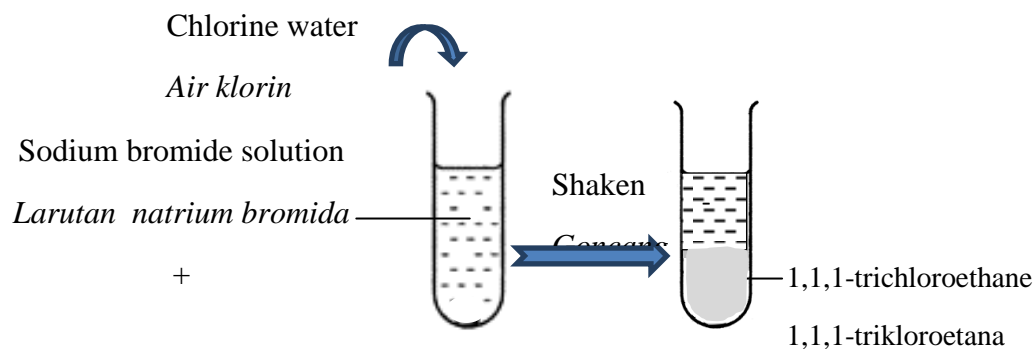


Diagram 4.3/Rajah 4.3

- i) What is the colour of the 1,1,1-trichloroethane layer formed?
Apakah warna lapisan 1,1,1-trikloroetana yang terbentuk?

.....
 [1 mark]

- ii) Name the substance that give the color in b(i).
Namakan bahan yang menyebabkan warna di b(i).

.....
 [1 mark]

- iii) State the change in oxidation number of chlorine.
Nyatakan perubahan nombor pengoksidaan klorin.

.....
 [1 mark]

- iv) Name the process undergoes by chlorine.
Namakan proses yang dilalui oleh klorin.

.....
 [1 mark]

- iii) Suggest one reagent that can replace chlorine water.
Cadangkan satu bahan uji yang boleh menggantikan air klorin.

.....
 [1 mark]

- 5 a) Diagram 5.1 shows three test tubes contain glacial ethanoic acid, sulphuric acid and hydrochloric acid.

Rajah 5.1 menunjukkan tiga tabung uji yang mengandungi asid etanoik glasial, asid sulfurik dan asid hidroklorik.

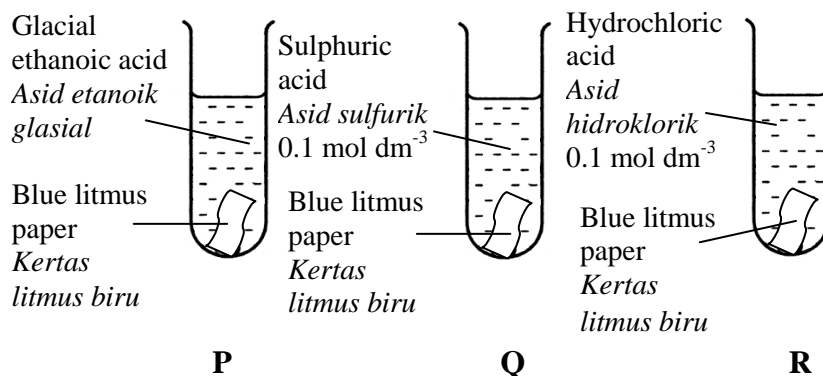


Diagram 5.1/ *Rajah 5.1*

- i) State the type of particle presence in test tube P.
Nyatakan jenis zarah yang hadir di dalam tabung uji P.

.....
[1 mark]

- ii) Among test tubes P, Q and R which test tube shows no change to the blue litmus paper? Explain why.
Antara tabung uji P, Q dan R yang manakah tidak menunjukkan perubahan pada kertas litmus biru? Terangkan mengapa.

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

- b) Table 5.2 shows the number of moles of hydrogen ions in sulphuric acid and hydrochloric acid which have the same volume.

Jadual 5.2 menunjukkan bilangan mol ion hidrogen dalam asid sulfurik dan asid hidroklorik yang mempunyai isi padu yang sama.

| Type of acid <i>Jenis asid</i> | Sulphuric acid <i>Asid sulfurik</i> | Hydrochloric acid <i>Asid hidroklorik</i> |
|---|--|--|
| Molarity <i>Kemolaran</i> | 0.1 mol dm ⁻³ | 0.1 mol dm ⁻³ |
| Number of moles of hydrogen ion <i>Bilangan mol ion hidrogen</i> | 0.01 | Y |

Table 5.2 / *Jadual 5.2*

State the value of Y. Explain why the number of moles of hydrogen ions in sulphuric acid and hydrochloric acid is different.

Nyatakan nilai Y. Terangkan mengapa bilangan mol ion hidrogen dalam asid sulfurik dan asid hidroklorik berbeza.

.....

.....

.....

[3 marks]

- c) Ammonium chloride is a soluble salt. It decomposes when heated strongly. The chemical equation below shows the decomposition of ammonium chloride:



- i) Name gas X.

Namakan gas X.

.....

[1 mark]

- ii) State the property of the solution formed when gas X dissolves in water.
Nyatakan sifat larutan yang terbentuk apabila gas X larut dalam air.

.....

[1 mark]

- iii) Describe briefly how to identify the chloride ion, Cl^- that is present in solid ammonium chloride.

Huraikan secara ringkas bagaimana untuk mengenal pasti ion klorida, Cl^- yang hadir di dalam pepejal ammonium klorida.

Procedure / prosedur:

.....

.....

[2 marks]

Observation / pemerhatian:

.....

[1 mark]

- 6 Experiments I, II and III are carried out to investigate the factors affecting the rate of reaction.

Table 6.1 shows the reactants and temperature used in each experiment.

Eksperimen I, II dan III dijalankan untuk mengkaji faktor-faktor yang mempengaruhi kadar tindak balas.

Jadual 6.1 menunjukkan bahan tindak balas dan suhu yang digunakan dalam setiap eksperimen.

| Experiment <i>Eksperimen</i> | Reactants <i>Bahan tindak balas</i> | Temperature (°C) <i>Suhu (°C)</i> |
|---------------------------------|---|--------------------------------------|
| I | Excess zinc powder + 25 cm ³ of 0.1 mol dm ⁻³ hydrochloric acid <i>Serbuk zink berlebihan + 25 cm³ asid hidroklorik 0.1 mol dm⁻³</i> | 30 |
| II | Excess zinc powder + 25 cm ³ of 0.1 mol dm ⁻³ hydrochloric acid <i>Serbuk zink berlebihan + 25 cm³ asid hidroklorik 0.1 mol dm⁻³</i> | 40 |
| III | Excess zinc powder + 25 cm ³ of 0.1 mol dm ⁻³ sulphuric acid <i>Serbuk zink berlebihan + 25 cm³ asid sulfurik 0.1 mol dm⁻³</i> | 30 |

Table 6.1 / *Jadual 6.1*

- a) Write the ionic equation for the reaction in Experiment I.
Tuliskan persamaan ion untuk tindak balas dalam Eksperimen I.

.....
[2 marks]

- b) Based on the experiments, state two factors that affect the rate of reaction.
Merujuk kepada eksperimen, nyatakan dua faktor yang mempengaruhi kadar tindak balas.

.....
[2 marks]

- c) Compare the rate of reaction between Experiment I and II.
Explain the difference by using collision theory.
*Bandungkan kadar tindak balas antara Eksperimen I dan II .
Terangkan perbezaan itu dengan menggunakan teori perlanggaran.*

.....

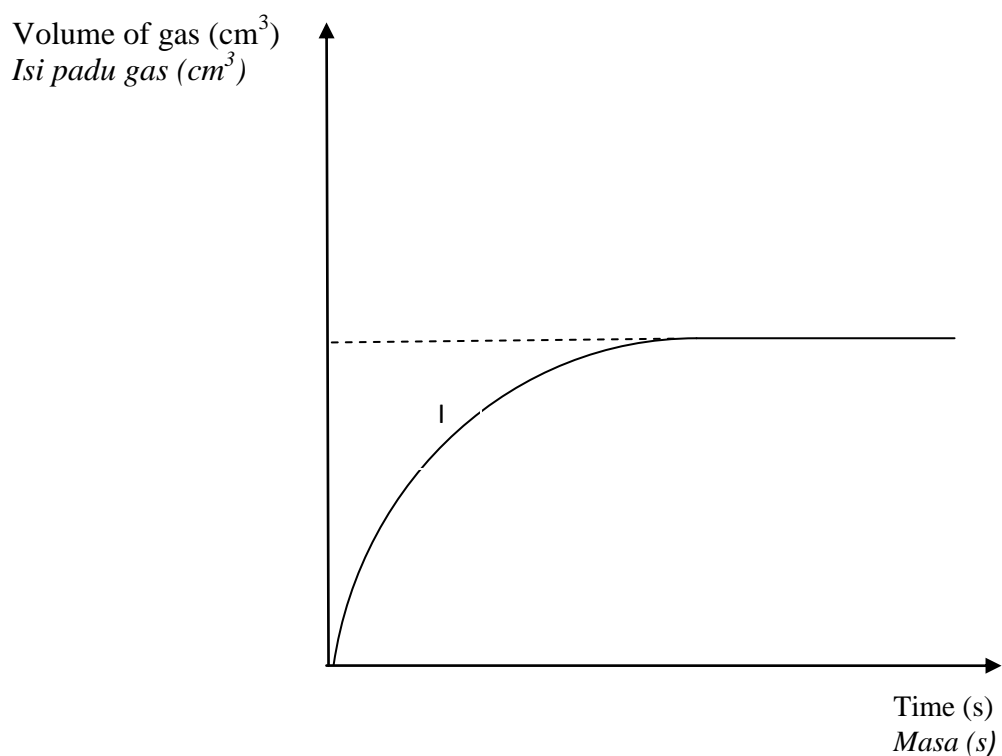
.....

.....

.....

[4 marks]

- d) Diagram 6.2 shows the curve of the graph of total volume against time for Experiment I.
Sketch the curve obtained for Experiment III on the same axes.
*Rajah 6.2 menunjukkan garis lengkung bagi graf jumlah isi padu gas melawan masa bagi Eksperimen I.
Lakarkan garis lengkung yang diperolehi bagi Eksperimen III pada paksi yang sama.*



[1 mark]

- e) During a master chef competition, an apprentice found that a piece of meat is still not tender after cooking for one hour.
Semasa satu pertandingan 'master chef', seorang pelatih mendapati ketulan daging yang dimasak masih tidak lembut selepas satu jam.



State one method that should be taken to make the meat become tender in a shorter time. Explain your answer.

Nyatakan satu kaedah yang boleh diambil supaya daging itu menjadi lembut dalam masa lebih singkat. Terangkan jawapan anda.

.....
.....

[2 marks]

Section B
Bahagian B

[20 marks/ 20 markah]

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Answer any one question.

Jawab mana-mana satu soalan.

7. (a) A student carried out an experiment to determine the heat of neutralisation by using 50 cm^3 of 1.0 mol dm^{-3} hydrochloric acid and 50 cm^3 of 1.0 mol dm^{-3} sodium hydroxide solution. Table 7 shows the results of the experiment.

Seorang pelajar telah menjalankan satu eksperimen untuk menentukan haba peneutralan dengan menggunakan 50 cm^3 asid hidroklorik 1.0 mol dm^{-3} dan 50 cm^3 larutan natrium hidroksida 1.0 mol dm^{-3} . Jadual 7 menunjukkan keputusan eksperimen tersebut.

| | |
|--|------|
| Initial temperature of hydrochloric acid ($^{\circ}\text{C}$) <i>Suhu awal larutan asid hidroklorik ($^{\circ}\text{C}$)</i> | 29.0 |
| Initial temperature of sodium hydroxide solution ($^{\circ}\text{C}$) <i>Suhu awal larutan natrium hidroksida ($^{\circ}\text{C}$)</i> | 28.0 |
| Highest temperature of the reaction mixture ($^{\circ}\text{C}$) <i>Suhu tertinggi campuran tindak balas ($^{\circ}\text{C}$)</i> | 35.0 |

Table 7/ Jadual 7

- (i) Calculate:

Hitungkan:

- The heat change during the reaction.
- The number of moles of water formed.
- The heat of neutralisation for this reaction.

[Specific heat capacity of a solution = $4.2 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$;
Density of solution = 1 g cm^{-3}]

- *Perubahan haba semasa tindak balas.*
- *Bilangan mol air terbentuk.*
- *Haba peneutralan bagi tindak balas tersebut.*

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

[4 marks]

- (ii) The experiment is repeated using 50 cm^3 of 1.0 mol dm^{-3} hydrochloric acid solution and 50 cm^3 of 1.0 mol dm^{-3} potassium hydroxide solution.

Predict the temperature change and give your reason.

Experimen ini diulangi dengan menggunakan 50 cm^3 asid hidroklorik 1.0 mol dm^{-3} dan 50 cm^3 larutan kalium hidroksida 1.0 mol dm^{-3} .

Ramalkan perubahan suhu dan berikan alasan anda.

[2 marks]

- (b) Diagram 7.1 shows the energy level diagram for two chemical reactions.
Rajah 7.1 menunjukkan gambarajah aras tenaga bagi dua tindak balas kimia.

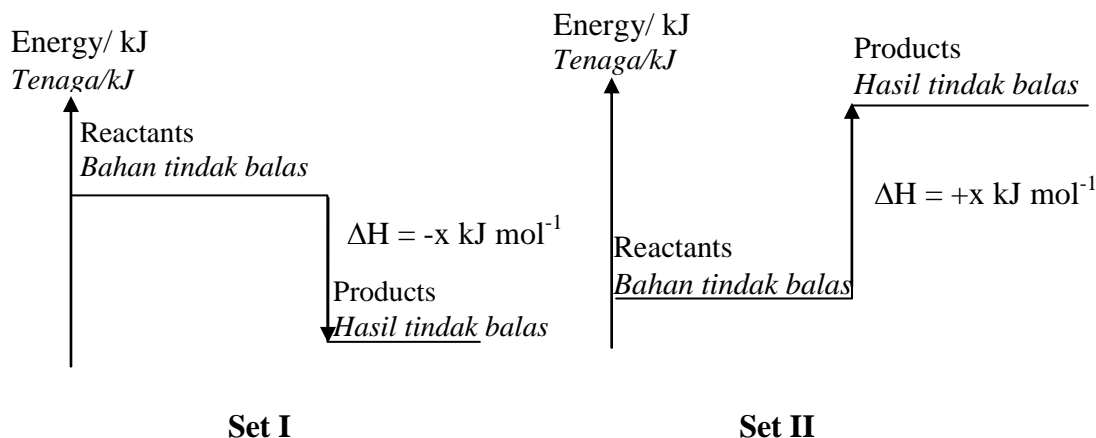


Diagram 7.1
Rajah 7.1

- (i) Based on Diagram 7.1, suggest one example for each reaction in Set I and Set II.
Berdasarkan Rajah 7.1, cadangkan satu contoh bagi setiap tindak balas dalam Set I dan Set II.
- [2 marks]
- (ii) Construct a table to compare the energy level diagram of Set I and Set II in terms of:
- Type of reaction
 - Temperature change
 - Energy content
 - Energy change.

Bina sebuah jadual untuk membandingkan gambar rajah aras tenaga Set I dan Set II dari segi:

- *Jenis tindak balas*
- *Perubahan suhu*
- *Kandungan tenaga*
- *Perubahan tenaga*

[8 marks]

- (c) Diagram 7.2 shows the structural formulae of propanol and butanol.
Rajah 7.2 menunjukkan formula struktur propanol dan butanol.

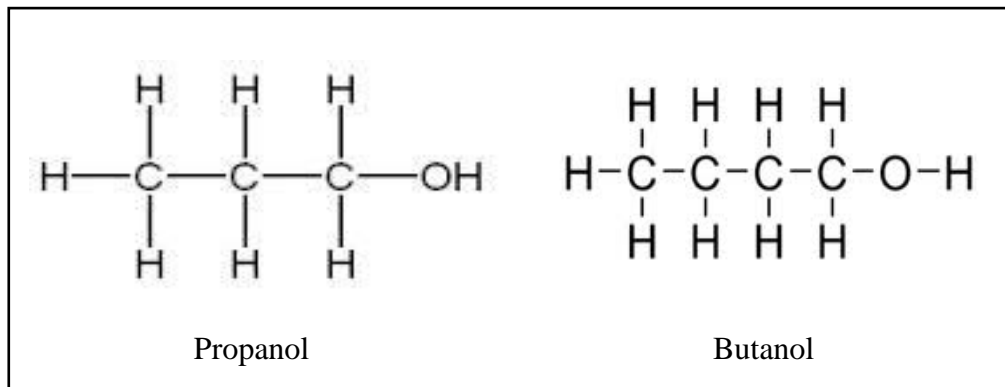


Diagram 7.2
Rajah 7.2

Based on Diagram 7.2, compare the heat of combustion of propanol and butanol.
Explain your answer.
*Berdasarkan Rajah 7.2, bandingkan haba pembakaran bagi propanol dan butanol.
Terangkan jawapan anda.*

[4 marks]

8. (a) Diagram 8.1 shows the electron arrangement of atom A and atom B.
Rajah 8.1 menunjukkan susunan elektron bagi atom A dan atom B.

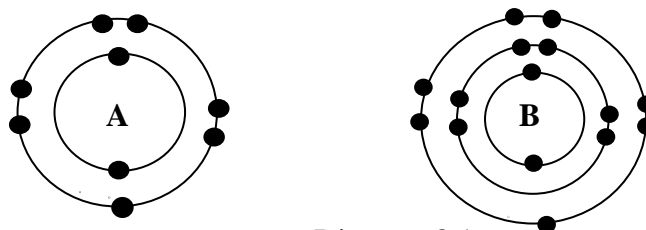


Diagram 8.1
Rajah 8.1

- (i) State the position of element A in the Periodic Table of Elements.
 Give reason for your answer.
Nyatakan kedudukan unsur A di dalam Jadual Berkala Unsur. Berikan alasan bagi jawapan anda. [4 marks]
- (ii) Element B reacts vigorously with iron wool.
 Write the chemical equation to show the reaction occurred.
Unsur B bertindak balas cergas dengan wul besi. Tuliskan persamaan kimia untuk menunjukkan tindak balas yang berlaku. [2 marks]
- (iii) Compare the reactivity of element A and element B. Explain your answer.
Bandingkan kereaktifan unsur A dengan unsur B. Terangkan jawapan anda. [4 marks]
- (b) Diagram 8.2 shows the structural formula of ammonia.
Rajah 8.2 menunjukkan formula struktur bagi ammonia.

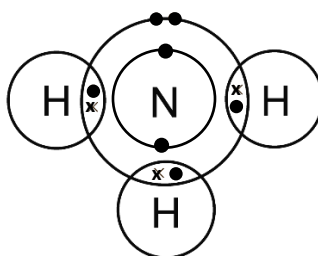


Diagram 8.2
Rajah 8.2

- (i) Describe the formation of the chemical bond between hydrogen and nitrogen atoms in the ammonia molecule.
Huraikan pembentukan ikatan kimia di antara atom-atom hidrogen dan nitrogen dalam molekul ammonia. [6 marks]
- (ii) Ammonia exists as a gas at room temperature. Explain why?
Ammonia wujud sebagai gas pada suhu bilik. Terangkan mengapa. [4 marks]

Section C
Bahagian C

[20 marks/20 markah]

<http://cikguadura.wordpress.com/>

Answer any one question.

Jawab mana-mana satu soalan.

9. (a) Electrolysis can be used to purify an impure copper.
State the name of the cathode and a suitable electrolyte for this purpose.
Write the half equations to represent the reactions occurred at the anode and cathode.

Elektrolisis boleh digunakan untuk menuliskan kuprum tak tulen.

Nyatakan nama bagi katod dan elektrolit yang sesuai bagi tujuan ini.

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

[4 marks]

- (b) Diagram 9 shows the apparatus set-up to investigate the voltage produced by two chemical cells.

Rajah 9 menunjukkan susunan radas untuk mengkaji voltan yang dihasilkan oleh dua sel kimia.

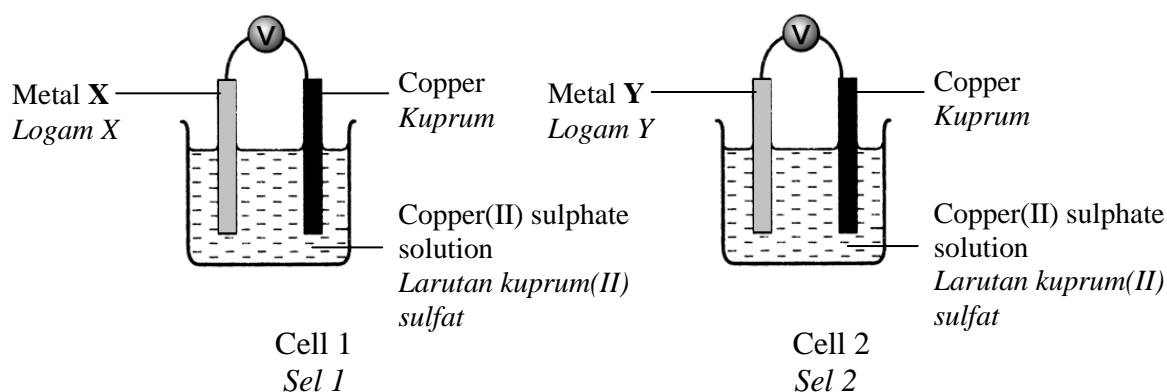


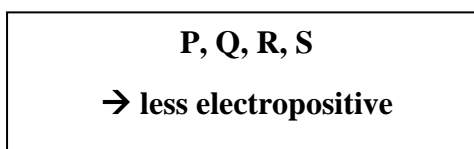
Table 9 shows the result of this experiment.

Jadual 9 menunjukkan keputusan eksperiment ini.

| Pair of metal <i>Pasangan logam</i> | Voltage (V) <i>Voltan (V)</i> | Negative terminal <i>Terminal negatif</i> |
|--|----------------------------------|--|
| Cu, X | 1.5 | X |
| Cu, Y | 0.7 | Cu |

Table 9
Jadual 9

- (i) Based on Table 9, suggest the identity of metals X and Y.
Explain your answer.
*Berdasarkan Jadual 9, cadangkan identiti logam X dan Y.
Terangkan jawapan anda.*
- [4 marks]
- (ii) If metals X and Y are used in a voltaic cell, predict the voltage and the negative terminal of the cell.
Jika logam X dan logam Y digunakan dalam satu sel kimia, ramalkan voltan dan terminal negatif bagi sel itu.
- [2 marks]
- (c) The arrangement of four metals in descending order of their electropositivity is shown below.
Susunan bagi empat logam dalam tertib keelektropositifan menurun ditunjukkan di bawah.



You are provided with strips of metals P, Q, R and S and nitrate solution of P, Q, R and S. Describe an experiment to prove that the arrangement of these metals.
Your answer should consist of the following:

- Procedure of the experiment
- Results
- Explanation to determine the order of the metals.

Anda dibekalkan dengan kepingan logam-logam P, Q, R dan S serta larutan nitrat P, Q, R and S. Huraikan satu eksperimen untuk membuktikan bahawa susunan logam-logam tersebut.

Jawapan anda mesti mengandungi yang berikut:

- *Prosedur eksperimen*
- *Keputusan*
- *Huraian untuk menentukan tertib susunan logam-logam itu.*

[10 marks]

10. Diagram 10 shows the conversion of an organic compound from one homologous series to another.

Rajah 10 menunjukkan penukaran sebatian organik daripada satu siri homolog kepada yang lain.

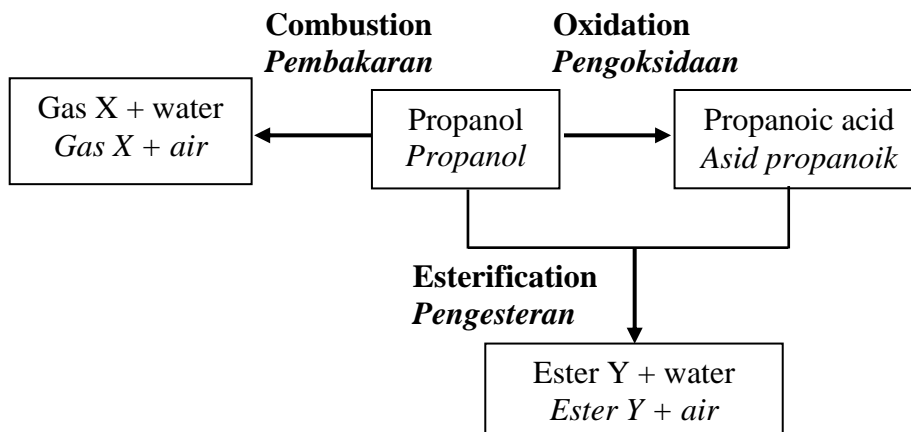


Diagram 10
Rajah 10

- (a) Propanol burns completely in excess oxygen gas to produce gas X and water.
- Write a balance chemical equation to show the reaction.
 - Calculate the volume of gas X produced if 0.3 mol of oxygen gas is used in this reaction.

[Molar volume at room conditions = $24.0 \text{ dm}^3 \text{ mol}^{-1}$]

Propanol terbakar dengan lengkap dalam oksigen berlebihan menghasilkan gas X dan air.

- *Tuliskan persamaan kimia seimbang bagi tindak balas tersebut.*
- *Hitungkan isi padu gas X yang terhasil jika 0.3 mol oksigen gas digunakan dalam tindak balas ini.*

[Isipadu molar pada keadaan bilik = $24.0 \text{ dm}^3 \text{ mol}^{-1}$.]

[4 marks]

- (b) Propanol reacts with propanoic acid to produce ester Y.
Draw the structural formula and name of the ester Y formed.
Compare propanol and ester Y in terms of:

- Functional group
- Solubility in water.

Propanol bertindak balas dengan asid propanoik untuk menghasilkan ester Y. Lukiskan formula struktur dan namakan ester yang terbentuk.

Bandingkan propanol dan ester Y dari segi:

- *Kumpulan berfungsi*
- *Keterlarutan dalam air.*

[6 marks]

- (c) Diagram 10 shows two reagent bottles P and Q. One of the bottles contains hexane while another contains hexene.

Rajah 10 menunjukkan dua botol reagen P dan Q. Satu daripada botol tersebut mengandungi heksana dan satu lagi mengandungi heksena.

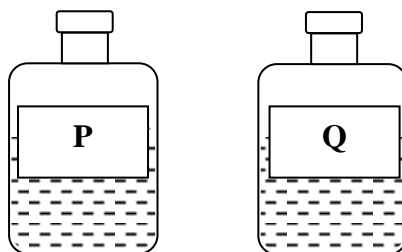


Diagram 10

Rajah 10

Describe a chemical test to verify hexane and hexene in the bottles.

Your explanation should include:

- List of apparatus and materials
- Procedure
- Observation

Huraikan satu ujian kimia untuk mengenal pasti heksana dan heksena dalam botol itu.

Penerangan anda hendaklah mengandungi:

- *Senarai bahan dan radas*
- *Prosedur*
- *Pemerhatian*

[10 marks]

END OF QUESTION PAPER

PERIODIC TABLE OF THE ELEMENTS

| 1 H Hydrogen 1 | | Proton number | | | | | | | | | | 2 He Helium 4 | | | | | |
|------------------------------|--------------------------------------|------------------------------|--|--|---------------------------------------|-----------------------------------|----------------------------------|----------------------------------|--------------------------------|-----------------------------|--------------------------------------|------------------------------|--------------------------------|--------------------------------------|------------------------------|--------------------------------|---------------------------|
| 10 Ne Neon 20 | | Symbol | | | | | | | | | | 9 F Flourine 19 | | | | | |
| 11 B Boron 11 | | Name of element | | | | | | | | | | 8 O Oxygen 16 | | | | | |
| 12 C Carbon 12 | | Relative atomic mass | | | | | | | | | | 7 N Nitrogen 14 | | | | | |
| 13 Al Aluminium 27 | | Relative atomic mass | | | | | | | | | | 6 C Carbon 12 | | | | | |
| 14 Si Silicon 28 | | Relative atomic mass | | | | | | | | | | 5 B Boron 11 | | | | | |
| 15 P Phosphorus 31 | | Relative atomic mass | | | | | | | | | | 4 Be Beryllium 9 | | | | | |
| 16 S Sulfur 32 | | Relative atomic mass | | | | | | | | | | 3 Li Lithium 7 | | | | | |
| 17 Cl Chlorine 35.5 | | Relative atomic mass | | | | | | | | | | 2 He Helium 4 | | | | | |
| 18 Ar Argon 40 | | Relative atomic mass | | | | | | | | | | 1 H Hydrogen 1 | | | | | |
| 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 86 | 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- quadrum 257 | 105 Unp Unnil- pentium 260 | 106 Unh Unnil- hexium 263 | 107 Uns Unnilseptium 262 | 108 Uno Unniloctium 265 | 109 Une Unnilennium 266 | 109 Ir Iridium 192 | 109 Au Gold 197 | 109 Hg Mercury 201 | 109 Tl Thallium 204 | 109 Pb Lead 207 | 109 Bi Bismuth 209 | 109 Po Polonium 210 | 109 At Astatine 210 | 109 Rn Radon 222 |
| 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 | 101 Md Mendele- vium 256 | 102 No Nobelium 254 | 103 Lr Lawrensium 257 | 109 Rn Radon 222 |
| 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 Lawrensium 257 | 254 Md Mendele- vium 256 | 254 No Nobelium 254 | 254 Lr Lawrensium 257 | 222 Rn Radon 222 |

Nama : Tingkatan :



KEMENTERIAN
PENDIDIKAN
MALAYSIA

<http://cikguadura.wordpress.com/>

BAHAGIAN PENGURUSAN SEKOLAH BERASRAMA PENUH
DAN SEKOLAH KECEMERLANGAN

PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2014
PERCUBAAN SIJIL PELAJARAN MALAYSIA

CHEMISTRY

Kertas 3

Satu jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan nama dan tingkatan pada ruang yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*

| <i>Untuk Kegunaan Pemeriksa</i> | | |
|---------------------------------|---------------------|-------------------------|
| Soalan | Markah Penuh | Markah Diperoleh |
| 1 | 33 | |
| 2 | 17 | |
| JUMLAH | 50 | |

Kertas soalan ini mengandungi 11 halaman bercetak.

INFORMATION FOR CANDIDATES**MAKLUMAT UNTUK CALON**

<http://cikguadura.wordpress.com/>

1. This question paper consists of three questions. Answer **all** questions.
*Kertas soalan ini mengandungi tiga 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 lined pages at the end of the question paper in detail. You may use equations, diagrams, tables, graphs and any other suitable methods to explain your answer.
*Tuliskan jawapan bagi **Soalan 2** pada halaman bergaris di bahagian akhir kertas soalan ini dengan terperinci. 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 ceraihan soalan ditunjukkan dalam kurungan.
8. Time suggested for answering **Question 1** is 45 minutes and **Question 2** is 45 minutes.
*Masa yang dicadangkan untuk menjawab **Soalan 1** ialah 45 minit dan **Soalan 2** ialah 45 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 <u>or</u> 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 <u>atau</u> respons salah |

For
Examiner's
use

<http://cikguadura.wordpress.com/>

Answer **all** the questions.

Jawab semua soalan.

1. Diagram 1.1 shows the set-up of apparatus for Set I, Set II, Set III, Set IV and Set V to investigate the effect of concentration on the rate of reaction between sodium thiosulphate solution and sulphuric acid using the same size of the conical flask. 50 cm^3 of 0.24 mol dm^{-3} of sodium thiosulphate solution is poured into a conical flask and 5 cm^3 of 1.0 mol dm^{-3} of sulphuric acid is added immediately into the sodium thiosulphate solution. The conical flask is shaken and then placed on a paper with mark 'X' as shown in Diagram 1.1. The time taken for the mark 'X' to disappear from sight is recorded.

Rajah 1.1 menunjukkan susunan radas bagi Set I, Set II, Set III, Set IV dan Set V untuk mengkaji kesan kepekatan ke atas kadar tindak balas antara larutan natrium tiosulfat dan asid sulfurik menggunakan saiz kelalang kon yang sama. 50 cm^3 larutan natrium tiosulfat 0.24 mol dm^{-3} dimasukkan ke dalam sebuah kelalang kon dan 5 cm^3 asid sulfurik 1.0 mol dm^{-3} ditambah dengan cepat kepada larutan natrium tiosulfat itu. Kelalang kon itu digoncangkan dan kemudian diletakkan di atas kertas yang ditanda 'X' seperti yang ditunjukkan pada Rajah 1.1. Masa untuk tanda 'X' hilang dari pandangan dicatatkan.

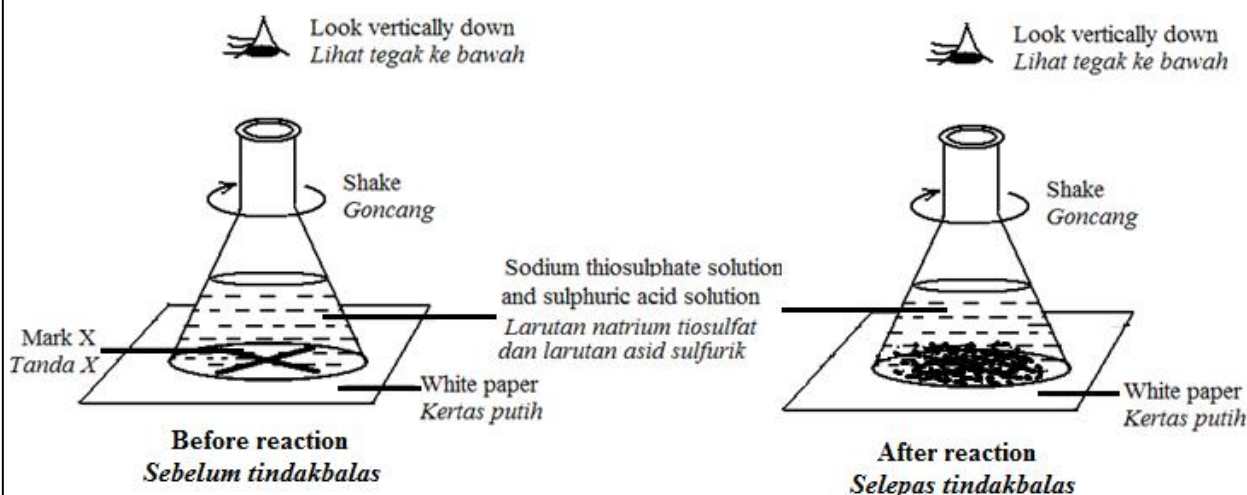


Diagram 1.1

Rajah 1.1

The experiment is repeated by using the same volume of sodium thiosulphate solution but with different concentration of sodium thiosulphate solution. Set II using 0.20 mol dm^{-3} , Set III using 0.16 mol dm^{-3} , Set IV using 0.12 mol dm^{-3} and Set V using 0.08 mol dm^{-3} .

Diagram 1.2 shows the readings of the stopwatch in each experiment.

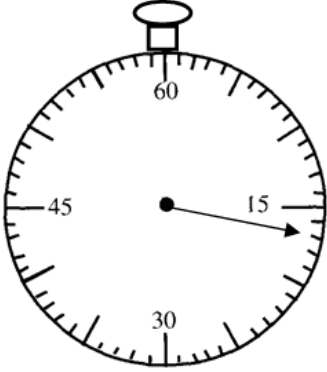
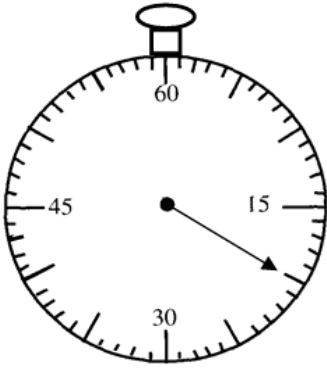
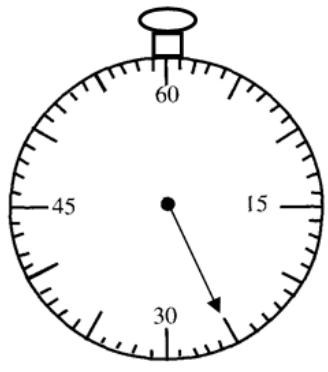
Eksperimen itu diulangi dengan menggunakan isi padu larutan natrium tiosulfat yang sama tetapi dengan kepekatan larutan natrium tiosulfat yang berbeza. Set II menggunakan 0.20 mol dm^{-3} , Set III menggunakan 0.16 mol dm^{-3} , Set IV menggunakan 0.12 mol dm^{-3} dan Set V menggunakan 0.08 mol dm^{-3} .

Rajah 1.2 menunjukkan bacaan jam randik bagi setiap eksperimen.

For
Examiner's
use

- (a) Record the stopwatch readings in the space provided in Diagram 1.2.
Catatkan bacaan jam randik pada ruang yang disediakan pada Rajah 1.2.

[3 marks]

| Set I <i>Set I</i> | Set II <i>Set II</i> | Set III <i>Set III</i> |
|---|---|---|
|  |  |  |
| | | |

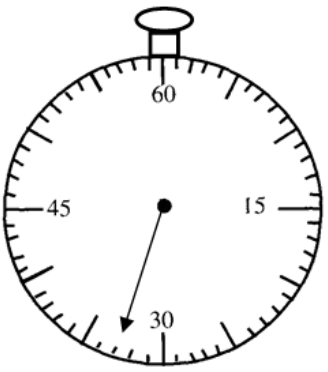
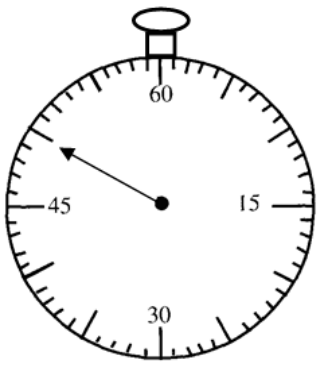
| Set IV <i>Set IV</i> | Set V <i>Set V</i> |
|---|--|
|  |  |
| | |

Diagram 1.2
Rajah 1.2

- (b) (i) Based on Diagram 1.1, state one observation in this experiment.
Berdasarkan Rajah 1.1, nyatakan satu pemerhatian dalam eksperimen ini.

1(b)

.....
.....

[3 marks]

For
Examiner's
use

1(b)(ii)

(ii) Based on your observation in 1(b)(i), state the inference
Berdasarkan pemerhatian anda dalam 1(b)(i), nyatakan inferens

.....
.....

[3 marks]

(c) Based on Diagram 1.2, complete Table 1.1
Berdasarkan kepada Rajah 1.2, lengkapkan Jadual 1.1

| Set | Concentration (mol dm ⁻³) | Time (s) | $\frac{1}{\text{Time}}$ (s ⁻¹) |
|-----|--|----------|--|
| I | 0.24 | | |
| II | 0.20 | | |
| III | 0.16 | | |
| IV | 0.12 | | |
| V | 0.08 | | |

Table 1.1
Jadual 1.1

1(c)

[3 marks]

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

(i) Manipulated variable :

.....
Pemboleh ubah dimanipulasikan :

(ii) Responding variable :
Pemboleh ubah bergerakbalas :

(iii) Constant variable :

.....
Pemboleh ubah dimalarkan :

[3 marks]

(e) State a hypothesis for this experiment.
Nyatakan hipotesis untuk eksperimen ini,

.....
.....
.....

1(e)

[3 marks]

1(f)



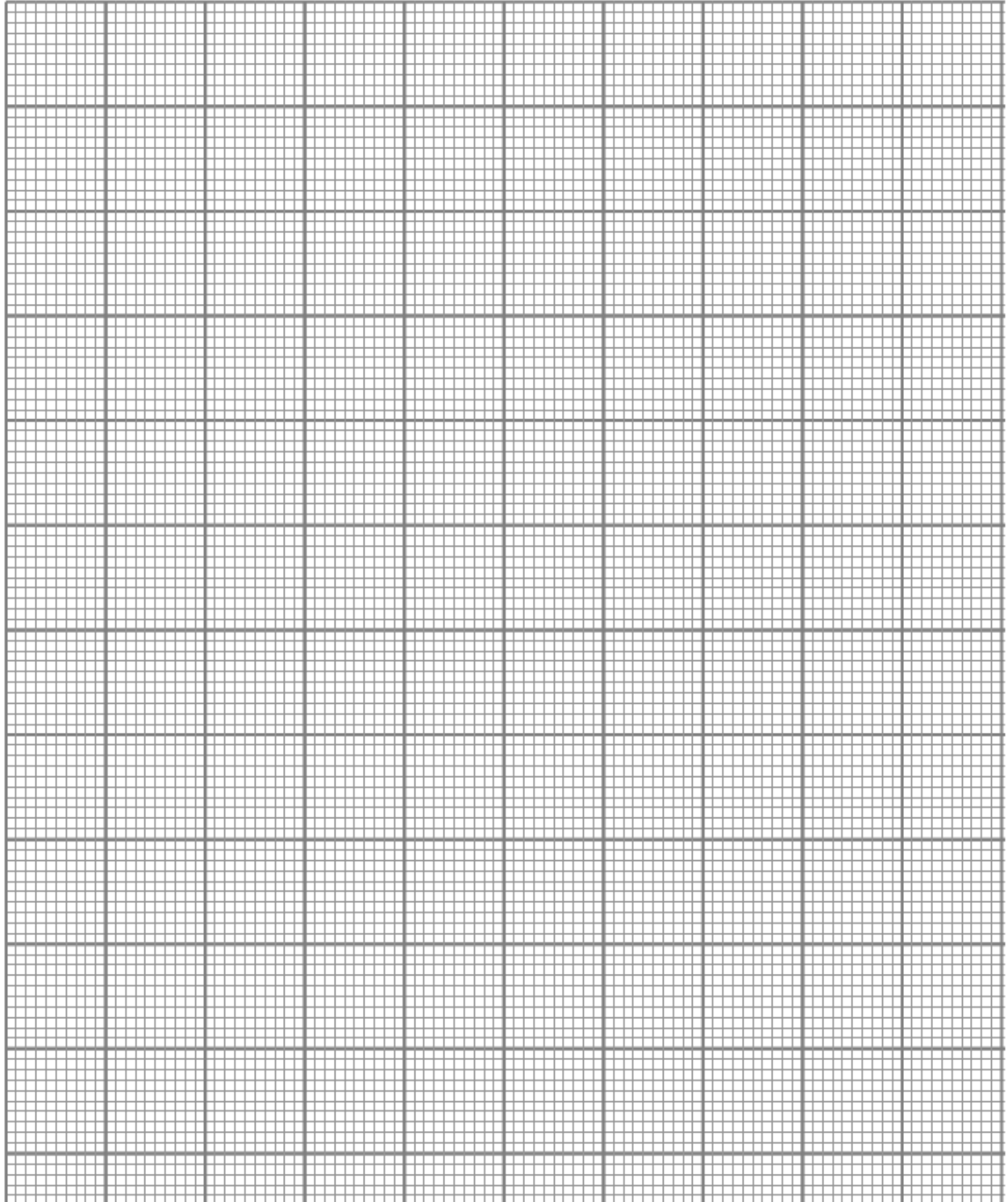
(f) Plot a graph of concentration of sodium thiosulphate solution against $\frac{1}{\text{time}}$ on the graph paper provided.

Lukiskan graf kepekatan natrium tiosulfat melawan $\frac{1}{\text{masa}}$ di atas kertas graf yang

disediakan.

marks]

[3



For
Examiner's
use

(g) Based on the graph,
Berdasarkan graf,

(i) State the relationship between the concentration of sodium thiosulphate solution and the rate of reaction.
Nyatakan hubungan antara kepekatan larutan natrium tiosulfat dengan kadar tindak balas.

.....
.....
.....

[3 marks]

(ii) Predict the time taken for the mark 'X' to disappear from sight if the experiment is carried out using 0.22 mol dm^{-3} of sodium thiosulphate solution. Show on the graph how you determine the time taken.
Ramalkan masa yang diambil bagi tanda 'X' hilang dari pandangan lagi jika eksperimen itu dilakukan dengan menggunakan larutan natrium tiosulfat 0.22 mol dm^{-3} . Tunjukkan pada graf itu bagaimana anda menentukan masa yang diambil.

1(g)(i)

1(g)(ii)

[3 marks]

(h) State the operational definition for the rate of reaction based on this experiment.
Nyatakan definisi secara operasi bagi kadar tindak balas berdasarkan eksperimen ini.

.....
.....
.....

[3 marks]

1(h)

(i) Classify the following reaction into fast reaction and slow reaction.

Kelaskan tindak balas berikut kepada tindak balas cepat dan tindak balas perlahan.

Rusting
Pengaratan

Fermentation
Penapaian

Neutralization
Peneutralan

Combustion
Pembakaran

Corrosion
Kakisan

Displacement
Penyesaran

1(i)

[3 marks]

Total

- 2 Diagram 2 shows how the name of ester is derived from the name of the alcohol and carboxylic acid that reacted to produce the ester.

Rajah 2 menunjukkan bagaimana nama ester diperolehi daripada nama alkohol dan asid karboksilik yang bertindak balas untuk menghasilkan ester itu.

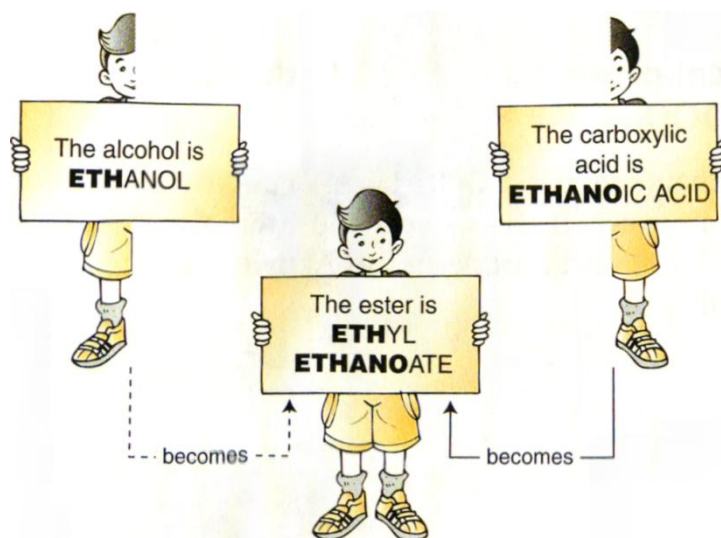


Diagram 2
Rajah 2

The different sweet and fruity odours of esters make them useful as flavourings in the food industries. Table 2 shows the different odours produced from the different esters. *Bau manis buah-buahan ester membuatnya berguna sebagai perisa dalam industri makanan. Jadual 2 menunjukkan bau yang berbeza daripada ester yang berlainan.*

| Name of ester <i>Nama ester</i> | Odour <i>Bau</i> |
|--|-----------------------|
| Butyl methanoate <i>Butil metanoat</i> | Cherry <i>Ceri</i> |
| Butyl ethanoate <i>Butil etanoat</i> | Apple <i>Epal</i> |
| Butyl propanoate <i>Butil propanoat</i> | Pear <i>Pir</i> |

Table 2
Jadual 2

Referring to Table 2, plan a laboratory experiment to prepare esters with different odours from different carboxylic acids

Merujuk kepada Jadual 2, rancang satu eksperimen makmal untuk menyediakan ester dengan bau yang berbeza dengan menggunakan asid karboksilik yang berbeza.

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

- (a) Problem statement
Pernyataan masalah
- (b) All the variables
Semua pembolehubah
- (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

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END OF QUESTION PAPER
KERTAS SOALAN TAMAT



**KEMENTERIAN
PENDIDIKAN
MALAYSIA**

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**PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2014
SIJIL PELAJARAN MALAYSIA**

PERATURAN PEMARKAHAN

CHEMISTRY

4541

PENTAKSIRAN DIAGNOSTIK AKADEMIK SBP 2014**SKEMA KERTAS 1****CHEMISTRY 4541/1**

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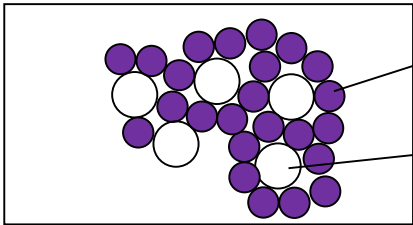
| | | | |
|----|---|----|---|
| 1 | C | 26 | C |
| 2 | C | 27 | C |
| 3 | C | 28 | B |
| 4 | D | 29 | D |
| 5 | D | 30 | D |
| 6 | C | 31 | A |
| 7 | D | 32 | A |
| 8 | A | 33 | B |
| 9 | D | 34 | B |
| 10 | C | 35 | D |
| 11 | D | 36 | D |
| 12 | D | 37 | A |
| 13 | A | 38 | D |
| 14 | A | 39 | B |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

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SECTION A

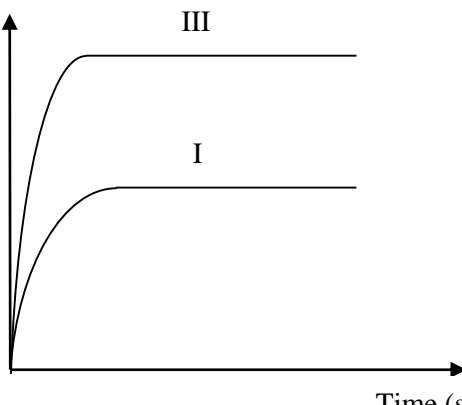
| Question | | Mark scheme | Sub Mark | Total Mark |
|--------------|-----|---|-------------|------------|
| 1 | (a) | Electron | 1 | 1 |
| | (b) | 2.8 | 1 | 1 |
| | (c) | (i) <ul style="list-style-type: none"> • The atomic size of potassium is bigger • The attraction force between nucleus/proton and electron is weaker • Easier to donate valence electron | 1 1 1 | 3 |
| | | (ii) <ul style="list-style-type: none"> • Potassium moves very fast/ rapidly on the surface of water • Burns with reddish purple/ lilac flame • Produce hiss/pop sound <i>Any two</i> | 1 1 1 | 2 |
| | (d) | (i) Atoms of the same element which have the same number of proton (proton number) but different number of neutrons (nucleon number) | 1 | 1 |
| | | (ii) To detect the leakage of underground pipes | 1 | 1 |
| TOTAL | | | | 9 |

| Question | | Mark scheme | Sub Mark | Total Mark |
|--------------|-----|---|---------------------|------------|
| 2 | (a) | (i) $n = 12$ $A = \text{Carbon-12} / \text{C-12}$ | 1 1 | 2 |
| | | (ii) $0.5 \times 6.02 \times 10^{23} \times 5$ $= 1.505 \times 10^{24}$ | 1 1 | 2 |
| | (b) | (i) To allow oxygen to enter the crucible | 1 | 1 |
| | | (ii) Lead is less reactive metal towards oxygen// lead react slowly with oxygen | 1 | 1 |
| | (c) | (i) Number of mol $\text{CuCO}_3 = \frac{6.2}{64 + 12 + 16(3)} = \frac{6.2}{124} = 0.05$ 1 mol CuCO_3 : 1 mol CO_2 0.05 mol CuCO_3 : 0.05 mol CO_2 Volume of CO_2 gas = $0.05 \times 24 / 1.2 \text{ dm}^3$ | 1 1 1 | 3 |
| TOTAL | | | | 9 |

| Question | | | Mark scheme | Sub Mark | Total Mark |
|----------|---|-----|--|----------|------------|
| 3 | a | i | Bronze | 1 | 1 |
| | | ii |  <ul style="list-style-type: none"> • <i>Correct label</i> • <i>Size of atoms Cu smaller than atom Sn</i> | 1 1 | 2 |
| | | iii | To increase the hardness/strength of pure metal | 1 | 1 |
| | | iv | Light Withstand high pressure/ strong | 1 1 | 2 |
| 3 | b | i | Saponification <i>r: wrong spelling</i> | 1 | 1 |
| | | ii | Palm/ olive/ sunflower oil concentrated sodium /potassium hydroxide solution. | 1 1 | 2 |
| | | iii | To reduce the solubility of soap in water// To precipitate out soap | 1 | 1 |
| | | | Total | | 10 |

| Question | | | Mark scheme | Sub Mark | Total Mark |
|----------|----|------|---|----------|------------|
| 4 | a) | i) | Oxidation number of iron = +3 | 1 | 1 |
| | | ii) | Carbon | 1 | 1 |
| | | iii) | Reducing agent | 1 | 1 |
| | | iv) | $2\text{Fe}_2\text{O}_3 + 3\text{C} \longrightarrow 4\text{Fe} + 3\text{CO}_2 //$ $\text{Fe}_2\text{O}_3 + 3\text{CO} \longrightarrow 2\text{Fe} + 3\text{CO}_2$ 1 - correct formula for reactant and product 2 - balanced chemical equation | 1 + 1 | 2 |
| | b) | i) | Brown colour | 1 | 1 |
| | | ii) | Bromine | 1 | 1 |
| | | iii) | 0 to -1 | 1 | 1 |
| | | iv) | Reduction | 1 | 1 |
| | | v) | Acidified potassium manganate(VII) solution // Acidified potassium dichromate (VI) solution | 1 | 1 |
| | | | Total | | 10 |

| Question | | | Explanation | Mark | Σ Mark |
|--------------|----|------|---|-------------|------------------|
| 5 | a) | i) | Molecule | 1 | 1 |
| | | ii) | Test tube P Hydrogen ion is not present/ ethanoic acid exists as molecule R : water is not present | 1 1 | 2 |
| | b) | | X = 0.005 <ul style="list-style-type: none"> • Sulphuric acid is a diprotic acid while hydrochloric acid is a monoprotic acid • Double concentration of hydrogen ion | 1 1 1 | 3 |
| | c) | i) | Hydrogen chloride <i>Reject: Hydrochloric acid</i> | 1 | 1 |
| | | ii) | Acidic | 1 | 1 |
| | | iii) | Procedure: Add distilled water Add silver nitrate solution Observation: A white precipitate formed | 1 1 1 | 3 |
| Total | | | | | 11 |

| Question | | Mark scheme | Sub Mark | Total Mark |
|----------|-----|---|----------------------|------------|
| 6 | (a) | $\text{Zn} + 2\text{H}^+ \rightarrow \text{Zn}^{2+} + \text{H}_2$ | 1+1 | 2 |
| | (b) | Temperature and concentration | 1+1 | 2 |
| | (c) | 1. The rate of reaction in Experiment II is higher than Experiment I 2. The temperature in experiment II is higher 3. The kinetic energy of hydrogen ions is higher 4. The frequency of collision between zinc atoms and hydrogen ions is higher// The frequency of effective collision between zinc atoms and hydrogen ions is higher | 1 1 1 1 | 4 |
| | (d) | <p>Volume of gas (cm³)</p>  <p>Time (s)</p> <ul style="list-style-type: none"> • Correct curve which shows the volume is double | 1 | 1 |
| | (e) | 1. Cut the meat into smaller size 2. Larger total surface area of meat will absorb more heat OR 1. Cook in pressure cooker 2. High pressure in pressure cooker increase the temperature | 1 1 1 1 | 2 |
| TOTAL | | | | 11 |

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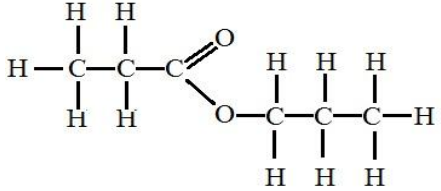
Section B (20 marks)

| Question | | Rubric | Marks | Total Mark | | | | | | | | | | | | | | | |
|---------------------------|--|---|------------------|------------|--------|-------------------------|--|--|---------------------------|---------------------------------------|---------------------------------------|-----------------------|--|---|----------------------|---------------------------------|---------------------------------|--------------------------|----------|
| 7(a) | (i) | 1. Heat change = $mc\theta$ $= 100 \times 4.2 \times 6.5 // 2730 \text{ Joule} // 2.73 \text{ kJ}$ 2. Number of mol of water = $\frac{1 \times 50}{1000} = 0.05 \text{ mol}$ $= \frac{2730}{0.05} // \frac{2.73}{0.05}$ 3. Heat of neutralisation = $-54600 \text{ Jmol}^{-1} // -54.6 \text{ kJmol}^{-1}$ | 1 1 1 1 | 4 | | | | | | | | | | | | | | | |
| | (ii) | 1. 6.5°C // same. 2. Potassium hydroxide and sodium hydroxide are strong alkali// Both alkali are ionize completely in water// Number of moles of hydroxide ion in both alkali is the same | 1 1 | 2 | | | | | | | | | | | | | | | |
| 7(b) | (i) | Example of reaction: Set 1: Neutralization between acid and alkali// combustion ethanol/ alkane/ alkene// precipitation of silver chloride/ lead(II) chloride // any suitable reaction. Set 2: Decomposition of carbonate/ nitrate salts // dissolving ammonium salts in water// any suitable reaction | 1 1 | 2 | | | | | | | | | | | | | | | |
| | (ii) | <table border="1"> <thead> <tr> <th></th> <th>Set I</th> <th>Set II</th> </tr> </thead> <tbody> <tr> <td>Type of reaction</td> <td>Exothermic reaction// heat is released to surrounding.</td> <td>Endothermic reaction // Heat is absorbed from surrounding.</td> </tr> <tr> <td>Temperature change</td> <td>Temperature of the mixture increases.</td> <td>Temperature of the mixture decreases.</td> </tr> <tr> <td>Energy content</td> <td>The total energy content of reactants is higher than products.</td> <td>The total energy content of reactants is lower than products.</td> </tr> <tr> <td>Energy change</td> <td>Chemical energy to heat energy.</td> <td>Heat energy to chemical energy.</td> </tr> </tbody> </table> | | Set I | Set II | Type of reaction | Exothermic reaction// heat is released to surrounding. | Endothermic reaction // Heat is absorbed from surrounding. | Temperature change | Temperature of the mixture increases. | Temperature of the mixture decreases. | Energy content | The total energy content of reactants is higher than products. | The total energy content of reactants is lower than products. | Energy change | Chemical energy to heat energy. | Heat energy to chemical energy. | 1+1 1+1 1+1 1+1 | 8 |
| | Set I | Set II | | | | | | | | | | | | | | | | | |
| Type of reaction | Exothermic reaction// heat is released to surrounding. | Endothermic reaction // Heat is absorbed from surrounding. | | | | | | | | | | | | | | | | | |
| Temperature change | Temperature of the mixture increases. | Temperature of the mixture decreases. | | | | | | | | | | | | | | | | | |
| Energy content | The total energy content of reactants is higher than products. | The total energy content of reactants is lower than products. | | | | | | | | | | | | | | | | | |
| Energy change | Chemical energy to heat energy. | Heat energy to chemical energy. | | | | | | | | | | | | | | | | | |
| 7(c) | | 1. Heat of combustion of butanol is higher than propanol. 2. The number of carbon atom per molecule of butanol is higher/ greater than propanol. 3. The number of carbon dioxide and water molecules formed is higher/ greater. 4. More heat energy is released. | 1 1 1 1 | 4 | | | | | | | | | | | | | | | |
| Total | | | 20 | | | | | | | | | | | | | | | | |

| Question | | Rubric | Marks | Total marks |
|---|-------|--|--|------------------|
| 8(a) | (i) | Group 17 | 1 | 4 |
| | | Atom has 7 valence electrons | 1 | |
| | | Period 2 | 1 | |
| Atom has 2 shells filled with electrons | 1 | | | |
| | (ii) | $2\text{Fe} + 3\text{B}_2 \rightarrow 2\text{FeB}_3 // 2\text{Fe} + 3\text{Cl}_2 \rightarrow 2\text{FeCl}_3$ <i>Correct formula of reactants and product</i> <i>Balanced equation</i> | 1 1 | 2 |
| | (iii) | 1. Element A more reactive than element B 2. Atomic size A is smaller than B 3. The nucleus force of attraction toward electrons become stronger// The attraction forces between proton and electrons become stronger 4. Easier to receive electrons | 1 1 1 1 | 4 |
| 8(b) | (i) | 1. Hydrogen atom has an electron arrangement of 1. 2. Nitrogen atom has an electron arrangement of 2.5. 3. Hydrogen and nitrogen atoms share electrons to achieve stable duplet/ octet electron arrangement. 4. One hydrogen atom contributes one electron for sharing, 5. One nitrogen atom contributes three electrons for sharing. 6. One nitrogen atom share electrons with three hydrogen atoms. [Sample of answer: <i>One nitrogen atom contributes three valence electrons ③, while three hydrogen atoms, each contributes one valence electron ④ to be shared ⑤ to achieve stable electron arrangement ⑥]</i> | 1 1 1 1 1 1 | 6 |
| | | (ii) | 1. Boiling point of ammonia is lower than the room temperature// ammonia has low boiling point. 2. Ammonia exists as molecule// covalent compound. 3. Weak intermolecular/ Van der Waals forces between molecules. 4. Little/ less heat energy needed to overcome the force. | 1 1 1 1 |
| Total | | | | 20 |

Section C (20 marks)

| Question | Rubric | Marks | Total marks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------------|--|----------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--|--|--|--|---|--|---|---|---|---|---|--|---|---|---|---|---|--|---|---|---|---|---|--|--|-----------|
| 9(a) | Cathode : Pure copper Electrolyte : Copper(II) sulphate/ nitrate/ chloride solution half equation at anode: $\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^-$ half equation at cathode: $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$ | 1 1 1 1 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9(b) | (i) <p>X: Aluminium/ magnesium/ zinc / iron / tin/ lead <i>[Reject : sodium /potassium]</i> Reason: X is more electropositive than copper// X is located higher than copper in Electrochemical Series. Y: Silver/ aurum (gold) Reason: Y is less electropositive than copper// Y is located lower than copper in Electrochemical Series.</p> | 1 1 1 1 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | (ii) <p>Voltage of the cell is 2.2 V Negative terminal is X.</p> | 1 1 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9(c) | <p>Procedure:</p> <ol style="list-style-type: none"> 1. Metal strips are cleaned with sandpaper. 2. [2 - 5] cm³ of each nitrate solution are poured into four separate test tubes. 3. A strip of metal P is placed into each of the solutions. 4. Observations on the deposition of metals are recorded. 5. Steps 1 to 4 are repeated using strip metals Q, R and S to replace strip metal P. <p>Result:</p> <table border="1"> <thead> <tr> <th>Salt solution \ Nitrate solution</th> <th>Nitrate solution P</th> <th>Nitrate solution Q</th> <th>Nitrate solution R</th> <th>Nitrate solution S</th> </tr> </thead> <tbody> <tr> <td>Metal strip</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>P</td> <td style="background-color: #cccccc;"></td> <td>√</td> <td>√</td> <td>√</td> </tr> <tr> <td>Q</td> <td>X</td> <td style="background-color: #cccccc;"></td> <td>√</td> <td>√</td> </tr> <tr> <td>R</td> <td>X</td> <td>X</td> <td style="background-color: #cccccc;"></td> <td>√</td> </tr> <tr> <td>S</td> <td>X</td> <td>X</td> <td>X</td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table> <p>√: Deposition of metal occurs X: No deposition of metal occurs</p> <p>Explanation:</p> <ol style="list-style-type: none"> 6. Metal P can displace metals Q, R and S from their salt solutions. Thus, P is placed at the highest position in the electrochemical series. 7. Metal Q can only displace metals R and S from their salt solutions. Thus, metal Q is placed higher than metals R and S but lower than metal P in the electrochemical series. 8. Metal R can only displace metal S from its salt solution. Thus, metal R is placed higher than metal S but lower than metals P and Q in the electrochemical series. 9. Metal S cannot displace any metals from their salt solutions because it is placed at the lowest position in the electrochemical series. | Salt solution \ Nitrate solution | Nitrate solution P | Nitrate solution Q | Nitrate solution R | Nitrate solution S | Metal strip | | | | | P | | √ | √ | √ | Q | X | | √ | √ | R | X | X | | √ | S | X | X | X | | 1 1 1 1 1 1 1 1 1 1 | 10 |
| Salt solution \ Nitrate solution | Nitrate solution P | Nitrate solution Q | Nitrate solution R | Nitrate solution S | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Metal strip | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| P | | √ | √ | √ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Q | X | | √ | √ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R | X | X | | √ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Total | | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Question | Rubric | Marks | Total marks | | | | | | | | | |
|---------------------|--|--------------------------|-------------|--------------------|--|--------------------|-------------------|--|------------------|--------------------|----------------------------------|---|
| 10(a) | Chemical equation: $C_3H_7OH + \frac{9}{2} O_2 \rightarrow 3CO_2 + 4H_2O$ // Chemical equation: $2C_3H_7OH + 9O_2 \rightarrow 6CO_2 + 8H_2O$ <i>Correct formula of reactants and product</i> <i>Balanced equation</i> Volume of gas X 1. Based on equation; $\frac{9}{2}$ mol O_2 : 3 mol CO_2 0.3 mol O_2 : 0.2 mol CO_2 2. Volume of $CO_2 = 0.2 \times 24 = 4.8dm^3 // 4800cm^3$ | 1 1 1 1 | 4 | | | | | | | | | |
| 10(b) | Structural formula of ester C  Name: propyl propanoate <table border="1" data-bbox="395 1048 1246 1227"> <tr> <td></td> <td>Propanol</td> <td>Ester C</td> </tr> <tr> <td>Functional Group</td> <td>Hydroxyl / -OH</td> <td>Carboxylate/ -COO</td> </tr> <tr> <td>Solubility in water</td> <td>Soluble in water</td> <td>Insoluble in water</td> </tr> </table> | | Propanol | Ester C | Functional Group | Hydroxyl / -OH | Carboxylate/ -COO | Solubility in water | Soluble in water | Insoluble in water | 1 1 1+1 1+1 | 6 |
| | Propanol | Ester C | | | | | | | | | | |
| Functional Group | Hydroxyl / -OH | Carboxylate/ -COO | | | | | | | | | | |
| Solubility in water | Soluble in water | Insoluble in water | | | | | | | | | | |
| 10(c) | Apparatus: test tubes, dropper. Materials: bromine water // acidified potassium manganate (VII) solution, hexane, hexane. Procedure: 1. [2 – 5] cm ³ of liquid in bottle P is poured into a test tube. 2. 2 cm ³ / A few drop of bromine water// acidified potassium manganate(VII) solution is added to the test tube. 3. The mixture is shaken. 4. Any changes is observed and recorded. 5. Steps 1 to 4 are repeated by using the liquid in bottle Q to replace the liquid in bottle P. Observation: <table border="1" data-bbox="395 1637 1241 1832"> <thead> <tr> <th>Set</th> <th>Observation</th> </tr> </thead> <tbody> <tr> <td>Liquid in bottle P</td> <td>Brown bromine water decolourised // purple acidified potassium manganate(VII) solution decolourised.</td> </tr> <tr> <td>Liquid in bottle Q</td> <td>No change.</td> </tr> </tbody> </table> Liquid in bottle P is hexene. Liquid in bottle Q is hexane. [a: P is hexene, Q is hexane] | Set | Observation | Liquid in bottle P | Brown bromine water decolourised // purple acidified potassium manganate(VII) solution decolourised. | Liquid in bottle Q | No change. | 1 1 1 1 1 1 1 1 1 1 | | | | |
| Set | Observation | | | | | | | | | | | |
| Liquid in bottle P | Brown bromine water decolourised // purple acidified potassium manganate(VII) solution decolourised. | | | | | | | | | | | |
| Liquid in bottle Q | No change. | | | | | | | | | | | |
| | Total | 20 | | | | | | | | | | |

Kertas 3

<http://cikguadura.wordpress.com/>

| Question | Rubric | Score |
|----------|---|-------|
| 1 (a) | <i>Able to record all readings accurately to one decimal point with unit</i> <i>Answer :</i> Set I (0.24 mol dm ⁻³) 17.0 s Set II (0.20 mol dm ⁻³) 20.0 s Set III (0.16 mol dm ⁻³) 25.0 s Set IV (0.12 mol dm ⁻³) 33.0 s Set V (0.08 mol dm ⁻³) 50.0 s | 3 |
| | <i>Able to record any 4 readings accurately / all readings correctly but without decimal point/without unit</i> | 2 |
| | <i>Able to record any 3 readings correctly but without decimal point/without unit</i> | 1 |
| | <i>No response given or wrong response or less than 3 correct readings</i> | 0 |

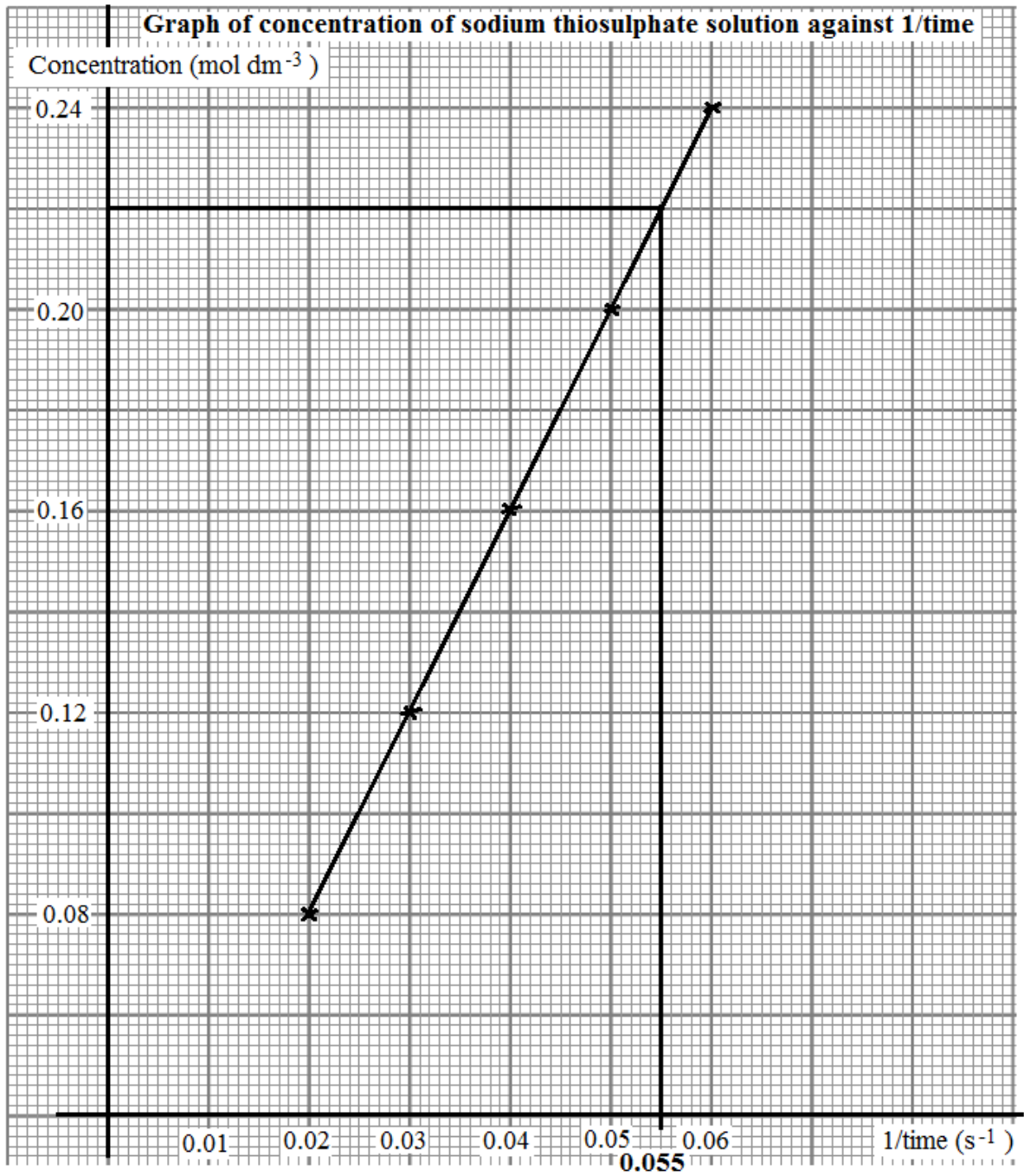
| Question | Rubric | Score |
|-----------|--|-------|
| 1 (b) (i) | <i>Able to state the observation correctly</i> <u>Suggested answer:</u> Mark X disappears from sight// Precipitate/solid is formed // Solid covers X | 3 |
| | <i>Able to state the observation less correctly</i> <u>Suggested answer:</u> Mark X disappears | 2 |
| | <i>Able to state idea of observation</i> <u>Suggested answer:</u> Precipitate// Solid// Reaction occurs | 1 |
| | <i>No response given / wrong response</i> | 0 |

| Question | Rubric | Score |
|------------|--|-------|
| 1 (b) (ii) | <i>Able to state the inference correctly</i> <u>Suggested answer:</u> Sulphur is formed | 3 |
| | <i>Able to state the inference less correctly</i> <u>Suggested answer:</u> Acid reacts with sodium thiosulphate // Insoluble substance formed | 2 |
| | <i>Able to state idea of inference</i> <u>Suggested answer:</u> Reaction occurs Rate of reaction affected by concentration | 1 |
| | <i>No response given / wrong response</i> | 0 |

| Question | Rubric | Score | | | | | | | | | | | | | | | | | | |
|------------------------------------|---|---|----------|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---|
| 1 (c) | <i>Able to complete the table with all correct value with 2 decimal place</i> <u>Answer :</u> <table border="1" data-bbox="438 1234 1136 1505"> <thead> <tr> <th>Concentration/mol dm⁻³</th> <th>Time / s</th> <th>$\frac{1}{\text{Time}} / \text{s}^{-1}$</th> </tr> </thead> <tbody> <tr> <td>0.24</td> <td>17.0</td> <td>0.06</td> </tr> <tr> <td>0.20</td> <td>20.0</td> <td>0.05</td> </tr> <tr> <td>0.16</td> <td>25.0</td> <td>0.04</td> </tr> <tr> <td>0.12</td> <td>33.0</td> <td>0.03</td> </tr> <tr> <td>0.08</td> <td>50.0</td> <td>0.02</td> </tr> </tbody> </table> | Concentration/mol dm ⁻³ | Time / s | $\frac{1}{\text{Time}} / \text{s}^{-1}$ | 0.24 | 17.0 | 0.06 | 0.20 | 20.0 | 0.05 | 0.16 | 25.0 | 0.04 | 0.12 | 33.0 | 0.03 | 0.08 | 50.0 | 0.02 | 3 |
| Concentration/mol dm ⁻³ | Time / s | $\frac{1}{\text{Time}} / \text{s}^{-1}$ | | | | | | | | | | | | | | | | | | |
| 0.24 | 17.0 | 0.06 | | | | | | | | | | | | | | | | | | |
| 0.20 | 20.0 | 0.05 | | | | | | | | | | | | | | | | | | |
| 0.16 | 25.0 | 0.04 | | | | | | | | | | | | | | | | | | |
| 0.12 | 33.0 | 0.03 | | | | | | | | | | | | | | | | | | |
| 0.08 | 50.0 | 0.02 | | | | | | | | | | | | | | | | | | |
| | <i>Able to complete the table with 4 correct values</i> | 2 | | | | | | | | | | | | | | | | | | |
| | <i>Able to complete the table with 3 correct values</i> | 1 | | | | | | | | | | | | | | | | | | |
| | <i>No response given or wrong response</i> | 0 | | | | | | | | | | | | | | | | | | |

| Question | Rubric | Score |
|----------|--|-------|
| 1 (d) | <p><i>Able to state all three variables correctly</i></p> <p><u>Suggested answer:</u> <i>Manipulated variable:</i> Concentration of sodium thiosulphate solution <i>Responding variable:</i> Time taken for mark X to disappear from sight // rate of reaction <i>Constant variable:</i> Volume of sodium thiosulphate // Temperature // size of conical flask // concentration and volume of sulphuric acid</p> | 3 |
| | <i>Able to state any two variables correctly</i> | 2 |
| | <i>Able to state any one variables correctly</i> | 1 |
| | <i>No response or wrong response</i> | 0 |

| Question | Rubric | Score |
|----------|--|-------|
| 1 (e) | <p><i>Able to state the relationship between the manipulated variable and responding variable correctly with direction.</i></p> <p><u>Suggested answer :</u> The higher / lower the concentration of sodium thiosulphate solution, the higher / lower the rate of reaction. // The higher / lower the concentration of sodium thiosulphate solution, the shorter the time taken for mark X to disappear from sight</p> | 3 |
| | <p><i>Able to state the relationship between manipulated variable and responding variable without stating the direction.</i></p> <p><u>Suggested answer :</u> The higher / lower the concentration of sodium thiosulphate, the faster/slower the rate of reaction</p> | 2 |
| | <p><i>Able to state an idea of the hypothesis</i></p> <p><u>Suggested answer :</u> Concentration affects the rate of reaction // The concentration change, the rate of reaction change</p> | 1 |
| | <i>No response or wrong response</i> | 0 |



| Question | Rubric | Score |
|----------|---|-------|
| 1 (f) | <p><i>Able to draw a graph of concentration against 1/time by showing the following information</i></p> <p>(1) The axes are labeled correctly with unit x-axis : concentration (mol dm^{-3}) y-axis : 1/time (1/s)</p> <p>(2) Uniform scale</p> <p>(3) size of the graph at least 50% of the graph paper</p> <p>(4) All points are transferred correctly</p> <p>(5) Smooth curve</p> | 3 |
| | <p><i>Able to draw a graph of concentration against 1/time by showing the following information</i></p> <p>(1) The axes are labeled correctly without unit</p> <p>(2) Uniform scale</p> <p>(3) All points are transferred correctly</p> <p>(4) Smooth curve</p> | 2 |
| | <p><i>Able to draw a graph of concentration against 1/time by showing the following information</i></p> <p>(1) The axes are labeled correctly without unit</p> <p>(2) Curve / straight line on the graph</p> | 1 |
| | <i>No response or wrong response</i> | 0 |

| Question | Rubric | Score |
|----------|--|-------|
| 1 (g)(i) | <p><i>Able to state the relationship between the concentration of sodium thiosulphate solution and the rate of reaction correctly</i></p> <p><u>Suggested answer:</u></p> <p>The higher/lower the concentration of sodium thiosulphate solution, the rate of reaction increase/decrease</p> | 3 |
| | <p><i>Able to state the relationship between the concentration of sodium thiosulphate solution and the rate of reaction less correctly</i></p> <p><u>Suggested answer:</u></p> <p>The rate of reaction is directly proportional to the concentration of sodium thiosulphate//</p> <p>The higher the concentration of sodium thiosulphate, the rate of reaction decrease//</p> <p>The lower the concentration of sodium thiosulphate, the rate of reaction increase</p> | 2 |

| | | |
|--|---|---|
| | <i>Able to give a relevant idea</i> <u>Suggested answer:</u> Rate of reaction is affected by concentration// Rate of reaction is changed by the concentration// Rate of reaction is inversely proportional with concentration | 1 |
| | <i>No response or wrong response</i> | 0 |

| Question | Rubric | Score |
|-----------|---|-------|
| 1 (g)(ii) | <i>Able to fulfil the following criteria</i> (1) Extend the line on the graph (2) Show on the graph the way to obtain the value of 1/time (3) State the time with unit $1/\text{time} = 0.055$ $\text{Time} = 1/0.055$ $= 18.18 \text{ s}/18.2 \text{ s}$ | 3 |
| | <i>Able to fulfil any two criteria</i> | 2 |
| | <i>Able to fulfil any one criteria</i> | 1 |
| | <i>No response or wrong response</i> | 0 |

| Question | Rubric | Score |
|----------|---|-------|
| 1 (h) | <i>Able to state the operational definition accurately by stating what should be done and what should be observed</i> What should be done : when sulphuric acid is added to a higher concentration sodium thiosulphate solution What should be observed : the time taken become shorter <u>Suggested answer :</u> Time taken for mark 'X' to disappear from sight// Time taken for mark 'X' to disappear from sight when sulphuric acid is added into different concentration of sodium thiosulphate solution. | 3 |
| | <i>Able to state the operational definition less accurately</i> <u>Suggested answer :</u> Time taken for mark 'X' to disappear// Time taken// X mark disappear | 2 |

| | | |
|--|---|---|
| | <i>Able to give an idea for the operational definition.</i> | |
| | <u>Suggested answer :</u> Time for reaction to occurs | 1 |
| | <i>No response given or wrong response</i> | 0 |

| Question | Rubric | Score | | |
|--|---|-------|---------------|---------------|
| 1 (j) | <i>Able to classify all the reaction correctly</i> | 3 | | |
| | <table border="1"> <tr> <td>Fast reaction</td> <td>Slow reaction</td> </tr> <tr> <td>Neutralization Combustion Displacement</td> <td>Rusting Fermentation Corrosion</td> </tr> </table> | | Fast reaction | Slow reaction |
| Fast reaction | Slow reaction | | | |
| Neutralization Combustion Displacement | Rusting Fermentation Corrosion | | | |
| | <i>Able to classify any 4 reaction correctly</i> | 2 | | |
| | <i>Able to classify any 3 reaction correctly or reverse classification</i> | 1 | | |
| | <i>No response or wrong response</i> | 0 | | |

| Question | Rubric | Score |
|----------|---|-------|
| 2(a) | <i>Able to give the statement of problem correctly</i> | 3 |
| | <u>Suggested answer :</u> Does different carboxylic acids react with butanol produce esters with different odour? | |
| | <i>Able to give the statement of problem less correctly</i> | 2 |
| | <u>Suggested answer :</u> Does different carboxylic acids react with butanol gives different esters?// To study different carboxylic acids react with butanol to give esters with different odours. | |
| | <i>Able to give an idea about the statement of problem</i> | 1 |
| | <u>Suggested answer :</u> Different carboxylic acids/alcohol gives different esters. | |
| | <i>No response or wrong response</i> | 0 |

| Question | Rubric | Score |
|----------|--|-------|
| 2(b) | <i>Able to state all the variables correctly</i> 1. Manipulated variable: Type of carboxylic acids// Methanoic acid, ethanoic acid and propanoic acid. 2. Responding variables: Esters / Odours produced 3. Fixed variable: butanol / alcohol used | 3 |
| | <i>Able to state any two variable correctly</i> | 2 |
| | <i>Able to state any one variable correctly</i> | 1 |
| | <i>No response or wrong response</i> | 0 |

| Question | Rubric | Score |
|----------|--|-------|
| 2(c) | <i>Able to state the hypothesis correctly by stating the relationship between the manipulated variable and the responding variable</i> <u>Suggested answer :</u> When different carboxylic acids are used, the esters formed will give different odours. | 3 |
| | <i>Able to state the hypothesis less correctly</i> <u>Suggested answer :</u> When different carboxylic used, different esters formed//Esters with different odours formed when different carboxylic acids are used | 2 |
| | <i>Able to state idea of the hypothesis</i> <u>Suggested answer :</u> Type of carboxylic acid affects esters formed | 1 |
| | <i>No response or wrong response</i> | 0 |

| Question | Rubric | Score |
|----------|---|-------|
| 2(d) | <p><i>Able to give the apparatus and materials correctly and completely</i></p> <p><u>List of apparatus :</u> Boiling tube, beaker, test tube holder, Bunsen burner, dropper, measuring cylinder OR Round bottom flask, beaker, Liebig condenser, measuring cylinder, Bunsen burner, dropper, porcelain chips</p> <p><u>List of materials :</u> Glacial methanoic acid, ethanoic acid and propanoic acid, butanol, concentrated sulphuric acid, water</p> | 3 |
| | <p><i>Able to give the list of apparatus and materials correctly but not complete</i></p> <p><u>List of apparatus :</u> Boiling tube, Bunsen burner, dropper Or Round bottom flask, , Bunsen burner, dropper</p> <p><u>List of materials :</u> Methanoic acid, ethanoic acid and propanoic acid, butanol concentrated sulphuric acid</p> | 2 |
| | <p><i>Able to give an idea of list of apparatus and materials</i></p> <p>Any container, any one acid// any one alcohol,</p> | 1 |
| | <p><i>No response or wrong response</i></p> | 0 |

| Question | Rubric | Score | | | | | | | | |
|---------------------------------|--|-----------------------|-------------|---------------------------------|--|-------------------------------|--|---------------------------------|--|---|
| 2(e) | <p><i>Able to state all procedures correctly</i></p> <p>Situation 1</p> <ol style="list-style-type: none"> 1. Pour [2-5] cm³ butanol and [2-5] cm³ glacial methanoic acid into a boiling tube. 2. Add a few drops of concentrated sulphuric acid into the mixture. 3. Heat the mixture gently. 4. Pour the mixture into beaker half-filled with water 5. Observe and record the product formed. 6. Repeat the experiment by replacing methanoic acid with ethanoic acid and propanoic acid. <p>Situation 2</p> <ol style="list-style-type: none"> 1. Pour [25 - 100] cm³ glacial methanoic acid into a round bottom flask and [25 - 100] cm³ butanol. 2. Put in a few pieces of porcelain chips into the flask 3. Add [5 – 20] cm³ of concentrated sulphuric acid into the mixture. 4. Reflux the mixture for about [30] minutes. 5. Observe and record the product formed. 6. Repeat the experiment by replacing methanoic acid with ethanoic acid and propanoic acid. | 3 | | | | | | | | |
| | <p><i>Able to state steps 1, 2, 3,5 and 6 for Situation 1 or</i> <i>Able to state steps 1, 3,4, 5, 6 for Situation 2</i></p> | 2 | | | | | | | | |
| | <p><i>Able to state an idea of the experiment</i></p> <ol style="list-style-type: none"> 1. Add [any one] carboxylic acid and any alcohol into a [suitable container]. | 1 | | | | | | | | |
| | <i>No response or wrong response</i> | 0 | | | | | | | | |
| Question | Rubric | Score | | | | | | | | |
| 2(f) | <p><i>Able to exhibit the tabulation of data correctly</i></p> <p>Tabulation of data has the following aspects:</p> <ol style="list-style-type: none"> 1. Two columns and at least 3 rows 2. Headings: Carboxylic acids/ Ester Observation 3. Name of acids/esters <p><u>Suggested answer :</u></p> <table border="1"> <thead> <tr> <th>Carboxylic acid/Ester</th> <th>Observation</th> </tr> </thead> <tbody> <tr> <td>Methanoic acid/Butyl methanoate</td> <td></td> </tr> <tr> <td>Ethanoic acid/Butyl ethanoate</td> <td></td> </tr> <tr> <td>Propanoic acid/Buytl propanoate</td> <td></td> </tr> </tbody> </table> | Carboxylic acid/Ester | Observation | Methanoic acid/Butyl methanoate | | Ethanoic acid/Butyl ethanoate | | Propanoic acid/Buytl propanoate | | 2 |
| Carboxylic acid/Ester | Observation | | | | | | | | | |
| Methanoic acid/Butyl methanoate | | | | | | | | | | |
| Ethanoic acid/Butyl ethanoate | | | | | | | | | | |
| Propanoic acid/Buytl propanoate | | | | | | | | | | |

| | | | | | | |
|-----------------------|---|-----------------------|----------------|--|--|---|
| | <p><i>Able to exhibit the tabulation of data but less accurately</i></p> <p>Tabulation of data has the following aspects: 1. Two columns and at least 2 rows 2. One heading:</p> <p><u>Suggested answer :</u></p> <table border="1" data-bbox="335 492 1316 571"> <tr> <td data-bbox="335 492 821 537">Carboxylic acid/Ester</td> <td data-bbox="821 492 1316 537">// Observation</td> </tr> <tr> <td data-bbox="335 537 821 571"></td> <td data-bbox="821 537 1316 571"></td> </tr> </table> | Carboxylic acid/Ester | // Observation | | | 1 |
| Carboxylic acid/Ester | // Observation | | | | | |
| | | | | | | |
| | <i>No response or wrong response</i> | 0 | | | | |

<http://cikguadura.wordpress.com/>
 END OF MARK SCHEME