4541/1

KIMIA

KERTAS 1

MASA 1 ¼ JAM

MAJLIS PENGETUA SEKOLAH MALAYSIA

(CAWANGAN PULAU PINANG)

MODUL LATIHAN BERFOKUS SPM 2015

https://cikguadura.wordpress.com/

KIMIA

KERTAS 1

1 JAM 15 MINIT

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. Kertas soalan ini adalah dalam dwibahasa.
2. Soalan dalam Bahasa Inggeris mendahului soalan yang sepadan dalam Bahasa Melayu.
3. Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.

Kertas soalan ini mengandungi 23 halaman bercetak

 [Lihat halaman sebelah

1 Diagram 1 shows the arrangement of the particles of a substance at room temperature.
Rajah 1 menunjukkan susunan zarah-zarah bagi satu bahan pada suhu bilik.

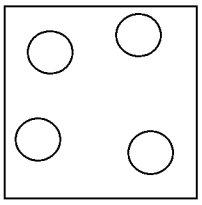


Diagram 1
Rajah 1

Which of the following is the substance?
Antara berikut, yang manakah bahan itu?

A Water
Air

B Ethanol
Etanol

C Naphthalene
Naftalena

D Helium
Helium

2 Table 1 shows the melting point and boiling point of substances W, X, Y and Z.
Jadual 1 *menunjukkan takat lebur dan takat didih bagi bahan-bahan* W, X, Y *dan* Z.

Substance ***Bahan***	**Melting point (°C)** ***Takat lebur (°C)***	**Boiling point (°C)** ***Takat didih (°C)***
W	-187	-126
X	-78	70
Y	75	130
Z	114	444

Table 1
Jadual 1

Which substance has the highest kinetic energy at room temperature?
Bahan yang manakah mempunyai tenaga kinetik yang paling tinggi pada suhu bilik?

A W

B X

C Y

D Z

3 The electron arrangement of atom Z is 2.8.2
Which of the following is the number of protons and electrons of ion Z^{2+}?

Susunan elektron atom Z ialah 2.8.2
Antara berikut, yang manakah bilangan proton dan elektron bagi ion Z^{2+}?

	Number of protons *Bilangan proton*	Number of electrons *Bilangan elektron*
A	10	11
B	11	11
C	12	10
D	12	12

4 Diagram 2 shows the cooling curve of liquid X.

Rajah 2 menunjukkan lengkung penyejukan bagi cecair X.

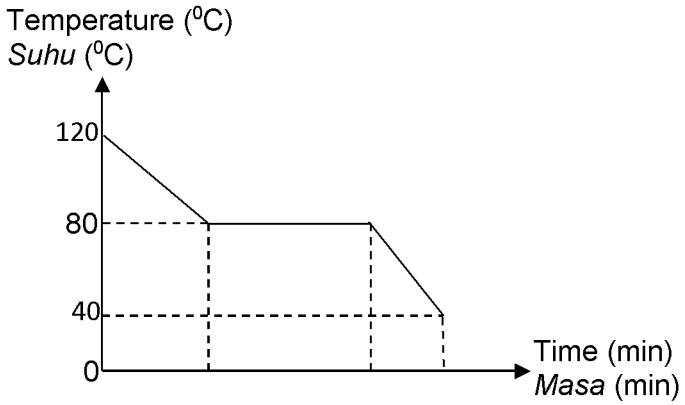


Diagram 2
Rajah 2

What is the physical state of X at 60^0C?

Apakah keadaan fizik bagi X pada suhu 60^0C?

A Gas
Gas

B Liquid
Cecair

C Solid
Pepejal

D Liquid and solid
Cecair dan pepejal

5 Table 2 shows the proton number and nucleon number of atom P.

Jadual 2 menunjukkan nombor proton dan nombor nukleon bagi atom P.

Proton number *Nombor proton*	13
Nucleon number *Nombor nukleon*	27

Table 2
Jadual 2

Which group and period is P located in the Periodic Table?

Dalam kumpulan dan kala manakah P *terletak dalam Jadual Berkala*?

	Group *Kumpulan*	Period *Kala*
A	3	2
B	3	3
C	11	2
D	13	3

6 Which statement explains why the reactivity of Group 17 elements decreases when going down the group?

Pernyataan yang manakah menerangkan mengapa kereaktifan unsur-unsur kumpulan 17 berkurang apabila menuruni kumpulan?

A *The size of atom becomes bigger when going down the group*

Saiz atom semakin besar apabila menuruni kumpulan

B *The melting and boiling point increase when going down the group*

Takat lebur dan takat didih bertambah apabila menuruni kumpulan

C *The strength of the nucleus of the atom to attract electron decreases*

Kecenderungan nukleus atom itu untuk menarik elektron berkurangan

D *The physical state of elements changes from gas to liquid then to solid at room temperature*

Keadaan fizik unsur-unsur berubah daripada gas kepada cecair dan kemudian kepada pepejal pada suhu bilik

7 Which substance can conduct electricity in molten state?

Bahan manakah yang boleh mengkonduksi elektrik dalam keadaan lebur?

A Sugar
Gula

B Ethanol
Etanol

C Naphthalene
Naftalena

D *Sodium chloride*
Natrium klorida

8 Metal X is soft and shiny. It reacts with cold water to produce an alkaline solution. What is metal X?

Logam X adalah lembut dan berkilat. Ia bertindak balas dengan air sejuk untuk menghasilkan larutan yang bersifat alkali. Apakah logam X?

A Copper
Kuprum

B Lithium
Litium

C Zinc
Zink

D Iron
Besi

9 Diagram 3 shows the standard representation of element J.

Rajah 3 menunjukkan pewakilan piawai bagi unsur J.

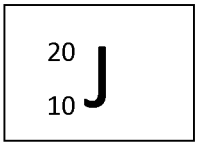


Diagram 3
Rajah 3

Which of the following is **true** about element J?

*Antara berikut, yang manakah **benar** tentang unsur J?*

A Element J is a metal
Unsur J adalah logam

B Element J is monoatomic gas
Unsur J adalah gas monoatom

C Element J has high boiling point
Unsur J mempunyai takat didih yang tinggi

D Element J reacts with water to produce hydrogen gas
Unsur J bertindak balas dengan air menghasilkan gas hidrogen

10 Which statement is **true** about the effect of higher concentration of reactants on the rate of reaction?

*Pernyataan yang manakah **benar** tentang kesan kepekatan bahan tindak balas yang lebih tinggi ke atas kadar tindak balas?*

A The kinetic energy of the reactant particles increases
Tenaga kinetik zarah-zarah bahan tindak balas bertambah

B The activation energy of the reactant particles increases
Tenaga pengaktifan zarah-zarah bahan tindak balas bertambah

C The number of reactant particles per unit volume increases
Bilangan zarah-zarah bahan tindak balas per unit isi padu bertambah

D The total surface area of reactant particles increases
Jumlah luas permukaan zarah-zarah bahan tindak balas bertambah

11 Diagram 4 shows the apparatus set-up for an experiment to electroplate an iron ring with silver.

Rajah 4 menunjukkan susunan radas bagi satu eksperimen untuk menyadur sebentuk cincin besi dengan argentum.

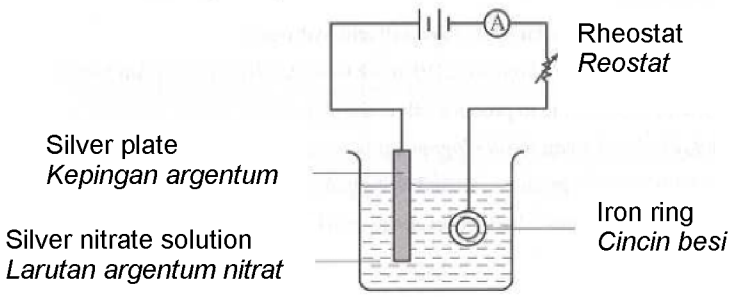


Diagram 4
Rajah 4

After 30 minutes, which of the following statement is true?
Selepas 30 minit, antara berikut yang manakah pernyataan yang benar?

A Silver plate is made the cathode
Kepingan argentum dijadikan katod

B The iron ring is made the anode
Cincin besi dijadikan anod

C The colourless solution turned green
Larutan tidak berwarna menjadi hijau

D Iron ring is coated with silvery grey solid
Cincin besi disadurkan dengan pepejal kelabu berkilat

12 Diagram 5 shows a simple chemical cell. Two different metals are used as electrodes.

Rajah 5 menunjukkan satu sel kimia ringkas. Dua logam yang berlainan digunakan sebagai elektrod.

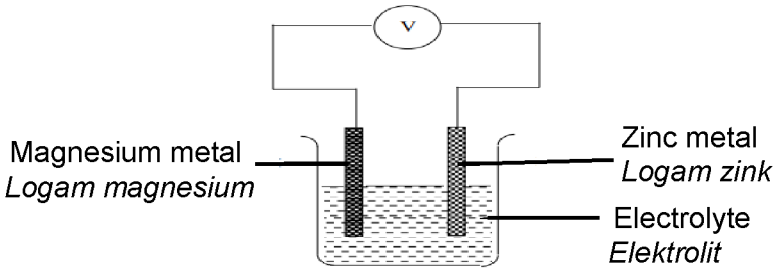


Diagram 5
Rajah 5

Which metal can be used to replace zinc metal to obtain the highest voltage reading?

Logam yang manakah boleh menggantikan logam zink untuk mendapatkan bacaan voltan yang paling tinggi?

A Tin
Stanum

B Silver
Argentum

C Iron
Ferum

D Lead
Plumbum

13 Table 3 shows information about three chemical cells P, Q and R.

Jadual 3 menunjukkan maklumat tentang tiga sel kimia P, Q *dan* R.

Chemical cell *Sel kimia*	Pair of metals *Pasangan logam*	Voltage (V) *Voltan* (V)	Negative terminal *Terminal negatif*
P	X,Y	0.45	X
Q	X,Z	0.60	Z
R	Y,Z	1.05	Z

Table 3
Jadual 3

Which of the following is the correct descending order of these metals in electrochemical series?

Antara berikut, yang manakah susunan secara menurun yang betul bagi logam-logam ini dalam siri elektrokimia?

A Z,X,Y

B Z,Y,X

C X,Y,Z

D X,Z,Y

14 Diagram 6 shows the set-up of apparatus for the reaction between sodium thiosulphate solution and sulphuric acid to form a yellow precipitate.

Diagram 6 menunjukkan susunan radas yang digunakan bagi tindak balas antara larutan natrium tiosulfat dengan asid sulfurik untuk membentuk satu mendakan kuning.

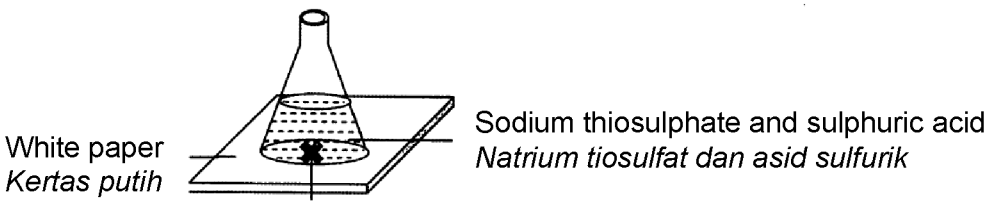
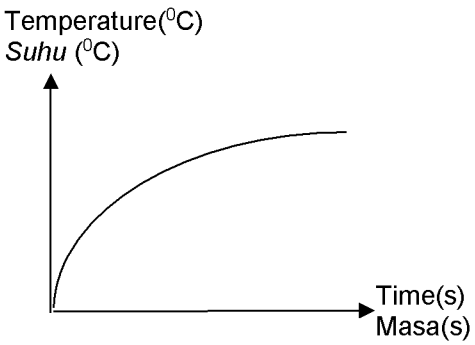


Diagram 6
Rajah 6

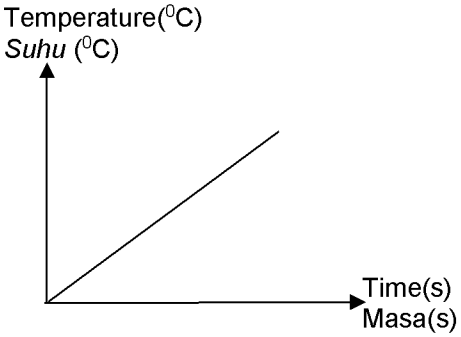
Which of the following graph shows the relationship between temperature of sodium thiosulphate solution and time taken?

Antara graf berikut, yang manakah menunjukkan hubungan antara suhu larutan natrium tiosulfat dengan masa yang diambil?

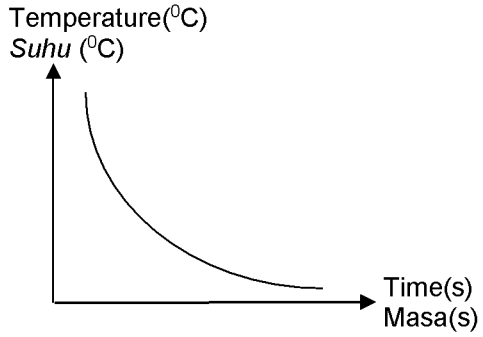
A



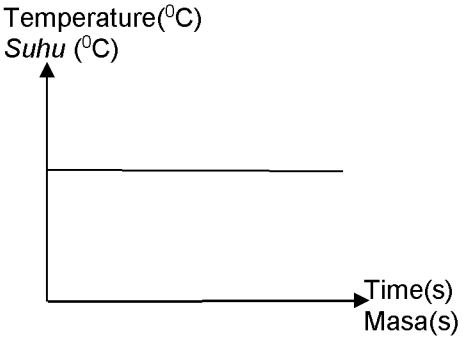
C



B



D



15 When a small amount of manganese(IV) oxide is added into hydrogen peroxide, the rate of reaction increases. Which statement explains this observation?

Apabila sedikit mangan(IV) oksida ditambah ke dalam hidrogen peroksida, kadar tindak balas bertambah. Pernyataan manakah menerangkan pemerhatian ini?

A The activation energy is lowered
Tenaga pengaktifan dikurangkan

B The total surface area of the reactant particles increases
Jumlah luas permukaan zarah-zarah bahan tindak balas bertambah

C The kinetic energy of the reactant particles increases
Tenaga kinetik zarah-zarah bahan tindak balas bertambah

D The total number of reactant particles per unit volume increases
Jumlah bilangan zarah-zarah bahan tindak balas per unit isi padu bertambah

16 Table 4 shows the total volume of hydrogen gas, H_2 collected in the reaction between magnesium and nitric acid.

Jadual 4 menunjukkan jumlah isi padu gas hidrogen, H_2 yang dikumpul dalam tindak balas antara magnesium dan asid nitrik.

Time (s) *Masa* (s)	0	15	30	45	60	75
Volume of gas (cm^3) *Isi padu gas* (cm^3)	0.00	22.00	38.00	45.00	48.00	48.00

Table 4
Jadual 4

Calculate the average rate of reaction.

Hitung kadar tindak balas purata.

A 0.37 cm^3s^{-1}

B 0.64 cm^3s^{-1}

C 0.80 cm^3s^{-1}

D 1.74 cm^3s^{-1}

17 Fe^{3+} ions can be converted to Fe^{2+} ions by adding zinc powder.
Which substance can be used to replace zinc powder in this reaction?

Ion Fe^{3+} boleh ditukarkan kepada ion Fe^{2+} dengan menambah serbuk zink.
Bahan yang manakah boleh digunakan untuk menggantikan serbuk zink dalam tindak balas ini?

A Chlorine water
Air klorin

B Potassium iodide solution
Larutan kalium iodida

C Acidified potassium dichromate(VI) solution
Larutan kalium dikromat(VI) berasid

D Acidified potassium manganate(VII) solution
Larutan kalium manganat(VII) berasid

18 Diagram 7 shows the set-up of apparatus to investigate the effect of other metals on rusting of iron nail.

Rajah 7 menunjukkan susunan radas untuk mengkaji kesan logam lain ke atas pengaratan paku besi.

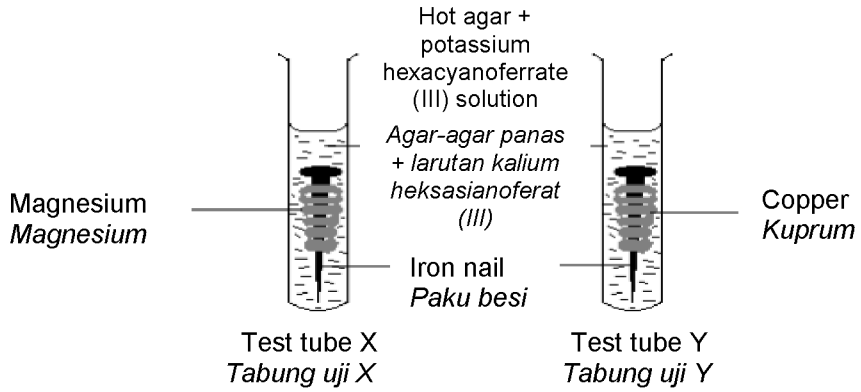


Diagram 7
Rajah 7

Which of the following statement is **true** about the experiment?

*Antara pernyataan berikut, yang manakah **benar** tentang ekperimen ini?*

A Potassium hexacyanoferrate(III) solution is to detect the presence of Fe^{2+} ions
Larutan kalium heksasianoferat(III) untuk mengesan kehadiran ion Fe^{2+}

B Rusting of iron occurs in both test tubes
Pengaratan besi berlaku dalam kedua-dua tabung uji

C There are more gas bubbles in test tube Y
Gelembung gas dalam tabung uji Y lebih banyak

D The presence of blue spot in test tube X
Terdapat tompok biru dalam tabung uji X

19 Which salt is soluble in water?
Garam yang manakah larut dalam air?

A Magnesium carbonate
Magnesium karbonat

B Calcium(II) carbonate
Kalsium(II) karbonat

C Copper(II) chloride
Kuprum(II) klorida

D Lead(II) chloride
Plumbum(II) klorida

20 What is the oxidation number of bromine in $NaBrO_3$?

Apakah nombor pengoksidaan bagi bromin dalam $NaBrO_3$?

A -1

B -3

C +5

D +6

21 Diagram 8 shows the apparatus set-up for the heating of salt R.

Rajah 8 menunjukkan susunan radas bagi pemanasan garam R.

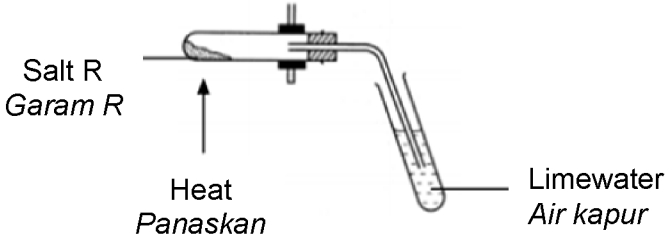


Diagram 8
Rajah 8

When R is heated, limewater turns cloudy and the hot residue is brown and turns yellow when cold. What is R?

Apabila R dipanaskan, air kapur menjadi keruh dan baki yang terhasil berwarna perang apabila panas dan bertukar menjadi kuning apabila sejuk. Apakah R?

A Lead(II) carbonate
Plumbum(II) karbonat

B Zinc carbonate
Zink karbonat

C Lead(II) nitrate
Plumbum(II) nitrat

D Lead(II) oxide
Plumbum(II) oksida

22 Which of the following reaction is **not** a redox reaction?

Antara tindak balas berikut, yang manakah ***bukan*** *tindak balas redox?*

A Magnesium burns in oxygen gas
Magnesium terbakar dalam gas oksigen

B Sodium oxide powder is added into nitric acid
Serbuk natrium oksida ditambah ke dalam asid nitric

C Zinc metal is added into copper(II) sulphate solution
Logam zink ditambah ke dalam larutan kuprum(II) sulfat

D Bromine water is added into potassium iodide solution
Air bromin ditambah ke dalam larutan kalium iodida

23 Which of the following ionic equation represents the reaction between lead(II) nitrate solution and potassium chloride solution?

Antara persamaan ion berikut, yang manakah mewakili tindak balas antara larutan plumbum(II) nitrat dan larutan kalium klorida?

A $Pb^{2+} + 2NO_3^- \longrightarrow Pb(NO_3)_2$

B $K^+ + NO_3^- \longrightarrow KNO_3$

C $Pb^{2+} + 2Cl^- \longrightarrow PbCl_2$

D $K^+ + Cl^- \longrightarrow KCl$

24 5 g of zinc powder is added to hydrochloric acid to produce 2.04 g of zinc chloride salt. Find the mass of zinc powder that does not react with the acid.

[Relative atomic mass : Zn, 65; H, 1; Cl, 35.5]

5 g serbuk zink ditambah kepada asid hidroklorik untuk menghasilkan 2.04 g garam zink klorida. Hitung jisim serbuk zink yang tidak bertindak balas dengan asid.

[*Jisim atom relatif* : Zn, 65; H, 1; Cl, 35.5]

A 0.975 g

B 2.960 g

C 3.715 g

D 4.025 g

25 Which of the following is analgesic medicine?

Antara berikut, yang manakah ubat analgesik?

A Aspirin
Aspirin

B Tranquilizer
Trankuilizer

C Barbiturate
Barbiturat

D Streptomycin
Streptomisin

26 Which of the following is the **correct** match?

*Antara berikut, manakah pasangan yang **betul**?*

	Name *Nama*	Formula *Formula*
A	Sodium *Natrium*	N_2
B	Iron(II) sulphate *Ferum(II) sulfat*	FSO_4
C	Potassium oxide *Kalium oksida*	KO
D	Ammonium nitrate *Ammonium nitrat*	NH_4NO_3

27 Chemists use mol as a unit to measure quantity of substances.
Which is **true** about 23 g of sodium?
[Relative atomic mass: Na = 23]

Ahli kimia menggunakan unit mol untuk mengukur kuantiti bahan.
*Yang manakah **benar** tentang 23 g natrium?*
[Jisim atom relatif: Na = 23]

A Molar mass for sodium is 1 mol
Jisim molar untuk natrium ialah 1 mol

B 1 mol sodium contains 23 g sodium
1 mol natrium mengandungi 23 g natrium

C 23 mol sodium contain 1 g sodium
23 mol natrium mengandungi 1 g natrium

D 23 g sodium contain 6.01×10^{23} molecules of sodium
23 g natrium mengandungi 6.01×10^{23} molekul natrium

28 Which of the following has a lowest pH value?

Antara berikut, yang manakah mempunyai nilai pH yang paling rendah?

A 0.02 mol HCl

B 0.02 mol NaOH

C 0.02 mol C_2H_5OH

D 0.02 mol CH_3COOH

29 Table 5 shows the ionic formulae of several ions.

Jadual 5 menunjukkan formula ion untuk beberapa ion

Name *Nama*	Formula *Formula*
Ammonium ion *Ion ammonium*	NH_4^+
Aluminium ion *Ion aluminium*	Al^{3+}
Phosphate ion *Ion fosfat*	PO_4^{3-}
Bromide ion *Ion bromida*	Br^-

Table 5
Jadual 5

Which is a **correct** match for the name of substance and its chemical formula?

*Yang manakah pasangan yang **betul** untuk nama bahan dan formula kimianya?*

	Name of substance *Nama bahan*	Chemical formula *Formula kimia*
A	Ammonium phosphate *Ammonium fosfat*	$NH_4(PO_4)_3$
B	Aluminium phosphate *Aluminium fosfat*	$Al_3(PO_4)_3$
C	Ammonium bromide *Ammonium bromide*	NH_4Br_4
D	Aluminium bromide *Aluminium bromide*	$AlBr_3$

30 Relative molecular mass for phosphorus oxide is 284. This oxide consists of 43.66% phosphorus and 56.34% oxygen in mass. What is the molecular formula of this oxide?
[Relative atomic mass: P = 31; O = 16]

Jisim molekul relatif untuk fosforus oksida ialah 284. Oksida ini mengandungi 43.66% fosforus dan 56.34% oksigen mengikut jisim. Apakah formula molekul bagi oksida ini?
[Jisim atom relatif: P = 31; O = 16]

A P_1O_3

B P_2O_6

C P_2O_5

D P_4O_{10}

31 Which statement is **not** true about ionic bond?

*Penyataan manakah **tidak** benar tentang ikatan ion?*

A Reaction between metal and non metal
Tindak balas antara logam dan bukan logam

B Metal atom will donate electron
Atom logam akan menderma elektron

C Non-metal atom will form positive ion
Atom bukan logam akan membentuk ion negatif

D Formation of ionic bond is by electron transfer
Ikatan ion terbentuk melalui pemindahan elektron

32 Diagram 9 shows the electron arrangement of a compound.

Rajah 9 menunjukkan susunan elektron bagi satu sebatian.

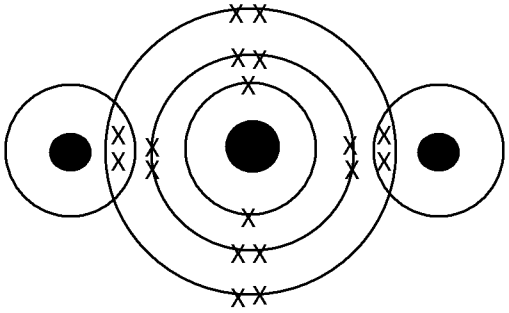


Diagram 9
Rajah 9

Which of the following shows the properties of the compound in Diagram 9?

Antara berikut yang manakah menunjukkan ciri-ciri sebatian di Rajah 9?

A Conducts electricity in molten or aqueous solution
Mengalirkan arus elektrik dalam keadaan lebur atau larutan akueus

B Consists of molecules
Terdiri daripada molekul

C Has high melting point
Mempunyai takat lebur yang tinggi

D Insoluble in organic solvent
Tidak larut dalam pelarut organik

33 An alloy is a mixture of two or more elements with a certain fixed composition. Which is the **correct** composition for the alloy?

*Aloi ialah satu campuran dua atau lebih unsur dengan komposisi yang tetap. Komposisi manakah **betul** untuk aloi?*

	Alloy *Aloi*	Composition *Komposisi*
A	Bronze *Gangsa*	Copper and zinc *Kuprum dan zink*
B	Brass *Loyang*	Copper and carbon *Kuprum dan karbon*
C	Steel *Keluli*	Iron and zinc *Ferum dan zink*
D	Pewter *Piuter*	Tin, copper and antimony *Stanum, kuprum dan antimoni*

34 Table 6 shows the proton number for six atoms.

Jadual 6 menunjukkan nombor proton untuk enam atoms

Atom	P	Q	R	S	T	U
Proton number *Nombor proton*	12	13	19	8	9	17

Table 6
Jadual 6

Which of the following pair will form ionic compound?

Antara berikut pasangan manakah yang akan menbentuk sebatian ion?

A P and Q
P dan Q

B Q and T
Q dan T

C S and U
S dan U

D P and R
P and R

35 Marwan was stung by wasp. Which substance is suitable to cure wasp sting?

Marwan telah disengat oleh penyengat. Bahan manakah sesuai untuk merawat sengatan tersebut?

A Sodium bicarbonate
Natrium bikarbonat

B Ammonia
Ammonia

C Vinegar
Cuka

D Calcium oxide
Kalsium oksida

36 How does the formation of chemical bond happen?

Bagaimanakah pembentukan ikatan kimia berlaku?

A By heating
Melalui pemanasan

B By neutralisation of charges
Melalui peneutralan cas

C By donating the electrons
Melalui pendermaan elektron

D By achieving the stable electron arrangement
Melalui pencapaian susunan elektron yang stabil

37 What is the suitable method to prepare 0.01 mol dm^{-3} hydrochloric acid solution from 2.0 mol dm^{-3} hydrochloric acid solution?

Apakah kaedah yang sesuai untuk menyediakan larutan asid hidroklorik 0.01 mol dm^{-3} daripada larutan asid hidroklorik 2.0 mol dm^{-3}?

A Dilution
Pencairan

B Fermentation
Penapaian

C Titration
Pentitratan

D Displacement
Penyesaran

38 A student pours 25 cm^3 of sodium hydroxide, NaOH solution into a conical flask and fills a burette with 0.2 mol dm^{-3} sulphuric acid, H_2SO_4. The average volume of sulphuric acid, H_2SO_4 needed for neutralisation is 44 cm^3. What is the molarity of sodium hydroxide, NaOH solution used?

Seorang pelajar menuang 25 cm^3 larutan natrium hidroksida, NaOH ke dalam kelalang kon dan mengisi buret dengan 0.2 mol dm^{-3} asid sulfurik, H_2SO_4. Isipadu purata asid sulfurik yang diperlukan untuk peneutralan ialah 44 cm^3. Berapakah kemolaran larutan natrium hidroksida, NaOH yang digunakan?

A 0.20 mol dm^{-3}

B 0.35 mol dm^{-3}

C 0.70 mol dm^{-3}

D 1.40 mol dm^{-3}

39 Gas X is the side product of Contact Process. The gas dissolves in water and causes acid rain. What is X?

Gas X ialah salah satu hasil sampingan Proses Sentuh. Gas X boleh larut di dalam air dan menyebabkan hujan asid. Apakah X?

A Sulphur dioxide
Sulfur dioksida

B Oxygen
Oksigen

C Nitrogen
Nitrogen

D Carbon dioxide
Karbon dioksida

40 What is the main component of glass?

Apakah komponen utama kaca?

A Silicon dioxide
Silikon dioksida

B Calcium carbonate
Kalsium karbonat

C Calcium hydroxide
Kalsium hidroksida

D Boron oxide
Boron oksida

41 Which of the following contains vinegar?
Antara berikut,yang manakah mengandungi cuka?

A HCl

B HNO_3

C C_2H_5OH

D CH_3COOH

42 Alcohol can be prepared in laboratory or in industry. What are the suitable substances for preparation of alcohol in the laboratory?

Alkohol boleh disediakan di dalam makmal atau secara industri. Apakah bahan-bahan yang sesuai untuk penyediaan etanol di dalam makmal?

A Rice and yeast
Nasi dan yis

B Starch and ethanol
Kanji dan etanol

C Ethanoic acid and ethanol
Asid etanoik dan etanol

D Ethanol and ethyl ethanoate
Etanol dan etil etanoat

43

$$H_2 + Cl_2 \longrightarrow 2HCl \; ; \qquad \Delta H = -184 \text{ kJ}$$

Which of the following is **true** about the thermochemical equation above?

*Antara berikut yang manakah **benar** tentang persamaan termokimia di atas?*

A The heat released is -184 kJ g^{-1}
Haba yang dibebaskan ialah -184 kJ g^{-1}

B The total energy content of products is lower than the reactants
Jumlah kandungan tenaga hasil tindak balas lebih rendah daripada bahan tindak balas

C The reaction is endothermic reaction
Tindak balas ini ialah tindak balas endotermik

D 184 kJ heat energy is absorbed when 2 mol HCl is formed
184 kJ tenaga haba diserap apabila 2 mol HCl terbentuk

44 Diagram 10 shows the structural formula of 2-methylbut-1-ene.

Rajah 10 menunjukkan formula struktur 2-metilbut-1-ena.

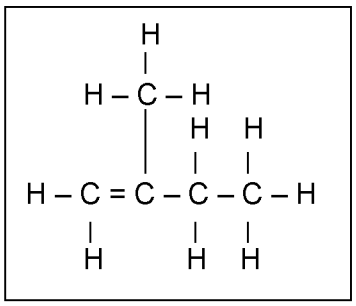


Diagram 10
Rajah 10

Which of the following is the correct name for the isomer of 2-methylbut-1-ene?

Antara berikut yang manakah benar untuk nama isomer 2-metilbut-1-ena?

A 2-methylpropene
2-metilpropena

B 3-methylbut-1-ene
3-metilbut-1-ena

C But-3-ene
But-3-ena

D But-1-ene
But-1-ena

45 The fuel value of charcoal is 34 kJ g^{-1}. Calculate the mass of charcoal needed to boil 2.0 dm^3 of water.

[Heat capacity of water, c =4.2 J g^{-1} $^oC^{-1}$
Density of water = 1 g cm^{-3}
Temperature of water at room temperature = 27°C]

Nilai bahan api arang kayu ialah 34 kJ g^{-1}. Hitung jisim arang kayu yang diperlukan untuk mendidihkan 2.0 dm^3 air.

*[Muatan haba tentu air, c =4.2 J g^{-1} $^oC^{-1}$
Ketumpatan air = 1 g cm^{-3}
Suhu air pada keadaan bilik = 27°C]*

A 18 g

B 16 g

C 12 g

D 9 g

46 Which of the following is **not** true about saturated fat?

*Antara berikut yang manakah **tidak** benar tentang lemak tepu?*

A Saturated fat is formed from unsaturated fatty acid
Lemak tepu dibentuk daripada asid lemak tak tepu

B Saturated fat can be produced by hydrogenation of unsaturated fat
Lemak tepu boleh dihasilkan melalui proses penghidrogenan lemak tak tepu

C Saturated fat contains only single bond in its hydrocarbon chain
Lemak tepu hanya mengandungi ikatan tunggal dalam hidrokarbonnya

D At room temperature, saturated fat is in solid form
Pada keadaan bilik, lemak tepu wujud sebagai pepejal

47 In an exothermic reaction, temperature of the surrounding increases whereas in an endothermic reaction, temperature of the surrounding decreases. Which of the following process involves endothermic reaction?

Dalam satu tindak balas eksotermik, suhu sekeliling meningkat manakala dalam tindak balas endotermik, suhu sekeliling menurun. Antara proses berikut yang manakah melibatkan tindak balas endotermik?

A Respiration
Respirasi

B Photosynthesis
Fotosintesis

C Rusting of iron
Pengaratan besi

D Decaying of organic substance
Pereputan bahan organik

48 Temperature incease is 10°C when excess zinc powder is added into 100 cm^3 of 0.2 mol dm^{-3} copper(II) sulphate solution. What is the temperature increase if the experiment is repeated by using 100 cm^3 of 0.1 mol dm^{-3} copper(II) sulphate solution?

Kenaikan suhu ialah 10°C apabila serbuk zink berlebihan ditambahkan ke dalam 100 cm^3 larutan kuprum(II) sulfat 0.2 mol dm^{-3}. Berapakah kenaikan suhu jika eksperimen ini diulang dengan menggunakan 100 cm^3 larutan kuprum(II) sulfat 0.1 mol dm^{-3}?

A 20°C

B 10°C

C 5°C

D 1°C

49 Which of the following modern medicine is not antipsychotic?

Antara ubat moden berikut, yang manakah bukan antipsikotik?

A Tranquilizer
Trankuilizer

B Barbiturate
Barbiturat

C Streptomycin
Streptomisin

D Haloperidol
Haloperidol

50 Which of the following is **true** about hard water?

*Antara berikut yang manakah **benar** tentang air liat?*

A Water that contains calcium ion, Ca^{2+} and bromide ion, Br^-
Air yang mengandungi ion kalsium, Ca^{2+} dan ion bromida, Br^-

B Anion detergent combines with ions in hard water and form insoluble salt
Anion detergen bergabung dengan ion-ion di dalam air liat dan membentuk garam tak terlarutkan

C Detergents are not effective as cleansing agent in hard water
Detergen tidak berkesan sebagai agen pencuci dalam air liat

D Detergents do not form scum in hard water
Detergen tidak membentuk kekat dalam air liat

INFORMATION FOR CANDIDATES

MATLUMAT UNTUK CALON

https://cikguadura.wordpress.com/

1. This question paper consists of **50** questions.
   *Kertas soalan ini mengandungi **50** soalan.*

2. Answer **all** questions.
   *Jawab **semua** soalan.*

3. Each question is followed by four alternative answers, **A**, **B**, **C** and **D**. For each question, choose **one** answer only. Blacken your answer on the objective answer sheet provided.
   *Tiap-tiap soalan diikuti oleh empat pilihan jawapan, iaitu **A**, **B**, **C** dan **D**. Bagi setiap soalan, pilih **sat**u jawapan sahaja. Hitamkan jawapan anda pada kertas jawapan objektif yang disediakan.*

4. If you wish to change your answer, erase the blackened mark that you have made. Then blacken the space for the new answer.
   Jika anda hendak menukar jawapan, padamkan tanda yang telah dibuat. Kemudian hitamkan jawapan yang baru.

5. The diagrams in the questions provided are not drawn to scale unless stated.
   Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

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

NAMA :

TINGKATAN :

MAJLIS PENGETUA SEKOLAH MALAYSIA
CAWANGAN PULAU PINANG

MODUL LATIHAN BERFOKUS SPM 2015
4541/2
KIMIA

https://cikguadura.wordpress.com/

Kertas 2
Ogos
2 ½ jam

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU.

1. Tulis **nama** dan **tingkatan** anda pada ruang yang disediakan.
2. Kertas soalan ini dalam dwibahasa.
3. Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam Bahasa Melayu.
4. Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam **Bahasa Inggeris** atau **Bahasa Melayu**.
5. Calon dikehendaki membaca maklumat di halaman 22.

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

Kertas soalan ini mengandungi 23 halaman bercetak

[Lihat halaman sebelah

Section A
Bahagian A

[60 marks]
[60 markah]

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

1 (a) Table 1 shows the number of protons, neutrons and electrons present in atom Q and atom X. The letters used are not the actual symbols of the atoms.

Jadual 1 menunjukkan bilangan proton, neutron dan elektron yang hadir di dalam atom Q dan atom X. Huruf yang digunakan bukan simbol sebenar bagi atom-atom itu.

Atom ***Atom***	**Number of protons** ***Bilangan proton***	**Number of neutrons** ***Bilangan neutron***	**Number of electrons** ***Bilangan elektron***
Q	11	12	11
X	17	18	17

Table 1
Jadual 1

1(a)(i) 1

(i) State the term for 'the total number of protons and neutrons' in an atom.

Nyatakan istilah bagi 'jumlah bilangan proton dan neutron' di dalam atom.

.....

[1 mark]
[1 markah]

(ii) Draw the electron arrangement of ion Q.

Lukiskan susunan elektron bagi ion Q.

1(a)(ii) 1

[1 mark]
[1 markah]

1(a)(iii) 1

(iii) Atom Y is an isotope of atom X. State the number of protons in atom Y.

Atom Y ialah isotop bagi atom X. Nyatakan bilangan proton bagi atom Y.

.....

[1 mark]
[1 markah]

1(b)(i) 1

(b) (i) Element R is an element which is used as a standard in determining relative atomic mass. Name element R.

Unsur R ialah unsur yang digunakan sebagai piawai untuk menentukan jisim atom relatif. Namakan unsur R.

.....

[1 mark]
[1 markah]

(ii) Element R is burnt in excess oxygen to produce gas RO_2. Calculate the mass of 672 cm^3 of gas RO_2 produced at standard temperature and pressure.

[1 mole of gas occupies 22.4 dm^3 at standard temperature and pressure; Relative molecular mass for RO_2 = 44]

Unsur R dibakar dalam oksigen berlebihan untuk menghasilkan gas RO_2. Hitungkan jisim bagi 672 cm^3 gas RO_2 yang dihasilkan pada suhu dan tekanan piawai.

[1 mol gas menempati 22.4 dm^3 pada suhu dan tekanan piawai; Jisim molekul relatif RO_2 = 44]

1(b)(ii)

[2 marks]
[2 markah]

2

(iii) How many molecules are there in 672 cm^3 of gas RO_2?

Berapakah bilangan molekul dalam 672 cm^3 gas RO_2?

[Avogadro's number / *Nombor Avogadro* = 6.02×10^{23}]

1(b)(iii)

[1 mark]
[1 markah]

1

(c) When silver carbonate, Ag_2CO_3 is heated, it will decompose to produce silver metal, carbon dioxide gas and oxygen gas as shown in the equation below.

Apabila argentum karbonat, Ag_2CO_3 dipanaskan, ia akan terurai untuk menghasilkan logam argentum, gas karbon dioksida dan gas oksigen seperti yang ditunjukkan di dalam persamaan di bawah.

$$2Ag_2CO_3\,(s) \longrightarrow 4Ag\,(s) + 2CO_2\,(g) + O_2\,(g)$$

A student heats13.8 g silver carbonate. Calculate the volume of oxygen gas, O_2 collected at room temperature.

[Relative atomic mass: O=16, Ag=108; Molar volume = 24 $dm^3\,mol^{-1}$ at room conditions]

Seorang pelajar memanaskan 13.8 g argentum karbonat. Hitungkan isi padu gas oksigen, O_2 yang dikumpulkan pada suhu bilik.

[Jisim atom relatif: O=16, Ag=108; Isipadu molar = 24 $dm^3\,mol^{-1}$ pada suhu bilik]

1(c)

[3 marks]
[3 markah]

3

2 Table 2 shows the symbols of the elements in Period 3.

Jadual 2 menunjukkan simbol bagi unsur-unsur dalam Kala 3.

Element *Unsur*	Na	Mg	Al	Si	P	S	Cl	Ar

Table 2
Jadual 2

Based on Table 2,

Berdasarkan Jadual 2,

(a) (i) How does the atomic size of elements change across the period from Na to Ar?

Bagaimanakah saiz atom unsur-unsur berubah apabila merentas kala dari Na ke Ar?

2(a)(i) 1

.....

[1 mark]
[1 markah]

(ii) Explain the answer in (a) (i).

Terangkan jawapan di (a) (i).

2(a)(ii) 2

.....

.....

.....

[2 marks]
[2 markah]

(b) How does the electronegativity of elements change across the period from Na to Ar?

Bagaimanakah keelektronegatifan unsur-unsur berubah apabila merentas kala dari Na to Ar?

2(b) 1

.....

[1 mark]
[1 markah]

(c) (i) State the oxide which can dissolve in water to form an alkaline solution.

Nyatakan oksida yang dapat larut dalam air untuk membentuk satu larutan beralkali.

2(c)(i) 1

.....

[1 mark]
[1 markah]

(ii) Write a chemical equation for the reaction when this oxide is dissolved in water.

Tuliskan satu persamaan kimia bagi tindak balas yang berlaku apabila oksida ini larut dalam air.

2(c)(ii)

2

.....

[2 marks]
[2 markah]

(iii) Name the oxide which is said to be amphoteric.

Namakan oksida yang dikatakan bersifat amfoterik.

2(c)(iii)

1

.....

[1 mark]
[1 markah]

(d)

Ar is the only element in Period 3 that does not form oxide. *Ar adalah satunya unsur dalam Kala 3 yang tidak membentuk oksida.*

Explain the above statement.

Terangkan pernyataan di atas.

2(d)

2

.....

.....

[2 marks]
[2 markah]

3 (a) Table 3 shows the concentrations and pH values of three solutions.

Jadual 3 menunjukkan kepekatan dan nilai pH bagi tiga larutan

Solution *Larutan*	X	Y	Z
Concentration *Kepekatan*	0.5 mol dm^{-3}	0.5 mol dm^{-3}	0.5 mol dm^{-3}
pH value *Nilai pH*	1	5	13

Table 3
Jadual 3

Based on Table 3,
Berdasarkan Jadual 3,

(i) Z is a strong alkali. What is meant by strong alkali?

Z ialah alkali kuat. Apakah yang dimaksudkan dengan alkali kuat?

3(a)(i)

1

.....

.....

.....

[1 mark]
[1 markah]

(ii) Which of the solutions has the highest concentration of hydrogen ions?

Larutan manakah mempunyai kepekatan ion hidrogen yang paling tinggi?

3(a)(ii)

1

.....

.[1 mark]
[1 markah]

(iii) Explain the answer in 3 (b) (i).

Terangkan jawapan di 3 (b) (i).

3(a)(iii)

1

……..

[1 mark]
[1 markah]

(b) When lead(II) nitrate solution is added to copper(II) chloride solution in a beaker, compound S and copper(II) nitrate solution are formed.

Apabila larutan plumbum(II) nitrat dicampurkan dengan larutan kuprum(II) klorida dalam sebuah bikar, sebatian S dan larutan kuprum(II) nitrat terbentuk.

(i) How do you obtain compound S from copper(II) nitrate solution?

Bagaimanakah anda memperoleh sebatian S daripada kuprum(II) nitrat?

3(b)(i)

2

.....

.....

……

[2 marks]
[2 markah]

(ii) Write the chemical equation for the reaction.

Tuliskan persamaan kimia untuk tindak balas ini.

3(b)(ii)

2

.....

[2 marks]
[2 markah]

(iii) Calculate the mass of compound S produced if 50 cm^3 of 0.2 mol dm^{-3} lead(II) nitrate solution reacst with 50 cm^3 of 0.2 mol dm^{-3} copper(II) chloride solution.

[Relative atomic mass : Pb = 207 ; Cl = 35.5]

Hitungkan jisim sebatian S yang dihasilkan apabila 50 cm^3 plumbum(II) nitrat 0.2 mol dm^{-3} bertindak balas dengan 50 cm^3 kuprum(II) klorida 0.2 mol dm^{-3}.

[Jisim atom relatif : Pb = 207 ; Cl = 35.5]

3(b)(iii)

[3 marks]
[3 markah]

3

4 Diagram 1 shows the flow chart for the industrial production of ammonia.
Rajah 1 menunjukkan carta alir bagi pembuatan ammonia dalam industri.

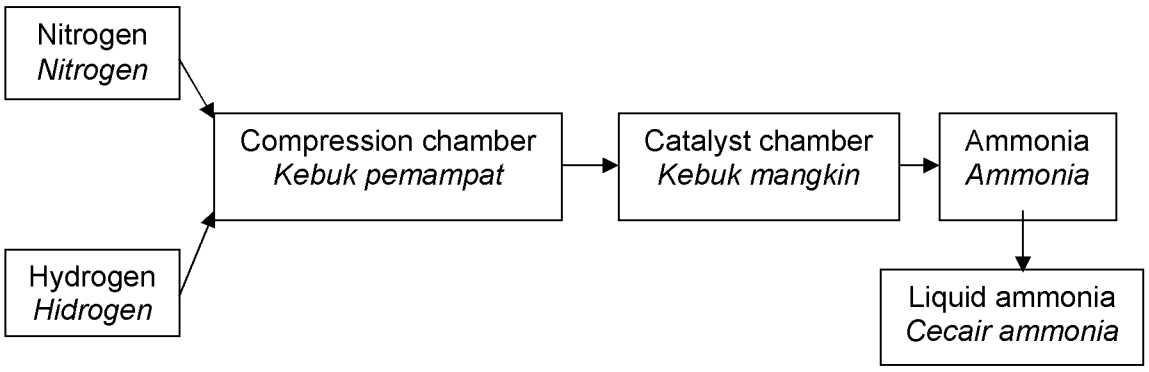


Diagram 1
Rajah 1

(a) (i) State the pressure of the compressed mixture of nitrogen and hydrogen.

Nyatakan tekanan campuran gas nitrogen dan hidrogen yang dimampatkan.

4(a)(i)

.....

[1 mark]
[1 markah]

1

4(a)(ii) 1

(ii) Name the catalyst used in the catalyst chamber.

Namakan mangkin yang digunakan dalam kebuk mangkin

.....

[1 mark]
[1 markah]

4(a)(iii) 1

(iii) State the temperature used in the catalyst chamber.

Nyatakan suhu yang digunakan dalam kebuk mangkin.

.....

[1 mark]
[1 markah]

4(a)(iv) 2

(iv) Ammonia is used to prepare ammonium sulphate which is a nitrogenous fertiliser.
Write a chemical equation for the preparation of ammonium sulphate.

Ammonia digunakan untuk menyediakan ammonium sulfat iaitu sejenis baja bernitrogen.
Tulis persamaan kimia bagi penyediaan ammonium sulfat.

.....

[2 marks]
[2 markah]

(b) Table 4 shows two types of alloys and their uses.

Jadual 4 menunjukkan dua jenis aloi dan kegunaannya.

Alloy *Aloi*	Use *Kegunaan*
S	To make musical instruments *Untuk membuat peralatan muzik*
T	To make body of aircrafts and bullet trains *Untuk membuat badan kapal terbang dan kereta api laju*

Table 4
Jadual 4

4(b)(i) 2

(i) Name alloy

Namakan aloi

S : .....

T: .....

[2 marks]
[2 markah]

(ii) Draw the arrangement of atoms in alloy S.

Lukis susunan atom-atom dalam aloi S.

[1 mark]
[1 markah]

4(b)(ii) 1

(iii) Explain the reason why alloy S is used instead of its pure metal in terms of hardness.

Terangkan sebab mengapa aloi S digunakan sebagai ganti kepada logam tulen.

.....

.....

.....

.....

[2 marks]
[2 markah]

4(b)(iii) 2

5 Diagram 2 shows a flow chart of the changes occurred of organic compounds.

Rajah 2 menunjukkan satu siri perubahan yang berlaku ke atas sebatian organik.

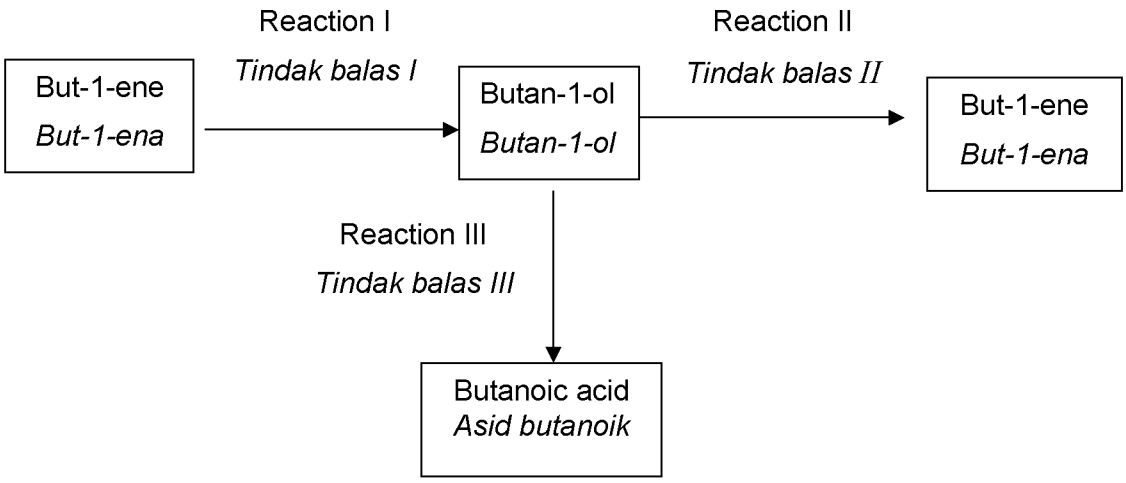


Diagram 2
Rajah 2

5(a)

1

(a) State the homologous series for but-1-ene.

Nyatakan siri homolog bagi but-1-ena.

.....

[1 mark]
[1 markah]

(b) Draw the structrural formula for two isomers of butan-1-ol.

Lukis formula struktur bagi dua isomer butan-1-ol.

5(b)

2

[2 marks]
[2 markah]

(c) Based on Reaction I, state the type of the reaction.

Berdasarkan Tindak balas I, nyatakan jenis tindak balas tersebut.

5(c)

1

.....

[1 mark]
[1 markah]

(d) Draw the set up of apparatus used in Reaction II

Lukis susunan radas yang digunakan dalam Tindak balas II.

5(d)

2

[2 marks]
[2 markah]

(e) In Reaction III, name the reagent used in this process.
Dalam tindak balas III, namakan reagen yang digunakan dalam proses ini.

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

5(e) 1

(f) Propanoic acid is added to butan-1-ol to produce compound P.
Asid propanoik ditambahkan kepada butan-1-ol untuk menghasilkan sebatian P.

(i) Write the chemical equation for the reaction.
Tulis persamaan kimia bagi tindak balas ini.

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

5(f)(i) 2

(ii) State one physical property of compound P.
Nyatakan satu sifat fizik bagi sebatian P.

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

5(f)(ii) 1

6 A student carried out an experiment to determine the heat of precipitation of lead(II) sulphate. 50 cm^3 of 2.0 mol dm^{-3} lead(II) nitrate, $Pb(NO_3)_2$ solution is mixed with 50 cm^3 of 2.0 mol dm^{-3} potassium sulphate, K_2SO_4 solution in a polystyrene cup to form a white precipitate of lead(II) sulphate, $PbSO_4$. The energy level diagram for the reaction is shown in Diagram 3.

Seorang pelajar menjalankan satu eksperimen untuk menentukan haba pemendakan plumbum(II) sulfat, $PbSO_4$. 50 cm^3 larutan plumbum(II) nitrat, $Pb(NO_3)_2$ 2.0 mol dm^{-3} dicampurkan dengan 50 cm^3 larutan kalium sulfat 2.0 mol dm^{-3} dalam satu cawan polistirena untuk membentuk mendakan putih plumbum(II) sulfat, $PbSO_4$. Gambarajah aras tenaga bagi tindak balas ini ditunjukkan dalam Rajah 3.

[Specific heat capacity of water = 4.2 J g^{-1} $^0C^{-1}$; Density of solution = 1.0 g cm^{-3}]
[Muatan haba tentu air = 4.2 J g^{-1} $^0C^{-1}$; Ketumpatan larutan = 1.0 g cm^{-3}]

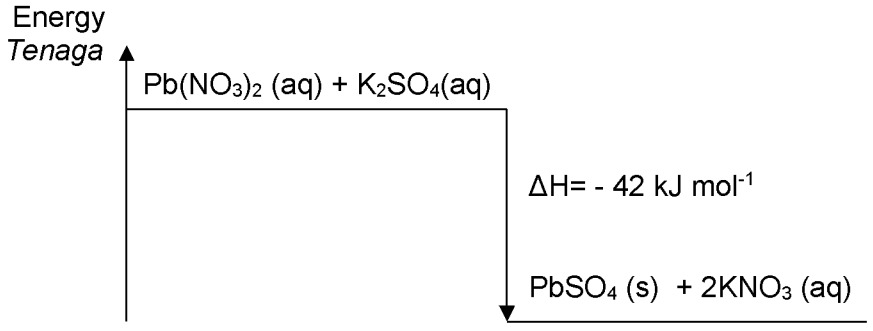


Diagram 3
Rajah 3

6(a)

1

(a) Why is a polystyrene cup used in this experiment?
Mengapa cawan polistirena digunakan dalam eksperimen ini?

……

[1 mark]
[1 markah]

(b) Based on the energy level diagram shown in Diagram 3,
Berdasarkan gambarajah aras tenaga yang ditunjukkan dalam Rajah 3,

6(b)(i)

1

(i) Explain the meaning of heat of precipitation for this reaction.
Terangkan maksud haba pemendakan bagi tindak balas ini.

……

……

[1 mark]
[1 markah]

6(b)(ii)

1

(ii) Write an ionic equation for the reaction.
Tulis persamaan ion bagi tindak balas itu.

……

[1 mark]
[1 markah]

6(b)(iii)

1

(iii) Calculate the number of moles of lead(II) sulphate, $PbSO_4$ formed.
Hitung bilangan mol bagi plumbum(II) sulfat, $PbSO_4$ yang terbentuk.

[1 mark]
[1 markah]

6(b)(iv)

1

(iv) Calculate the heat given out in the reaction.
Hitung haba yang dibebaskan dalam tindak balas itu.

[1 mark]
[1 markah]

(v) Determine the temperature change of the reaction.
Tentukan perubahan suhu bagi tindak balas tersebut.

6(b)(v)

1

[1 mark]
[1 markah]

(c) Give three information that can be obtained from the energy level diagram.
Beri tiga maklumat yang boleh diperoleh daripada gambar rajah aras tenaga.

……

……

……

……

……

6(c)

3

[3 marks]
[3 markah]

(d) The value of the heat of precipitation of lead(II) sulphate obtained in this reaction is less than the actual value. Give a reason.
Nilai haba pemendakan bagi plumbum(II) sulfat yang diperoleh adalah kurang daripada nilai sebenar. Beri satu sebab.

6(d)

……

……

1

[1 mark]
[1 markah]

Section B
Bahagian B

[20 marks]
[20 markah]

Answer **any one** question in this section.
*Jawab mana-mana **satu** soalan dalam bahagian ini.*

7 Experiment I is carried out to determine the rate of reaction between 25 cm^3 of 0.2 mol dm^{-3} hydrochloric acid and excess zinc powder. Diagram 4 shows the apparatus set-up for Experiment I.

Eksperimen I dijalankan untuk menentukan kadar tindak balas antara 25 cm^3 asid hidroklorik 0.2 mol dm^{-3} dan serbuk zink berlebihan. Rajah 4 menunjukkan susunan radas bagi Eksperimen I.

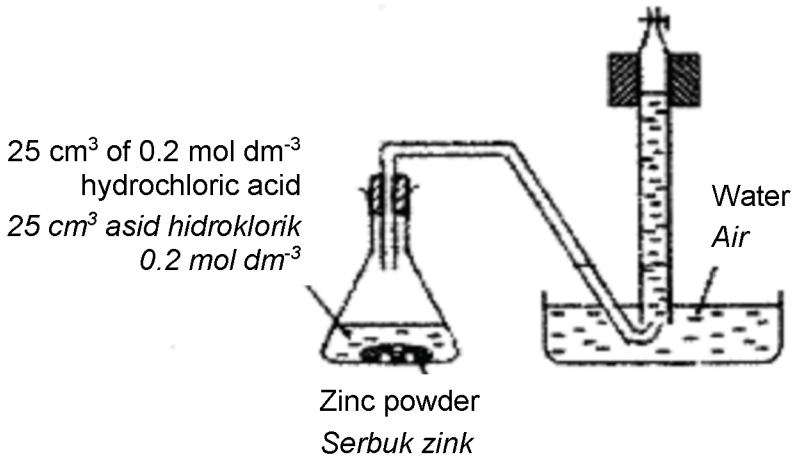


Diagram 4
Rajah 4

(a) Write a chemical equation for the reaction and calculate the maximum volume of hydrogen gas released.

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

Tulis persamaan kimia bagi tindak balas itu dan hitung isi padu maksimum gas hidrogen yang terbebas.

[Isi padu molar gas pada keadaan bilik ialah 24 dm^3mol^{-1}]

[5 marks]
[5 markah]

(b) The rate of reaction between zinc and hydrochloric acid can be changed by using catalyst.

Kadar tindak balas antara zink dan asid hidroklorik dapat diubah dengan menggunakan mangkin.

(i) Name **one** suitable catalyst that can be used in this reaction.

*Namakan **satu** mangkin yang sesuai digunakan dalam tindak balas ini.*

[1 mark]
[1 mark]

(ii) Draw the energy profile diagram for the reaction. Show in the diagram the activation energy without the use of catalyst, E_a and with the use of catalyst, E_a'.

Lukis gambarajah profil tenaga bagi tindak balas itu. Tunjukkan pada rajah tersebut tenaga pengaktifan tanpa menggunakan mangkin, E_a dan dengan menggunakan mangkin, E_a'.

[4 marks]
[4 markah]

(iii) Referring to the collision theory, explain how catalyst can affect the rate of the reaction.

Dengan merujuk kepada teori perlanggaran, terangkan bagaimana mangkin boleh mempengaruhi kadar tindak balas itu.

[4 marks]
[4 markah]

(iv) Catalysts are widely used in industries for the manufacturing of chemical based products. State **one** chemical process and name the catalyst used in that industrial process.

*Mangkin digunakan secara meluas dalam industri pembuatan produk berasaskan bahan kimia. Nyatakan **satu** proses kimia dan nama mangkin yang digunakan dalam proses industri tersebut.*

[2 marks]
[2 markah]

(c) Experiment II is also carried out under the same conditions except using 10 cm^3 of 0.5 mol dm^{-3} hydrochloric acid to replace 25 cm^3 of 0.2 mol dm^{-3} hydrochloric acid used in Experiment I.

Compare the rate of reaction and the maximum volume of hydrogen gas released for both of the experiments. Explain your answer.

Eksperimen II dijalankan pada keadaan-keadaan yang sama kecuali menggunakan 10 cm^3 asid hidroklorik 0.5 mol dm^{-3} untuk menggantikan 25 cm^3 asid hidroklorik 0.2 mol dm^{-3} yang digunakan dalam Eksperimen I.

Bandingkan kadar tindak balas serta isi padu maksimum gas hidrogen yang dibebaskan bagi kedua-dua eksperimen. Jelaskan jawapan anda.

[4 marks]
[4 markah]

8 (a) Diagram 5 shows the standard representation for three elements, P, Q and R. The letters are not the actual symbols of the elements.

Rajah 5 menunjukkan perwakilan piawai bagi tiga unsur, P, Q dan R. Huruf yang digunakan bukan simbol sebenar unsur.

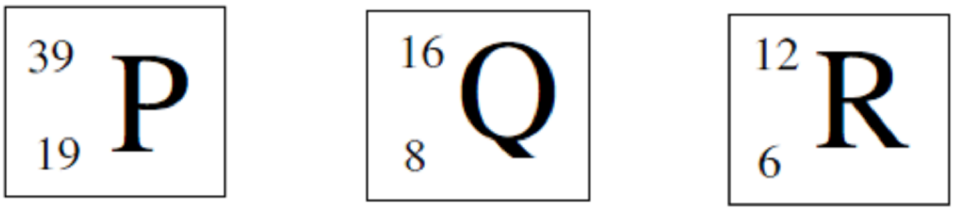


Diagram 5
Rajah 5

Based on Diagram 5,

Berdasarkan Rajah 5,

(i) State the position of element P in the Periodic Table. Explain how you obtain your answer.

Nyatakan kedudukan unsur P dalam Jadual Berkala. Terangkan bagaimana anda memperoleh jawapan anda.

[4 marks]
[4 markah]

(ii) Gas Q and element P react to produce a white solid.
Write a chemical equation for the reaction between gas Q and element P.

Gas Q dan unsur P bertindak balas untuk menghasilkan pepejal putih.
Tulis satu persamaan kimia bagi tindak balas di antara gas Q dan unsur P.

[2 marks]
[2 markah]

(iii) Elements Q and R react to form a compound. State the type of compound formed and explain the formation of the compound.

Unsur Q dan R bertindak balas membentuk satu sebatian. Nyatakan jenis sebatian yang terbentuk dan terangkan pembentukan sebatian tersebut.

[8 marks]
[8 markah]

(b) Table 5 shows the melting and boiling points of two chemical compounds at room temperature.

Jadual 5 menunjukkan takat lebur dan takat didih bagi dua sebatian kimia pada suhu bilik.

Compound ***Sebatian***	**Melting point (°C)** ***Takat lebur (°C)***	**Boiling point (°C)** ***Takat didih (°C)***
Tetrachloromethane *Tetraklorometana*	- 23	76.8
Aluminium oxide *Aluminium oksida*	2030	2970

Table 5
Jadual 5

Compare the melting and boiling points of tetrachloromethane and aluminium oxide.
Explain why the two compounds have different physical states at room temperature.

Bandingkan takat lebur dan takat didih tetraklorometana dan aluminium oksida.
Jelaskan mengapa kedua-dua sebatian tersebut mempunyai keadaan fizik yang berbeza pada suhu bilik.

[6 marks]
[6 markah]

Section C
Bahagian C

[20 marks]
[20 markah]
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Answer any **one** question from this section in this section.

*Jawab mana-mana s**atu** soalan daripada bahagian ini.*

9 (a) Define redox reaction.
Write a chemical equation showing an example of a redox reaction.
Based on the given chemical equation, identify the oxidising agent and reducing agent.

Takrifkan tindak balas redoks.
Tuliskan satu persamaan kimia yang menunjukkan contoh tindak balas redoks.
Berdasarkan persamaan kimia yang diberikan, kenalpasti agen pengoksidaan dan agen penurunan dalam tindak balas tersebut.

[5 marks]
[5 markah]

(b) Diagram 6.1 shows an iron padlock found on the door inside a house. Diagram 6.2 shows the same type of padlock on the door of a lighthouse at the seaside.

Rajah 6.1 menunjukkan sebuah mangga besi terjumpa pada pintu dalam sebuah rumah. Rajah 6.2 menunjukkan mangga jenis yang sama pada pintu sebuah rumah api di tepi laut.

Inside the house
Di dalam rumah

Diagram 6.1
Rajah 6.1

Beside the sea
Di tepi laut

Diagram 6.2
R*ajah 6.2*

(i) Explain why the iron padlock rusts easily at places near the sea?

Terangkan mengapakah mangga besi senang berkarat di tempat-tempat yang berdekatan dengan laut?

[2 marks]
[2 markah]

(ii) Suggest **two** methods that can be used to prevent the rusting of the padlock.

*Cadangkan **dua** cara yang boleh digunakan untuk mencegah pengaratan mangga tersebut.*

[2 marks]
[2 markah]

(c) The following statement is about redox reaction.

Pernyataan berikut adalah berkaitan dengan tindak balas redoks.

During a redox reaction, electrons are transferred from the reducing agent to the oxidizing agent. *Semasa tindak balas redoks, elektron dipindahkan daripada agen penurunan kepada agen pengoksidaan.*

Below is a list of apparatus provided to carry out a redox reaction.

Berikut ialah satu senarai radas yang dibekalkan untuk menjalankan tindak balas redoks.

- U-tube
  Tiub U
- Connecting wires
  Wayar penyambung
- Galvanometer
  Galvanometer
- Carbon electrodes
  Elektrod karbon

Using the apparatus provided and suitable chemicals, explain the above statement.

Dengan menggunakan radas yang dibekalkan dan bahan kimia yang sesuai, terangkan pernyataan di atas.

Your explanation should also include the following aspects:

Penerangan anda juga perlu melibatkan aspek-aspek berikut:

- Observations
  Pemerhatian
- Half equations
  Persamaan setengah
- Labelled diagram
  Gambar rajah berlabel

[11 marks]
[11 markah]

10 Diagram 7 shows the extraction of aluminium from molten aluminium oxide by electrolysis.

Rajah 7 menunjukkan pengekstrakan logam daripada leburan aluminium oksida melalui elektrolisis.

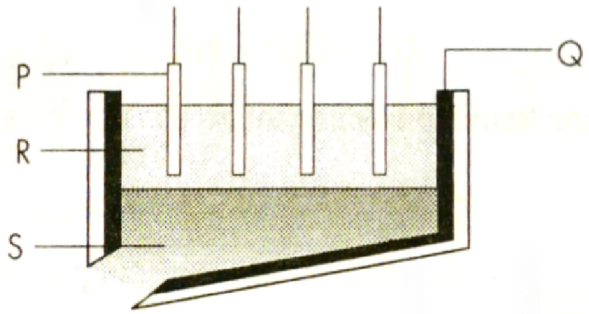

Diagram 7
Rajah 7

(a) Identify P, Q, R and S.
Q acts as the negative electrode of the cell. Write half equation at the negative electrode of the cell.

Kenalpasti P, Q, R and S.
Q bertindak sebagai elektrod negatif sel itu. Tulis persamaan setengah pada elektrod negatif sel itu.

[5 marks]
[5 markah]

(b) Before electrolysis, compound T is added to aluminium oxide. Name compound T and state its function.

Sebelum electrolysis, sebatian T ditambah kepada aluminium oksida. Namakan sebatian T dan nyatakan fungsinya.

[2 marks]
[2 markah]

(c) Electrolysis can be used in industries to electroplate metals with chromium.

Elektrolisis boleh digunakan dalam industri untuk menyadur logam dengan kromium.

(i) Suggest two reasons why chromium plating is used.

Nyatakan dua sebab mengapa penyaduran logam kromium digunakan.

[2 marks]
[2 markah]

(ii) Name one other metal that can be used to electroplate metals.

Namakan satu logam lain yang boleh digunakan untuk menyadurkan logam.

[1 mark]
[1 markah]

(d) A student wants to purify an impure copper plate by electrolysis.
Design an experiment in the laboratory to purify the impure copper plate.

Seorang pelajar ingin menulenkan sekeping kuprum tidak tulen melalui elektrolisis. Rancangkan satu eksperimen di makmal untuk menulenkan kepingan kuprum tidak tulen itu.

Your answer should include the following:

Jawapan anda perlu merangkumi yang berikut:

- Materials and apparatus needed
  Bahan dan radas yang diperlukan
- Diagram showing the set up of apparatus
  Gambar rajah susunan radas
- Experiment procedure
  Prosedur eksperimen
- Observation
  Pemerhatian
- Half equations involved
  Persamaan setengah yang terlibat.

[10 marks]
[10 markah]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT
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INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON
https://cikguadura.wordpress.com/

1. This question paper consists of three sections: **Section A**, **Section B** and **Section C**.
   Kertas soalan ini mengandungi tiga bahagian: Bahagian A, Bahagian B *dan* **Bahagian C**.

2. Answer **all** questions in **Section A.** Write your answers for **Section A** in the spaces provided in the question paper.
   Jawab **semua** *soalan dalam* **Bahagian A.** *Tuliskan jawapan bagi* **Bahagian A** *dalam ruang yang disediakan dalam kertas soalan.*

3. Answer **one** question from **Section B** and one question from **Section C**.
   Write your answers for Section B and Section C on the `writing paper' (examination pad)
   Answer questions in **Section B** and **Section C** in detail.
   You may use equations, diagrams, tables, graphs and other suitable methods to explain your answer.

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

4. 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 that you have done.
   Then write down the new answer.
   Sekiranya anda hendak membatalkan sesuatu jawapan, buat garisan di atas jawapan itu.

6. The diagrams in the questions are not drawn to scale unless stated.
   Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan.

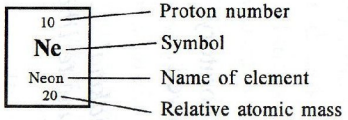
7. Marks allocated for each question or part question are shown in brackets.
   Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.

8. The time suggested to answer Section A is 90 minutes, Section B is 30 minutes and Section C is 30 minutes.
   Masa yang dicadangkan untuk menjawab Bahagian A *ialah 90 minit,* Bahagian B *ialah 30 minit dan* Bahagian C *ialah 30 minit.*

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

10. Hand in your answer sheets at the end of the examination.
    Serahkan semua kertas jawapan anda di akhir peperiksaan.

THE PERIODIC TABLE OF ELEMENTS



1 H Hydrogen 1																	2 He Helium 4
3 Li Lithium 7	4 Be Beryllium 9											5 B Boron 11	6 C Carbon 12	7 N Nitrogen 14	8 O Oxygen 16	9 F Flourine 19	10 Ne Neon 20
11 Na Sodium 23	12 Mg Magnesium 24											13 Al Aluminium 27	14 Si Silicon 28	15 P Phosphorus 31	16 S Sulphur 32	17 Cl Chlorine 35	18 Ar Argon 40
19 K Potassium 39	20 Ca Calcium 40	21 Sc Scandium 45	22 Ti Titanium 48	23 V Vanadium 51	24 Cr Chromium 52	25 Mn Manganese 55	26 Fe Iron 56	27 Co Cobalt 59	28 Ni Nickel 59	29 Cu Copper 64	30 Zn Zinc 65	31 Ga Gallium 70	32 Ge Germanium 73	33 As Arsenic 75	34 Se Selenium 79	35 Br Bromine 80	36 Kr Krypton 84
37 Rb Rubidium 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	48 In Indium 115	50 Sn Tin 119	51 Sb Antimony 122	52 Te Tellurium 128	53 I Iodine 127	54 Xe Xenon 131
55 Cs Cesium 133	56 Ba Barium 137	57 La Lanthanum 139	72 Hf Hafnium 179	73 Ta Tantalum 181	74 W Tungsten 184	75 Re Rhenium 186	76 Os Osmium 190	77 Ir Iridium 192	78 Pt Platinum 195	79 Au Gold 197	80 Hg Mercury 201	81 Tl Thallium 204	82 Pb Lead 207	83 Bi Bismuth 209	84 Po Polonium 210	85 At Astatine 210	86 Rn Radon 222
87 Fr Francium 223	88 Ra Radium 226	89 Ac Actinium 227	104 Unq Unnil-quadium 257	105 Unp Unnil-pentium 260	106 Unh Unnil-hexium 263	107 Uns Unnilseptium 262	108 Uno Unniloctium 265	109 Une Unnilennium 266									

58 Ce Cerium 140	59 Pr Praseo-dymium 141	60 Nd Neodymium 144	61 Pm Promethium 147	62 Sm Samarium 150	63 Eu Europium 152	64 Gd Gadolinium 157	65 Tb Terbium 159	66 Dy Dysprosium 163	67 Ho Holmium 165	68 Er Erbium 167	69 Tm Thulium 169	70 Yb Ytterbium 173	71 Lu Lutetium 175
90 Th Thorium 232	91 Pa Proactinium 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 Ein-steinium 254	100 Fm Fermium 253	101 Md Mendele-vium 256	102 No Nobelium 254	103 Lr Lawrensium 257

Reference: Chang, Raymond (1991). Chemistry. McGraw-Hill, Inc.

NAMA

TINGKATAN

MAJLIS PENGETUA SEKOLAH MALAYSIA
CAWANGAN PULAU PINANG

MODUL LATIHAN BERFOKUS SPM 2015
4541/3

KIMIA
Kertas 3
Ogos
1 ½ jam

https://cikguadura.wordpress.com/

Satu jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tulis **nama** dan **tingkatan** anda pada ruang yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan dalam Bahasa Inggeris mendahului soalan yang sepadan dalam Bahasa Melayu.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam Bahasa Inggeris atau Bahasa Melayu.*
5. *Calon dikehendaki membaca maklumat di halaman 10 kertas soalan ini.*

Soalan	Markah penuh	Markah diperoleh
1	33	
2	17	
Jumlah	50	

Kertas soalan ini mengandungi 10 halaman bercetak

[Lihat halaman sebelah

Answer **all** questions.
*Jawab **semua** soalan.*
https://cikguadura.wordpress.com/

1 Diagram 1 shows the apparatus set-up used in an experiment to investigate the effect of temperature on the rate of reaction between sodium thiosulphate solution and sulphuric acid.

Rajah 1 menunjukkan susunan radas yang digunakan dalam satu eksperimen untuk mengkaji kesan suhu terhadap kadar tindak balas antara larutan natrium tiosulfat dengan asid sulfurik.

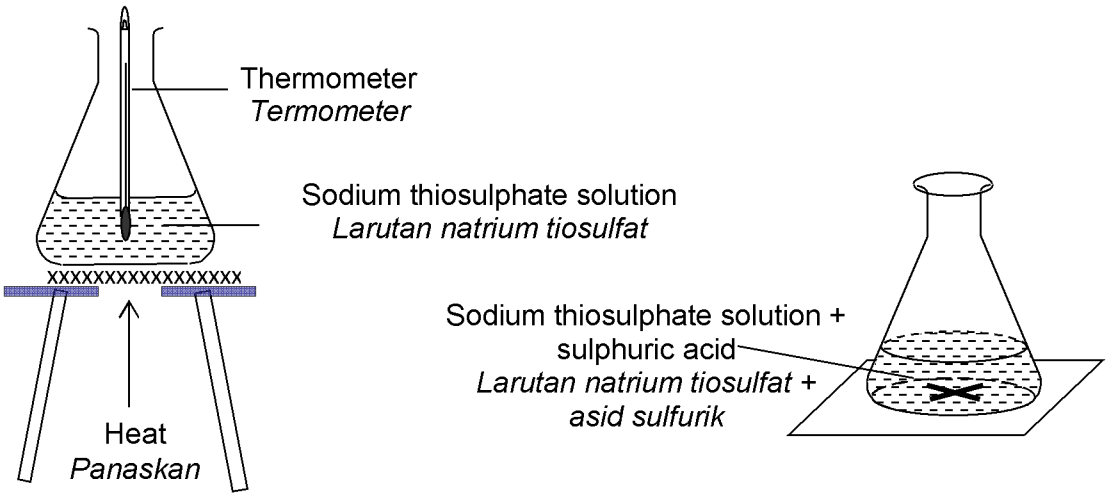


Diagram 1
Rajah 1

50 cm^3 of 0.05 mol dm^{-3} sodium thiosulphate solution is poured into a 250 cm^3 conical flask at the temperature of 30 °C. 10 cm^3 of 1.0 mol dm^{-3} hydrochloric acid is added to the conical flask. At the same time, the stopwatch is started. The conical flask is swirled a few times before putting it on a piece of paper with a mark 'X' at the centre. Time taken for the mark 'X' to disappear from sight is then recorded.

50 cm^3 larutan natrium tiosulfat 0.05 mol dm^{-3} dituang ke dalam sebuah kelalang kon 250 cm^3 pada suhu 30 °C. 10 cm^3 asid hidroklorik 1.0 mol dm^{-3} ditambah ke dalam kelalang kon itu. Pada masa yang sama, jam randik dimulakan. Kelalang kon digoncang beberapa kali sebelum diletakkan di atas kertas yang bertanda 'X' di bahagian tengah. Masa yang diambil untuk tanda 'X' tidak kelihatan direkodkan kemudian.

The experiment is repeated by heating the sodium thiosulphate solution to the temperature of 35 °C, 40 °C and 45 °C.

Eksperimen diulang dengan memanaskan larutan natrium tiosulfat ke suhu 35 °C, 40 °C dan 45 °C.

Table 1 shows the data collected in the experiment.
Jadual 1 menunjukkan data yang dikumpul dalam eksperimen ini.

Experiment *Eksperimen*	Temperature (°C) *Suhu (°C)*	Time taken for mark 'X' to disappear from sight (s) *Masa yang diambil untuk tanda 'X' tidak kelihatan (s)*	$\frac{1}{time}$ (s^{-1}) $\frac{1}{masa}$ (s^{-1})
1	30	33	
2	35	24	
3	40	19	
4	45	16	

Table 1
Jadual 1

(a) Complete Table 1 by recording the values of $\frac{1}{time}$.

Lengkapkan Jadual 1 dengan merekod nilai $\frac{1}{masa}$.

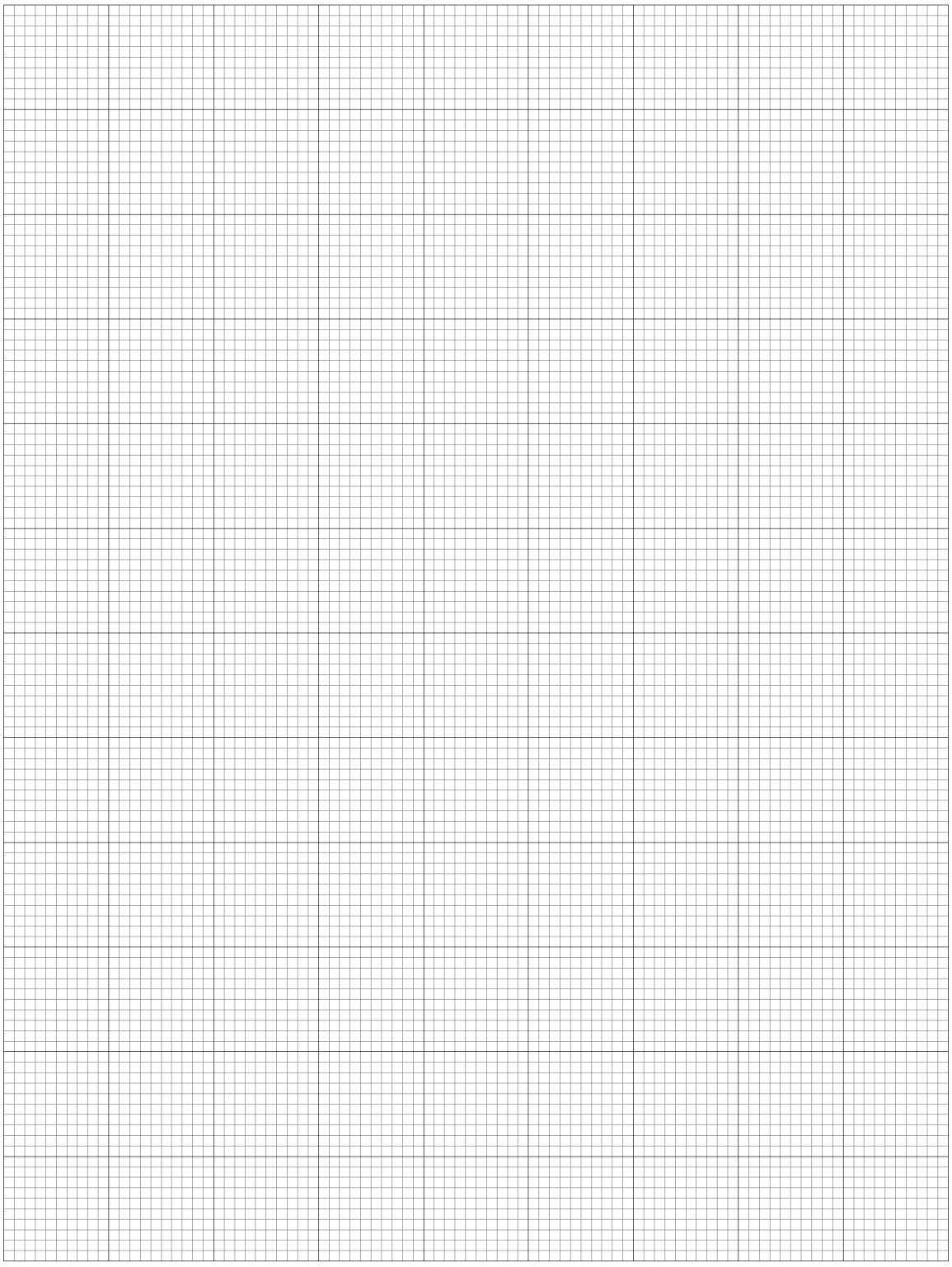
[3 marks]
[3 markah]

1(a)

3

(b) Plot a graph of temperature of sodium thiosulphate solution against $\frac{1}{time}$.

Plotkan satu graf suhu larutan natrium tiosulfat melawan $\frac{1}{masa}$.



1(b)

3

[3 marks]
[3 markah]

(c) State the operational definition for rate of reaction.

Nyatakan definisi secara operasi bagi kadar tindak balas.

.....

.....

[3 marks]
[3 markah]

1(c) 3

(d) Predict the time needed for mark 'X' to disappear from sight if the experiment is carried out at the temperature of 50 °C.

Ramalkan masa yang diperlukan untuk tanda 'X' tidak kelihatan jika eksperimen dijalankan pada suhu 50 °C.

.....

[3 marks]
[3 markah]

1(d) 3

(e) What can be observed in the conical flask when sulphuric acid is added to sodium thiosulphate solution?

Apakah yang dapat diperhatikan pada kelalang kon apabila asid sulfurik ditambah kepada larutan natrium tiosulfat?

.....

[3 marks]
[3 markah]

1(e) 3

(f) Based on the observation in (a), state the inference for the reaction occurred.

Berdasarkan pemerhatian dalam (a), nyatakan inferens bagi tindak balas yang berlaku.

.....

.....

[3 marks]
[3 markah]

1(f) 3

(g) Based on this experiment, state:

Berdasarkan eksperimen ini, nyatakan:

i) The manipulated variable

Pemboleh ubah dimanipulasikan

.....

ii) The responding variable

Pemboleh ubah bergerak balas

.....

iii) The fixed variable

Pemboleh ubah dimalarkan

1(g)

3

.....

[3 marks]
[3 markah]

(h) State the hypothesis for this experiment.

Nyatakan hipotesis bagi eksperimen ini.

1(h)

3

.....

.....

[3 marks]
[3 markah]

(i) Milk can last longer when it is kept in refrigerator as compared to kitchen cabinet. Using your knowledge of chemistry, state the relationship between temperature and rate at which the milk turns bad.

Susu boleh tahan lebih lama apabila disimpan dalam peti sejuk jika dibanding dengan almari dapur. Dengan menggunakan pengetahuan kimia anda, nyatakan hubungan antara suhu dengan kadar di mana susu menjadi basi.

1(i)

3

.....

[3 marks]
[3 markah]

(j) Classify the ions present in sodium thiosulphate solution into cation and anion.

Kelaskan ion-ion yang hadir dalam larutan natrium tiosulfat kepada kation dan anion.

1(j)

[3 marks]
[3 markah]

3

(k) Ali's mother usually used yeast to raise the dough when making bread. However, the dough would not rise effectively as required. One day, Ali came across an article about baking powder. According to the article, baking powder contains a mixture of sodium bicarbonate, cream of tartar, a dry acid, and corn starch that acts as a drying agent. When liquid is added to the baking powder, cream of tartar will react with sodium bicarbonate as represented by the following equation.

$$NaHCO_3 + KHC_4H_4O_6 \rightarrow KNaC_4H_4O_6 + H_2O + CO_2$$

After studying the article, Ali suggested to his mother that she should add baking powder to the bread dough rather than solely using the yeast. He also suggested that the dough should be placed under a filament light bulb so that it can rise effectively.

Ibu Ali biasanya menggunakan yis untuk menaikkan adunan semasa membuat roti. Namun begitu, adunan tidak naik dengan berkesan seperti yang diimpikan. Suatu hari, Ali terbaca satu artikel tentang serbuk penaik. Berdasarkan artikel itu, serbuk penaik mengandungi campuran natrium bikarbonat, krim tartar, suatu asid kering, dan tepung jagung yang bertindak sebagai agen pengering. Apabila cecair ditambah kepada serbuk penaik, krim tartar akan bertindak balas dengan natrium bikarbonat seperti yang diwakili dengan persamaan kimia yang berikut.

$$NaHCO_3 + KHC_4H_4O_6 \rightarrow KNaC_4H_4O_6 + H_2O + CO_2$$

Setelah mengkaji artikel tersebut, Ali mencadangkan kepada ibunya untuk menambahkan serbuk penaik kepada adunan roti daripada hanya menggunakan yis. Dia juga mencadangkan adunan itu perlu diletak di bawah mentol berfilamen supaya ianya dapat naik dengan berkesan.

Based on the situation above, explain why Ali made that suggestion to his mother.

Berdasarkan situasi di atas, terangkan mengapa Ali membuat cadangan tersebut kepada ibunya.

.....

.....

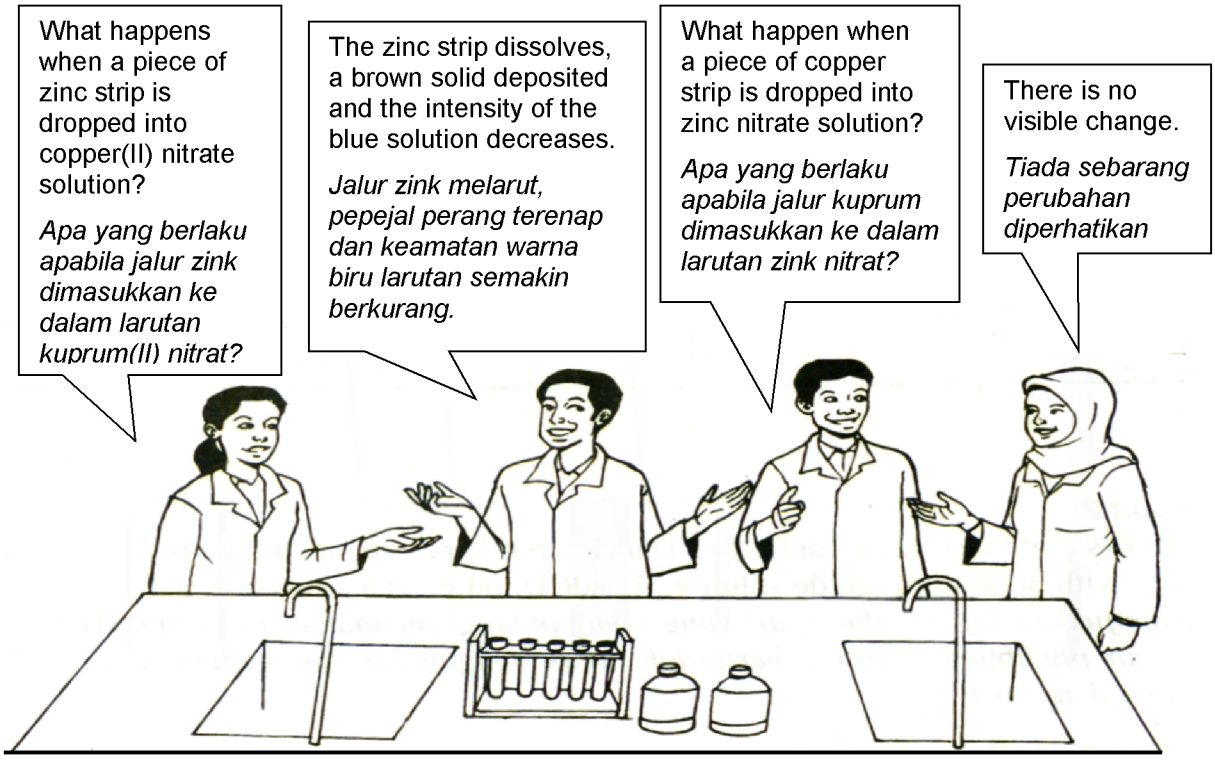
.....

1(k)

[3 marks]
[3 markah]

3

2



Referring to the above conversation, plan a laboratory experiment to construct the electrochemical series based on the ability of a metal to displace another metal from its salt solution.
You are given copper strip, lead strip, iron nail, zinc strip, magnesium ribbon, sandpaper and several nitrate salt solutions.

Merujuk kepada perbualan di atas, rancang satu eksperimen makmal untuk membina siri elektrokimia berdasarkan keupayaan logam menyesarkan logam lain daripada larutan garamnya.
Anda dibekalkan dengan jalur kuprum, jalur plumbum, paku besi, jalur zink, pita magnesium, kertas pasir dan beberapa larutan garam nitrat.

Your planning should include the following aspects:

Perancangan anda hendaklah mengandungi aspek-aspek berikut:

(a) Problem statement
Penyataan masalah

(b) All the variables
Semua pembolehubah

(c) Statement of the hypothesis
Penyataan hipotesis

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

(e) Procedure for the experiment
Prosedur eksperimen

(f) Tabulation of data
Penjadualan data

[17 marks]
[17 markah]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

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1. This question paper consists of two questions: **Question 1 and Question 2.**

   Kertas soalan ini mengandungi dua soalan: ***Soalan 1 dan Soalan 2****.*

2. Answer **all** the questions. You may use equations, diagrams, tables, graphs and other suitable method to explain your answers.

   Jawab ***semua*** *soalan. Anda boleh menggunakan persamaan, rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda.*

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

   Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

4. The marks allocated for each question or sub-part of a question are shown in brackets.

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

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

   Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.

6. You are advised to spend 45 minutes to answer **Question 1** and 45 minutes for **Question 2**.

   Anda dinasihati supaya mengambil masa 45 minit untuk menjawab ***Soalan 1*** *dan 45 minit untuk* ***Soalan 2****.*

Marks awarded:

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

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SKEMA JAWAPAN

MODUL LATIHAN BERFOKUS

SPM 2015

KIMIA KERTAS 1

4541/1

JAWAPAN KIMIA KERTAS 1 https://cikguadura.wordpress.com/

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

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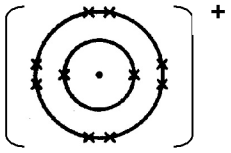
SKEMA JAWAPAN

MODUL LATIHAN BERFOKUS

SPM 2015

KIMIA KERTAS 2

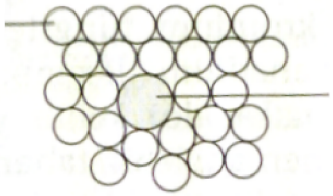
4541/2

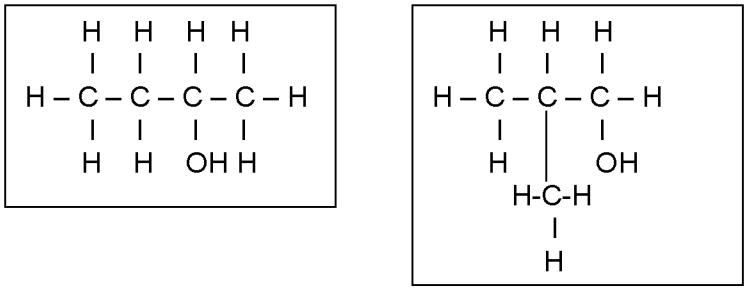
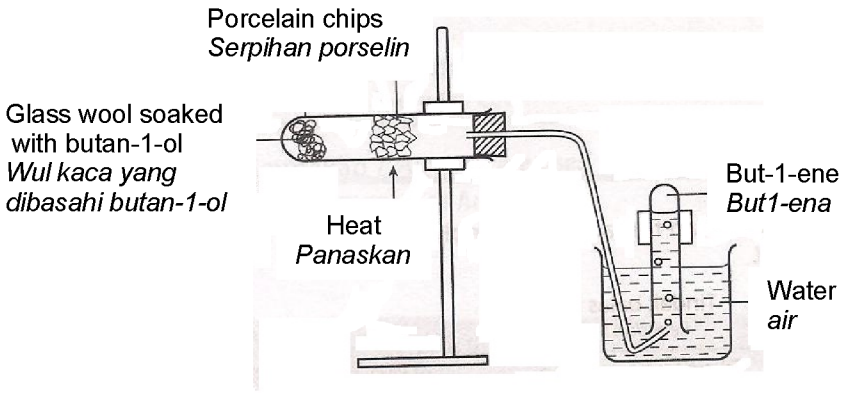
Question No		Mark Scheme https://cikguadura.wordpress.com/	Sub Mark	Total Mark
1 (a)	(i)	Nucleon number	1	1
	(ii)		1	1
	(iii)	17	1	1
1 (b)	(i)	Carbon	1	1
	(ii)	Number of moles of RO_2 = $\frac{0.672}{22.4}$ = 0.03 mol Mass of RO_2 = 0.03 x 44 = 1.32 g	1 1	2
	(iii)	Number of molecules = 0.03 x 6.02 x 10^{23} = 1.806 x 10^{22}	1	1
1 (c)	1. 2. 3.	Number of moles of Ag_2CO_3 = $\frac{13.8}{276}$ = 0.05 mol 2 mol Ag_2CO_3 produce 1 mol O_2 0.05 mol Ag_2CO_3 produce 0.025 mol of CO_2 Volume of CO_2 = 0.025 × 24 dm^3 = 0.6 dm^3	1 1 1	3
			Total	**10**

Question No		Mark Scheme	Sub Mark	Total Mark
2 (a)	(i)	Decrease.	1	1
	(ii)	1. The proton number / positive charge of the nucleus increases across the period, 2. Stronger nucleus attraction on the electrons in the shells pulls the electrons closer to the nucleus	1 1	2
2 (b)		Increases	1	1
2 (c)	(i)	Sodium oxide / Na_2O	1	1
	(ii)	$Na_2O + H_2O \rightarrow 2\ NaOH$ Correct chemical formulae of reactants and products Balanced equation	 1 1	 2
	(iii)	Aluminium oxide	1	1
2 (d)		1. Ar atom has achieved stable octet electron arrangement. 2. Ar atom does not release, receive or share electrons with other atoms.	1 1	2
			Total	**10**

Question No		Mark Scheme	Sub Mark	Total Mark
3 (a)	(i)	Alkali which ionizes/dissociates completely in water to form high concentration of hydroxide ions	1	1
	(ii)	X	1	1
	(iii)	It has the lowest pH value	1	1
3 (b)	(i)	1. Filter and rinse the compound S 2. Dry the compound S between filter papers	1 1	2
	(ii)	$Pb(NO_3)_2 + CuCl_2 \longrightarrow PbCl_2 + Cu(NO_3)_2$ Correct chemical formulae of reactants and products Balanced equation	 1 1	2
	(iii)	Number of moles $Pb(NO_3)_2$ / $CuCl_2$ = $\frac{50x0.2}{1000}$ = 0.01 mol Number of moles $PbCl_2$ = Number of moles $Pb(NO_3)_2$ = 0.01 mol Mass of compound S, $PbCl_2$ = 0.01 x [207 + 2(35.5)] = 2.78 g	1 1 1	3
			Total	**10**

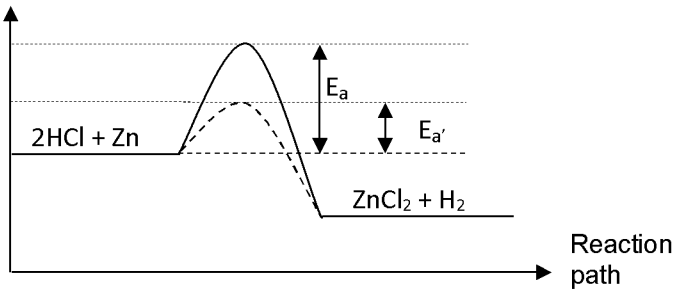
Question No		Mark Scheme	Sub Mark	Total Mark
4 (a)	(i)	200 atm	1	1
	(ii)	Iron	1	1
	(iii)	450 °C	1	1
	(iv)	$2NH_3 + H_2SO_4 \rightarrow (NH_4)_2SO_4$ Correct formula of reactants and product Balanced equation	 1 1	2
(b)	(i)	S : Brass T : Duralumim	1 1	2

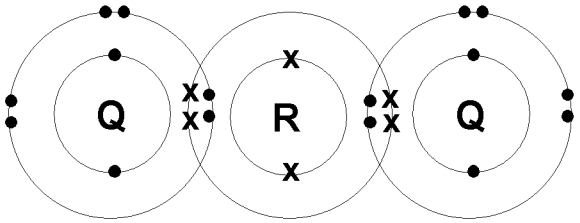
	(ii)	Pure atom *Atom tulen*  Foreign atom *Atom asing*	1	1
	(iii)	1 The presence of foreign/zinc atoms which have different size from pure/copper atoms disturb the orderly arrangement of pure/ copper atoms 2 This prevents the layers of pure/copper atoms from sliding easily over one another	1 1	2
			Total	**10**

Question No		Mark Scheme	Sub Mark	Total Mark
5 (a)		Alkene	1	1
5 (b)			1+1	2
5 (c)		Hydration	1	1
5 (d)		 Functional diagram Labelled diagram	 1 1	 2

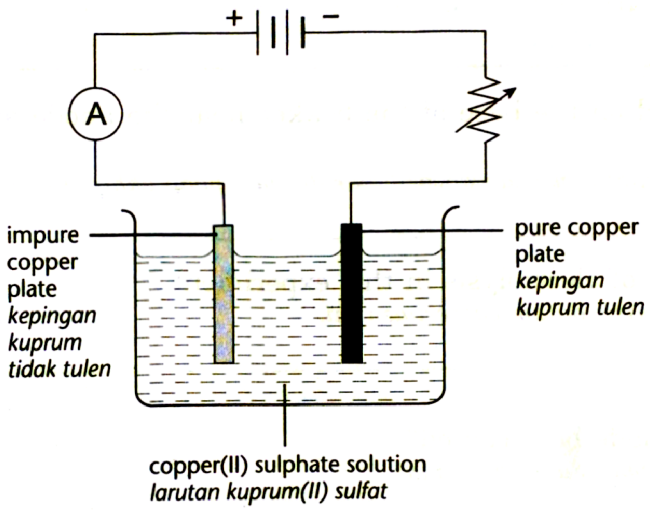
5 (e)		Acidified potassium manganate(VII) // Acidified potassium dichromate(VI)	1	1
5 (f)	(i)	$C_2H_5COOH + C_4H_9OH \longrightarrow C_2H_5COOC_4H_9 + H_2O$ Correct chemical formula of reactants and products Balanced equation	 1 1	 2
	(ii)	Sweet / pleasant / fruity smell	1	1
			Total	**10**

Question No		Mark Scheme	Sub Mark	Total Mark
6 (a)		To reduce heat loss to the surroundings // Polystyrene cup is a good insulator	1	1
6 (b)	(i)	Heat released when 1 mole of lead(II) sulphate is formed from lead(II) / Pb^{2+} ions and sulphate / SO_4^{2-} ions.	1	1
	(ii)	$Pb^{2+} + SO_4^{2-} \rightarrow PbSO_4$	1	1
	(iii)	Number of moles of $PbSO_4 = \frac{2.0 \times 50}{1000} = 0.1$ mol	1	1
	(iv)	1 mol $PbSO_4$ produced 42000 J 0.1 mol $PbSO_4$ produced 0.1 x 42000 J = 4200 J	1	1
	(v)	Heat change = mcθ 4200 J = 100 X 4.2 x θ θ = 10 °C	1	1
6 (c)		1. Reactants: $Pb(NO_3)_2$ and K_2SO_4 2. Products: $PbSO_4$ and KNO_3 3. Total energy content of $Pb(NO_3)_2$ and K_2SO_4 is higher than the total energy content of $PbSO_4$ and KNO_3 4. The reaction is exothermic 5. 42 KJ energy is released when I mole of $PbSO_4$ is formed	1 1 1 1 1	3 (any three)
6 (d)		Heat is lost to the surrounding // Thermometer and polystyrene absorb some heat.	1	1
			Total	**10**

Question No		Mark Scheme https://cikguadura.wordpress.com/	Sub Mark	Total Mark
7 (a)		$2HCl + Zn \longrightarrow ZnCl_2 + H_2$ 1. Correct chemical formula of reactants and products 2. Balanced equation 3. No. of moles of HCl = 0.2 x 25 /1000 = 0.005 4. No. of moles of H_2 = ½ x No. of moles of HCl = 0.0025 5. Volume of H_2 = 0.0025 x 24 = 0.06 dm^3	 1 1 1 1 1	 5
7 (b)	(i)	Copper(II) sulphate solution	1	1
	(ii)	Energy  1. Label Energy on the y-axis 2. Energy level of reactants is higher than the products 3. Correct position of E_a 4. Correct position of $E_{a'}$	 1 1 1 1	 4
	(iii)	1. Catalyst increases the rate of reaction 2. Copper(II) sulphate / Catalyst lowers the activation energy // Copper(II) sulphate / Catalyst provides an alternative path with a lower activation energy 3. More zinc atoms and hydrogen ions are able to achieve the lower activation energy 4. The frequency of effective collision increases	1 1 1 1	 4
	(iv)	1. Haber process, iron 2. Contact process, vanadium(V) oxide 3. Ostwald process, platinum (**Any one**)	1 + 1	2
7 (c)		1. Rate of reaction in Experiment II is higher than in Experiment I. 2. The concentration of hydrochloric acid / H^+ ions used in Experiment II is higher than in Experiment I. 3. The maximum volume of hydrogen gas released from both experiments is the same. 4. The number of moles of hydrochloric acid used in both experiments is the same.	1 1 1 1	 4
			Total	**20**

Question No		Mark Scheme	Sub Mark	Total Mark
8 (a)	(i)	1. P is in Group 1 and 2. Period 4 3. Group 1 because atom P has one valence electron 4. Period 4 because atom P has four shells occupied with electrons	1 1 1 1	4
	(ii)	$4\ P + Q_2 \rightarrow 2\ P_2Q$ Correct chemical formula of reactants and products Balanced equation	 1 1	2
	(iii)	1. Covalent compound 2. Atom R has electron arrangement of 2.4 and four valence electrons 3. Atom Q has electron arrangement of 2.6 and six valence electrons 4. Each atom R contributes 4 electrons and each atom Q contributes 2 electrons for sharing 5. to achieve stable [octet] electron arrangement 6. One atom R shares electrons with two atoms 7. to form two double covalent bonds 8. Diagram showing the correct electron arrangement of the compound formed Correct number of shells of each atom Correct number of electrons of each atom  	1 1 1 1 1 1 1 1 1 (any 8)	8 max
8 (b)		1. Magnesium oxide is an ionic compound 2. Strong electrostaticforces [forces of attraction] between Mg^{2+} and O^{2-} ions [oppositely-charged magnesium and oxide ions] 3. More heat energy is needed to overcome the strong forces of attraction between ions 4. Tetrachloromethane is a covalent compound 5. Weak intermolecular / Van der Waals forces of attraction between molecules 6. Less heat energy is needed to overcome the weak forces of attraction between molecules	1 1 1 1 1 1	6
			Total	**20**

Question No		Mark Scheme https://cikguadura.wordpress.com/	Sub Mark	Total Mark
9 (a)		Redox reaction is a reaction that involves oxidation and reduction that occur at the same time. Example of redox reaction : $2Mg + O_2 \rightarrow 2MgO$ Mg is reducing agent O_2 is oxidizing agent. [accept any possible answers]	1 1 1 1	4
9 (b)	(i)	1. The sea breeze contains salts which increase the electrical conductivity of water. 2. This makes the water a better electrolyte and therefore speeds up the rusting / corrosion of the iron padlock.	1 1	2
	(ii)	1. Attach the iron padlock to a more electropositive metal which acts as the sacrificial metal. 2. Coat/Galvanise the iron padlock with a thin layer of zinc. 3. Coat the iron padlock with a thin layer of tin // Tin plating 4. Electroplate the iron padlock with rust- resistant metals such as chromium/nickel // Alloying 5. Paint the iron padlock (any four)	1 1 1 1	4
9 (c)		1. Chemicals used • Bromine water // any suitable oxidising agent • Iron(II) sulphate solution // any suitable reducing agent 2. Functional diagram 3. Correct label 4. The needle of galvanometer deflects / shows reading 5. Brown bromine water turns colourless 6. Green iron(II) sulphate solution turns yellow / brown 7. Iron(II) ion is oxidised to iron(III) ion 8. $Fe^{2+} \rightarrow Fe^{3+} + e$ 9. Bromine molecules are reduced to bromide ions 10. $Br_2 + 2e \rightarrow 2Br^-$ 11. Electrons are transferred from the electrode dipped in iron(II) sulphate solution to the electrode dipped in bromine water	 1 1 1 1 1 1 1 1 1 1 1 1	Max 11
			Total	**20**

Question No		Mark Scheme	Sub Mark	Total Mark
10 (a)		P – Carbon anode Q – Carbon cathode R – Molten aluminium oxide S – Molten aluminium Half equation : $Al^{3+} + 3e \rightarrow Al$	1 1 1 1 1	5
10 (b)		1. Cryolite 2. To reduce / lower the melting point of aluminium oxide	1 1	2
10 (c)	(i)	1. Improve the appearance of metals 2. Prevent rusting / corrosion	1 1	2
	(ii)	Silver / Nickel	1	1
10 (d)		Materials : Impure copper plate and pure copper plate, copper(II) sulphate solution Apparatus : Batteries, connecting wires with crocodile clips, ammeter, rheostat, beaker Diagram :  Functional diagram Correct label Procedure : 1 Impure copper plate is made the anode. 2 Pure copper plate is made the cathode. 3 Both plates/electrodes are dipped/immersed into copper(II) sulphate solution. 4 The circuit is completed by allowing the electric current to flow through the electrolyte.	1 1 1 1 1 1 1 1	

	Observation : Anode : Impure copper plate dissolves / becomes thinner Cathode : Pure copper plate becomes thicker Half equations: Anode : $Cu \rightarrow Cu^{2+} + 2e$ Cathode : $Cu^{2+} + 2e \rightarrow Cu$	 1 1 1 1 (any 10)	10
https://cikguadura.wordpress.com/		**Total**	**20**

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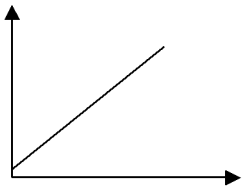
SKEMA JAWAPAN
MODUL LATIHAN BERFOKUS
SPM 2015
KIMIA KERTAS 3
4541/3

JAWAPAN KIMIA KERTAS 3

Question	Mark Scheme https://cikguadura.wordpress.com/	Marks
1(a)	*Able to record all the values in three decimal places and with correct unit.* Answer: Experiment 1: 0.030 s Experiment 2: 0.042 s Experiment 3: 0.053 s Experiment 4: 0.063 s	3
	Able to record at least three values in two / three decimal places and with / without unit.	2
	Able to record the at least 2 values correctly.	1
	No response or wrong response	0

Question	Mark Scheme	Marks
1(b)	*Able to plot the graph with the following aspects:* • *Labelled axes with correct units* • *Uniform scales* • *Transfer of points correct* • *≥ ½ graph paper*	3
	Able to plot the graph with the following aspects: • *Labelled axes without units* • *Uniform scales* • *Transfer of points*	2
	Able to give an idea of the graph Sample answer: 	1
	No response or wrong response	0

Question	Mark Scheme	Marks
1(c)	*Able to define operationally the rate of reaction with the following aspects:* 1. *What would be observed* 2. *What is done* 3. *Relationship* Sample answer: Rate of reaction is the time taken for the mark 'X' to disappear from sight when hydrochloric acid is added into sodium thiosulphate solution in which the shorter the time taken, the higher the rate of reaction.	3
	Able to state the operational definition less correctly. Sample answers: Time taken for the mark 'X' to disappear // The shorter the time taken, the higher the rate of reaction	2
	Able to give an idea of rate of reaction. Sample answers: Speed of the reaction // Time taken shorter	1
	No response or wrong response	0

Question	Mark Scheme	Marks
1(d)	*Able to predict the time taken for mark 'X' to disappear from sight correctly.* Sample answer: Able to show from the graph $\frac{1}{0.075}$ = 13.33 s Time = 13.33 s	3
	Able to predict the time taken for mark 'X' to disappear from sight less accurately. Sample answer: 15 s // 0.075 s	2
	Able to state an idea of the time taken Sample answer: Less than 16 s // ≤ 14 s	1
	No response or wrong response	0

Question	Mark Scheme	Marks
1(e)	*Able to state the observation correctly.* Sample answer: Yellow precipitate is produced // Mark 'X' disappears from sight	3
	Able to state the observation less correctly. Sample answer: Sulphur precipitate is produced // Mark 'X' disappears // Yellow colour is formed.	2
	Able to give an idea of the observation. Sample answer: Solution changes colour	1
	No response or wrong response	0

Question	Mark Scheme	Marks
1(f)	*Able to state the inference correctly.* Sample answer: Sulphur is produced // Mark 'X' is covered by sulphur precipitate	3
	Able to state the inference less accurately. Sample answer: Precipitate formed	2
	Able to give an idea of the inference. Sample answers: Reaction occurs	1
	No response or wrong response	0

Question	Mark Scheme	Marks
1(g)	*Able to state all variables correctly*: Sample answer: **Manipulated variable**: Temperature of sodium thiosulphate solution **Responding variable**: Rate of reaction // Time taken for mark 'X' to disappear from sight **Fixed variable**: Concentration and volume of sulphuric acid / sodium thiosulphate solution	3
	*Able to state **any two** variables correctly.*	2
	*Able to state **any one** variable correctly.*	1
	No response or wrong response	0

Question	Mark Scheme	Marks
1(h)	*Able to state the relationship between the manipulated variable and the responding variable with direction correctly*: Sample answer: 1. The higher the temperature of sodium thiosulphate solution, the shorter the time taken for mark 'X' to disappear from sight // 2. The higher the temperature of sodium thiosulphate solution, the higher the rate of reaction	3
	Able to state the relationship between the manipulated variable and the responding variable with direction but less correctly. Sample answers: The higher the temperature of sodium thiosulphate solution, the shorter the time taken for mark 'x' to disappear	2
	Able to give an idea of hypothesis. Sample answers: Temperature affects the rate of reaction	1
	No response or wrong response	0

Question	Mark Scheme	Marks
1(i)	*Able to state the relationship between the temperature and the rate at which the milk turns bad correctly* Sample answer: When the temperature increases, the rate at which the milk turns bad also increases.	3
	Able to state the relationship but less correctly Sample answer: 1. The higher the temperature, the faster the rate at which the milk turns bad // 2. The higher the rate at which the milk turns bad, the higher the temperature.	2
	Able to state an idea of relationship: Sample answer: Different temperature will have different rate	1
	No response or wrong response	0

<table>
<tr><th>Question</th><th>Mark Scheme</th><th>Marks</th></tr>
<tr><td>1(j)</td><td>Able to classify the cation and anion correctly

<u>Sample answer</u>:

<table><tr><th>Cation</th><th>Anion</th></tr><tr><td>Sodium ion
Hydrogen ion</td><td>Thiosulphate ion
Hydroxide ion</td></tr></table></td><td>3</td></tr>
<tr><td></td><td>Able to classify any two ions correctly.</td><td>2</td></tr>
<tr><td></td><td>Able to classify any one ion correctly.</td><td>1</td></tr>
<tr><td></td><td>No response or wrong response</td><td>0</td></tr>
</table>

Question	Mark Scheme	Marks
1(k)	*Able to give the correct explanation* <u>Sample answer</u>: Baking powder will provide more carbon dioxide gas that can raise the dough rather than yeast. Under the filament bulb, the temperature is higher. This increases the rate of reaction between cream of tartar and sodium bicarbonate to produce carbon dioxide gas.	3
	Able to give the explanation less correctly <u>Sample answer</u>: Under higher temperature the rate of reaction to produce carbon dioxide is higher.	2
	Able to give an idea for the explanation <u>Sample answer</u>: Baking powder will provide carbon dioxide gas	1
	No response or wrong response	0

Question	Mark Scheme https://cikguadura.wordpress.com/	Marks
2(a)	*Able to state the problem statement correctly*. Sample answer: How can the electrochemical series be constructed based on the ability of a metal to displace another metal from its salt solution?	3
	Able to state the problem statement less accurately. Sample answer: How can the electrochemical series be constructed based on the ability of a metal to displace another metal? // To construct the electrochemical series based on the ability of a metal to displace another metal from its salt solution	2
	Able to state an idea of problem statement Sample answer: How to construct the electrochemical series?	1
	No response or wrong response	0

Question	Mark Scheme	Marks
2(b)	*Able to state all the variables correctly*. Sample answer: **Manipulated variable**: Type of metal and salt solution used **Responding variable**: Deposition of metal **Fixed variable**: Concentration of salt solution	3
	*Able to state **any two** variables correctly*.	2
	*Able to state **any one** variable correctly*.	1
	No response or wrong response	0

Question	Mark Scheme	Marks

2(c)	*Able to state the relationship between the manipulated variable and the responding variable with direction.* Sample answer: A metal which is situated at a higher position in the electrochemical series is able to displace a metal below it in the series from its salt solution	3
	Able to state the relationship between the manipulated variable and the responding variable but less accurately. Sample answer: A metal which is situated at a higher position is able to displace a metal below it from its salt solution	2
	Able to state an idea of hypothesis. Sample answer: An electropositive metal is able to displace a metal from its salt solution	1
	No response or wrong response	0

Question	Mark Scheme	Marks
2(d)	*Able to give a complete list of materials and apparatus that involves the following*: Sample answer: [0.1 – 0.5] mol dm^{-3} copper(II) nitrate solution, [0.1 – 0.5] mol dm^{-3} lead(II) nitrate solution, [0.1 – 0.5] mol dm^{-3} iron(II) nitrate solution, [0.1 – 0.5] mol dm^{-3} zinc nitrate solution, [0.1 – 0.5] mol dm^{-3} magnesium nitrate solution, copper strip, lead strip, iron nail, zinc strip, magnesium ribbon, sandpaper, test tubes and test tube rack.	3
	Able to give a list of materials and apparatus that involves the following but less accurately: Sample answer: Copper(II) nitrate solution, lead(II) nitrate solution, iron(II) nitrate solution, zinc nitrate solution, magnesium nitrate solution, copper strip, lead strip, iron nail, zinc strip, magnesium ribbon, sandpaper and test tubes.	2
	Able to give an idea of the materials and apparatus that involves the following: Sample answer: Several nitrate solution, copper strip, lead strip, iron nail, zinc strip, magnesium ribbon, sandpaper and test tubes.	1
	No response or wrong response	0

Question	Mark Scheme	Marks
2(e)	*Able to state all the following 5 steps correctly:* Sample answer: 1. Five test tubes are filled with copper(II) nitrate solution respectively until they are half full. 2. A piece of copper strip, lead strip, iron nail, zinc strip, and magnesium ribbon are cleaned respectively with sandpaper and dropped into each of the test tubes. 3. The reactions are allowed to take place for five minutes. 4. Any change in the colour of the solutions and whether any metals are deposited are observed. 5. Steps 1 to 4 are repeated using lead(II) nitrate solution, iron(II) nitrate solution, zinc nitrate solution and magnesium nitrate solution respectively to replace copper(II) nitrate solution. 6. The results of the experiment are recorded in a table.	3
	Steps 1, 2, 4, 5	2
	Steps 1, 2, 5	1
	No response or wrong response	0

<table>
<tr><th>Question</th><th>Mark Scheme</th><th>Marks</th></tr>
<tr><td>2(f)</td><td>Able to exhibit the tabulation of data that includes the following information:

1. Heading for manipulated variable :
2. Heading for responding variable :
3. 6 x 6 table

<u>Sample answer</u>:

<table>
<tr><th rowspan="2">Solution
Metal</th><th colspan="5">Observation</th></tr>
<tr><th>Copper(II) nitrate// $Cu(NO_3)_2$</th><th>Lead(II) nitrate// $Pb(NO_3)_2$</th><th>Iron(II) nitrate// $Fe(NO_3)_2$</th><th>Zinc nitrate// $Zn(NO_3)_2$</th><th>Magnesium nitrate// $Mg(NO_3)_2$</th></tr>
<tr><td>Copper</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Lead</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Iron</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Zinc</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Magnesium</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</td><td>2</td></tr>
<tr><td></td><td>Able to exhibit the tabulation of data that includes the following information

1. Heading for manipulated/ responding variable
2. 2 x 2 table

<u>Sample answer</u>:

<table>
<tr><td>Metal + salt solution</td><td>Observation</td></tr>
<tr><td></td><td></td></tr>
</table>
</td><td>1</td></tr>
<tr><td></td><td>No response or wrong response

https://cikguadura.wordpress.com/</td><td>0</td></tr>
</table>