PROGRAM GEMPUR KECEMERLANGAN
SIJIL PELAJARAN MALAYSIA 2016
ANJURAN BERSAMA
MAJLIS PENGETUA SEKOLAH MALAYSIA
NEGERI PERLIS
DAN
MAJLIS GURU CEMERLANG NEGERI PERLIS

SIJIL PELAJARAN MALAYSIA 2016 4541/1

KIMIA
Kertas 1
Ogos
1 ¼ jam **Satu jam lima belas minit**

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

Arahan:

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

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

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

Kertas soalan ini mengandungi 24 halaman bercetak.

1 Which of the following explains the meaning of effective collision?
Antara berikut, yang manakah menjelaskan maksud perlanggaran berkesan?

A The collision that causes a reaction
Perlanggaran yang menghasilkan tindak balas

B The collision with a correct orientation
Perlanggaran dengan orientasi yang betul

C The collision which takes place before a reaction
Perlanggaran yang berlaku sebelum sesuatu tindak balas

D The collision which achieve an activation energy
Perlanggaran yang mencapai tenaga pengaktifan

2 The following equation represents a reaction
Persamaan berikut mewakili suatu tindak balas

$CuO + H_2SO_4 \rightarrow CuSO_4 + H_2O$

What are the products in this equation?
Apakah hasil tindak balas dalam persamaan ini?

A Copper(II) oxide and water
Kuprum(II) oksida dan air

B Copper(II) sulphate and water
Kuprum(II) sulfat dan air

C Copper(II) oxide and sulphuric acid
Kuprum(II) oksida dan sulphuric

D Copper(II) sulphate and sulphuric acid
Kuprum(II) sulfat dan asid sulfurik

3 Which of the following chemical equations represents the reaction of preparation of soap?
Di antara persamaan kimia berikut, yang manakah mewakili tindak balas penyediaan sabun?

A Glucose + yeast → ethanol + carbon dioxide
Glukosa + yis → etanol + karbon dioksida

B Ethanoic acid + ethanol → ethyl ethanoate + water
Asid etanoik + etanol → etil etanoat + air

C Oil + sodium hydroxide → glycerol + sodium palmitate
Minyak + natrium hidroksida → gliserol + natrium palmitat

D Alkylbenzene sulphonic acid + sodium hydroxide → sodium alkylbenzene sulphonate + water
Asid alkilbenzena sulfonik + natrium hidroksida → natrium alkilbenzena sulfonat + air

4 Which of the following salts is decompose when heated?
Antara garam-garam berikut, yang manakah terurai apabila dipanaskan?

A Sodium chloride
Natrium klorida

B Sodium carbonate
Natrium karbonat

C Potassium carbonate
Kalium karbonat

D Ammonium chloride
Ammonium klorida

5 Which of the following is an oxidising agent?
Manakah antara berikut adalah agen pengoksidaan?

A Sodium nitrite
Natrium nitrit

B Sulphur dioxide
Sulphur dioksida

C Hydrogen sulphide
Hidrogen sulfida

D Hydrogen peroxide
Hidrogen peroksida

6 Which substance is an element?
Bahan manakah yang merupakan suatu unsur?

A Air
Udara

B Steam
Stim

C Oxygen
Oksigen

D Naphthalene
Naftalena

7 Which of the following is a covalent compound?
Antara berikut yang manakah sebatian kovalen?

A Zinc oxide
Zink oksida

B Sodium flouride
Natrium florida

C Carbon monoxide
Karbon monoksida

D Aluminium chloride
Aluminium klorida

8 Diagram 1 shows the electron arrangement of atom X,
Rajah 1 menunjukkan susunan elektron bagi atom X,

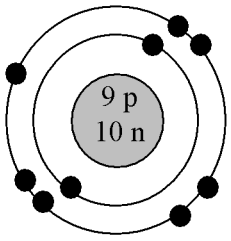


Diagram 1
Rajah 1

Which of the following statement is **true** about atom X?
Manakah antara pernyataan berikut ***benar*** *tentang atom* X?

A Exist as monoatomic element
Wujud sebagai unsur monoatom

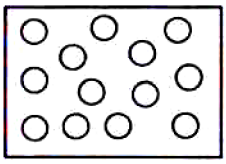
B Donate one electron to form positive ion
Menderma satu elektron untuk membentuk ion positif

C Receives one electron to form negative ion
Menerima satu elektron untuk membentuk ion negatif

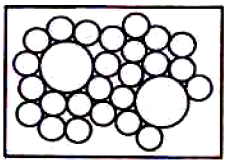
D An element of Period 3, Group 17 of the Periodic Table of Element
Merupakan unsur Kala 3, Kumpulan 17 dalam Jadual Berkala Unsur

9 Which of the following shows the arrangement of the atoms in an alloy?
Antara berikut, yang manakah menunjukkan susunan atom dalam aloi?

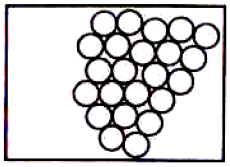
A



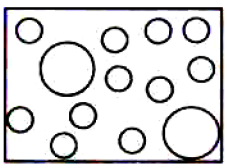
B



C



D



10 Compound P and compound Q have the molecular formulae **CH_3OH** and **C_2H_5OH** respectively.
Which of the following reaction is true of **both** compounds?
Sebatian P dan sebatian Q mempunyai formula molekul CH_3OH dan C_2H_5OH masing-masing.
*Tindak balas manakah antara berikut adalah benar untuk **kedua-dua** sebatian?*

A Produce esters when reflux with concentrated sulphuric acid.
Menghasilkan ester apabila direfluks dengan asid sulfurik pekat

B Produce the same amount of heat when undergo complete combustion.
Menghasilkan jumlah haba yang sama banyak apabila mengalami pembakaran lengkap

C Produce alkenes when the vapour is passed through heated porcelain chips.
Menghasilkan alkena apabila wap sebatian melalui serpihan porselin yang panas.

D Produce carboxylic acids when reflux with acidified potassium dichromate(VI) solution.
Menghasilkan asid karbosilik apabila direfluks dengan larutan kalium dikromat(VI) berasid.

11 The following equations show the reactions to determine the position of metals P, Q and R in reactivity series.
Persamaan menunjukkan tindak balas untuk menentukan kedudukan logam P, Q dan R dalam siri kereaktifan.

$2P + QO \rightarrow P_2O + Q$
$Q + RO \rightarrow QO + R$

Which sequence below shows the three metals arranged in ascending order of their reactivity?
Urutan manakah menunjukkan tiga logam disusun secara menaik berdasarkan kereaktifannya?

A P, Q and R

B P, R and Q

C Q, R and P

D R, Q and P

12 Which of the following is a redox reaction?
Antara berikut, manakah merupakan tindak balas redoks?

A Displacement reaction
Tindak balas penyesaran

B Neutralisation reaction
Tindak balas peneutralan

C Precipitation reaction
Tindak balas pemendakan

D Substitution reaction
Tindak balas penukargantian

13 Diagram 2 shows the electron arrangement of the Y ion.
Rajah 2 *menunjukkan susunan elektron bagi ion* Y.

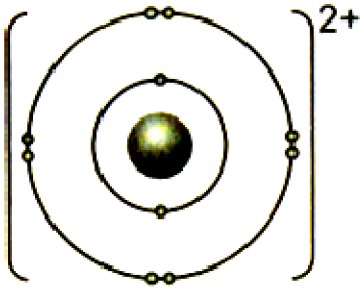


Diagram 2
Rajah 2

What is the number of valence electrons in Y atom?
Berapakah bilangan elektron valens bagi atom Y*?*

A 2

B 6

C 8

D 10

14 Diagram 3 shows an electrolytic cell.
Rajah 3 *menunjukkan satu sel elektrolisis*

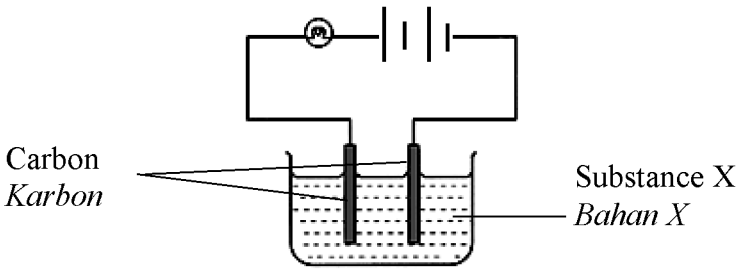


Diagram 3
Rajah 3

Which substance that can be used as X and will light a bulb in Diagram 3?
Manakah bahan yang boleh digunakan sebagai X dan akan menyalakan mentol dalam Rajah 3*?*

A Glucose solution
Larutan glukosa

B Glacial ethanoic acid
Asid etanoik glasial

C Zinc chloride solution
Larutan zink klorida

D Ammonia in propanone
Ammonia dalam propanon

15 The following statement are the properties of substance X.
Penyataan berikut adalah sifat-sifat bahan X.

- Ionizes completely in water
  Mengion lengkap di dalam air
- Has lowest pH value
  Mempunyai nilai pH paling rendah

A Ammonia
Amonia

B Nitric acid
Asid nitrik

C Ethanoic acid
Asid etanoik

D Sodium Hydroxide
Natrium hidroksida

16 Exothermic reaction is a chemical reaction that gives out heat .
Which of the following is an exothermic reaction ?
Tindak balas eksotermik adalah satu tindak balas kimia yang membebaskan haba.
Antara berikut, yang manakah tindak balas eksotermik ?

A Photosynthesis
Fotosintesis

B Melting of ice
Peleburan ais

C Frying an egg
Menggoreng telur

D Rusting of iron
Pengaratan besi

17 The following equation represent the ionisation of molecule HX in water.
Persamaan berikut mewakili pengionan molekul HX di dalam air.

$$HX \longrightarrow H^+ + X^-$$

What is HX?
Apakah HX.

A Weak acid
Asid lemah

B Strong acid
Asid kuat

C Weak alkali
Alkali lemah

D Strong alkali
Alkali kuat

18 Table 1 shows the electron arrangement of elements P and Q.
Jadual 1 *menunjukkan susunan elektron unsur P dan Q.*

Element P ***Unsur P***	***Element Q*** ***Unsur Q***
2.8.3	2.6

Table 1
Jadual 1

Which of statement is **true** about the compound formed from the reaction between P and Q?
Penyataan manakah ***benar*** *tentang sebatian yang terbentuk daripada tindak balas antara P dan Q?*

A Insoluble in water
Tidak larut di dalam air

B Can conduct electricity
Boleh mengalirkan arus elektrik

C Soluble in organic solvent
Larut di dalam pelarut organik

D High melting and boiling point
Takat lebur dan takat didih yang tinggi

19 Which element shows different oxidation numbers in its compounds?
Unsur manakah yang mempunyai nombor pengoksidaan yang berbeza dalam sebatiannya?

A Copper
Kuprum

B Sulphur
Sulfur

C Oxygen
Oksigen

D Magnesium
Magnesium

20 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 a solid form
Pada keadaan bilik, lemak tepu wujud sebagai pepejal

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

Diagram 4
Rajah 4

Which element formed basic oxide?
Unsur yang manakah membentuk oksida bes?

A W

B X

C Y

D Z

22 The following equation represents a reaction for the industrial preparation of butanol.
Persamaan berikut mewakili tindak balas penyediaan butanol secara industri.

$$X + H_2O \xrightarrow[300°C/60\ atm]{\text{Catalyst Y/}\textit{mangkin Y}} CH_3CH_2CH_2CH_2OH$$

What is X and the catalyst Y used in the reaction?
Apakah X dan mangkin Y yang digunakan dalam tindak balas ini?

	X	**Catalyst Y/ *Mangkin Y***
A	C_4H_8	Sulphuric acid *Asid sulfuric*
B	C_4H_8	Phosphoric acid *Asid fosforik*
C	C_4H_{10}	Sulphuric acid *Asid sulfuric*
D	C_4H_{10}	Phosphoric acid *Asid fosforik*

23 The diagram 5 represents the arrangement of particles in substance M.
Rajah 5 mewakili susunan zarah dalam bahan M.

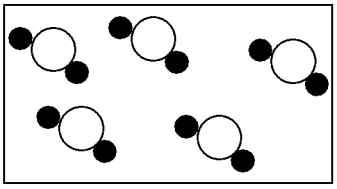


Diagram 5
Rajah 5

What is M?
Apakah M?

A Water
Air

B Ammonia
Ammonia

C Carbon dioxide
Karbon dioksida

D Sodium chloride
Natrium klorida

24 Diagram 6 shows the energy level diagram for the reaction between zinc and copper(II) sulphate solution .
Rajah 6 menunjukkan gambar rajah aras tenaga bagi tindak balas antara zink dan larutan kuprum(II) sulfat.

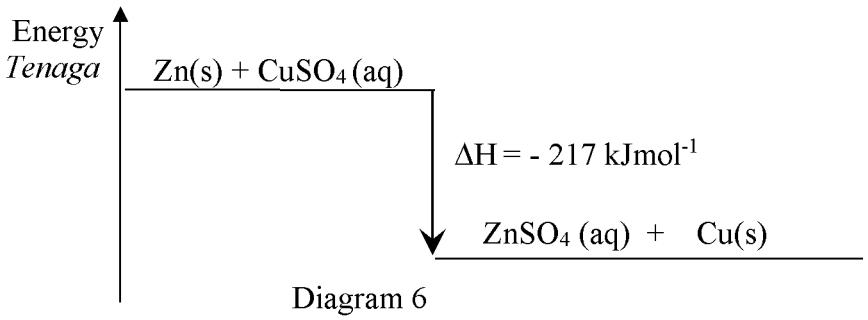


Diagram 6
Rajah 6

What is the change in temperature when 50 cm^3 of 0.1 mol dm^{-3} copper(II) sulphate solution is reacted with excess zinc?
[Specific heat capacity of solution = 4.2 $Jg^{-1}°C^{-1}$]
Berapakah perubahan suhu jika 50 cm^3 larutan kuprum(II) sulfat 0.1 mol dm^{-3} ditindakbalaskan dengan zink berlebihan?
[Muatan haba tentu larutan = 4.2 $Jg^{-1}°C^{-1}$]

A 2.1 °C

B 2.6 °C

C 5.2 °C

D 8.2 °C

25 The equation shows a reaction in the industrial preparation of ammonia.
Persamaan menunjukkan tindak balas penghasilan ammonia secara industri.

$$N_2 + 3\,H_2 \xrightarrow[450^oC/\ 60\ atm]{\text{Catalyst M}} 2NH_3$$

What is catalyst M?
Apakah mangkin M?

A Iron
Ferum

B Nickel
Nikel

C Copper(II) oxide
Kuprum(II) oksida

D Manganese(IV) oxide
Mangan(IV) 0ksida

26 Diagram 7 shows the set up of the apparatus for the electrolysis of copper(II) nitrate solution.
Rajah 7 menunjukkan susunan radas bagi elektrolisis larutan kuprum (II) nitrat.

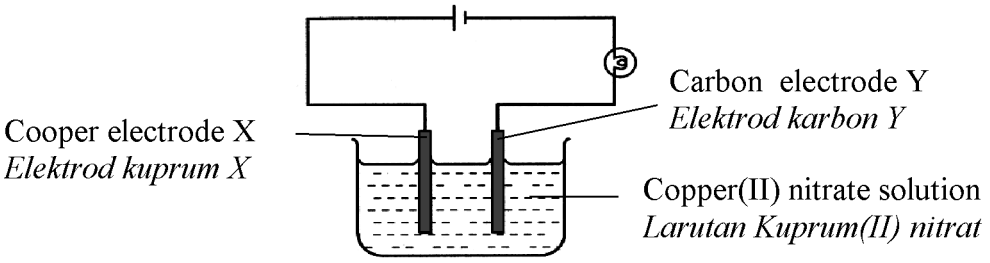


Diagram 7
Rajah 7

What is product formed at carbon electrode Y?
Apakah hasil yang terbentuk di elektrod karbon Y?

A Oxygen
Oksigen

B Copper
Kuprum

C Hydrogen ions
Ion hidrogen

D Copper(II) ion
Ion kuprum(II)

27 Three experiments were conducted by a group of students to investigate the reaction between excess magnesium and the acids as shown in the Table 2.
Tiga eksperimen telah dilakukan oleh sekumpulan pelajar untuk menyiasat tindakbalas di antara magnesium yang berlebihan dengan asid-asid seperti yang ditunjukkan dalam Jadual 2.

Experiment *Eksperimen*	**Acid** **Asid**
P	50 cm^3 sulphuric acid 1.0 mol dm^{-3} *50 cm^3 asid sulfurik 1.0 mol dm^{-3}*
Q	25 cm^3 hydrochloric acid 2.0 mol dm^{-3} *25 cm^3 asid hidroklorik 2.0 mol dm^{-3}*
R	50 cm^3 hydrochloric acid 1.5 mol dm^{-3} 50 cm^3 *asid hidroklorik* 1.5 mol dm^{-3}

Table 2
Jadual 2

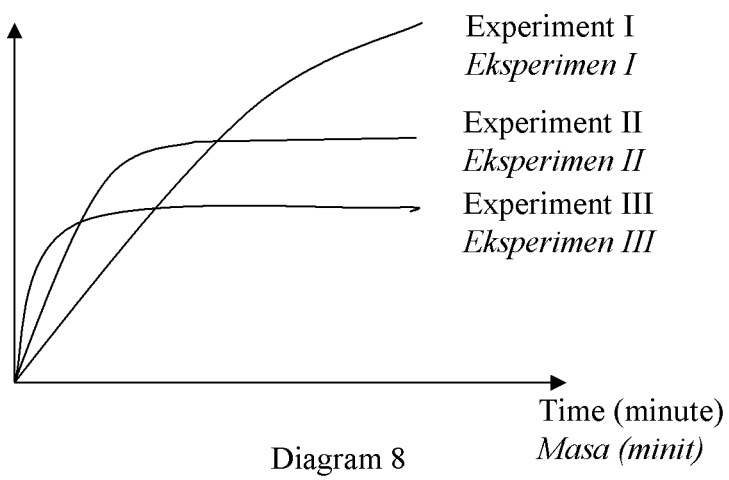


Diagram 8
Rajah 8

Based on Table 2 and Diagram 8, which of the following represents P, Q and R?
Berdasarkan Jadual 2 dan Rajah 8, manakah di antara berikut mewakili P, Q, R?

	P	**Q**	**R**
A	I	II	III
B	II	I	III
C	I	III	II
D	II	III	I

28 Diagram 9 shows the symbol of carbon atom.
Rajah 9 menunjukkan simbol bagi atom karbon.

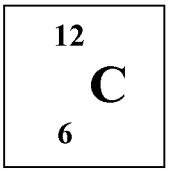


Diagram 9
Rajah 9

Which of the following is **true** about the symbol?
*Antara berikut, yang manakah **benar** tentang simbol tersebut*?

	Proton number *Bilangan proton*	Nucleon number *Nombor nukleon*
A	12	6
B	6	12
C	6	6
D	12	12

29 The mass of one atom of element X is three times more than an atom of nitrogen.
What is the relative atomic mass of element X?
[Relative atomic mass: N = 14)
Jisim satu atom unsur X adalah tiga kali lebih berat dari satu atom nitrogen.
Berapakah jisim atom relatif bagi unsur X?
[Jisim atom relatif: N = 14)

A 14

B 28

C 42

D 56

30 Aspirin is a medicine for headache, but it can also cause stomachache. Why?
Aspirin ialah ubat untuk sakit kepala, tetapi ia juga boleh mengakibatkan sakit perut. Mengapa?

A Aspirin contains acid
Aspirin mengandungi asid

B Aspirin contains poisonous substances
Aspirin mengandungi bahan beracun

C Aspirin can react with gastric juice to produce acid
Aspirin akan bertindak balas dengan jus gastrik menghasilkan asid

D Aspirin can react with food to produce poisonous substances
Aspirin akan bertindak balas dengan makanan menghasilkan bahan beracun

31 Diagram 10 shows the elements of Period 3 in Periodic Table of elements.
Rajah 10 *menunjukkan unsur-unsur Kala* 3 *dalam Jadual Berkala Unsur.*

Na	Mg											Al	Si	P	S	Cl	Ar

Diagram 10
Rajah 10

Which of the following statement is **correct** about the elements?
Antara pernyataan berikut yang manakah ***benar*** *tentang unsur tersebut?*

A Magnesium has lower melting point than Sulphur
Magnesium mempunyai takat lebur yang rendah daripada Sulfur

B Chlorine is more electronegative than Aluminium
Klorin lebih elektronegatif daripada Aluminium

C The metallic properties increases across the period.
Sifat kelogaman meningkat merentasi kala.

D The atomic size of elements increases across the period.
Saiz atom bagi unsur-unsur semakin bertambah.merentasi kala

32 Diagram 11 shows the symbol of element X .
Rajah 11 *menunjukkan simbol unsur X.*

$$^{19}_{9}X$$

Diagram 11
Rajah 11

What is the position of element X in the Periodic Table of Element?
Apakah kedudukan unsur X dalam Jadual Berkala Unsur ?

	Period *Kala*	Group *Kumpulan*
A	2	1
B	4	1
C	2	17
D	4	17

33 Diagram 12 shows the set up of the apparatus for a chemical cell.
Rajah 12 *menunjukkan susunan radas bagi sel kimia..*

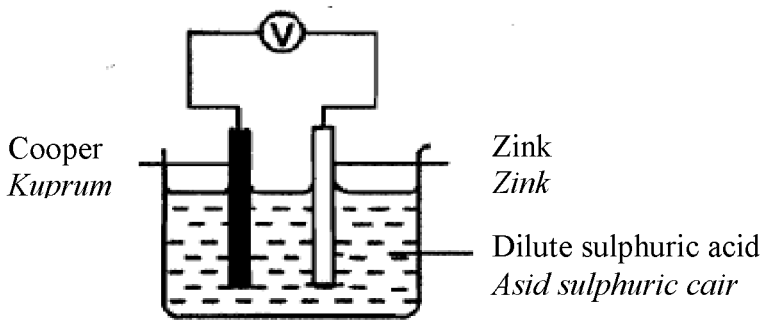


Diagram 12
Rajah 12

Which of the following is **true** about the chemical cell?
Manakah berikut ***benar*** *mengenai sel kimia tersebut?*

A Cooper becomes thinner
Kuprum menjadi nipis

B Zink is the positive terminal.
Zink menjadi terminal positif

C Electrons move from zinc to copper through the wire.
Elektron bergerak dari zink kepada kuprum melalui wayar.

D The colour of the solution changed from colorless to blue.
Warna larutan berubah daripada tidak berwarna kepada biru.

34 The following ionic equation shows the change of Fe^{3+} to Fe^{2+}.
Persamaan ion berikut menunjukkan perubahan Fe^{3+} *kepada* Fe^{2+}.

$$Zn\,(s) + 2Fe^{3+}\,(aq) \longrightarrow Zn^{2+}\,(aq) + 2Fe^{2+}\,(aq)$$

Which statement is **correct** about the equation?
Pernyataan manakah yang ***benar*** *tentang persamaan tersebut?*

A Fe^{2+} is reduced
Fe^{2+} *diturunkan*

B Fe^{3+} loses electron
Fe^{3+} *kehilangan elektron*

C Zn^{2+} is oxidised
Zn^{2+} *dioksidakan*

D Zn is a reducing agent
Zn ialah agen penurunan

35 Table 3 shows the observation of electrolysis of a sodium chloride solution using carbon electrode.
Jadual 3 menunjukkan pemerhatian bagi elektrolisis larutan natrium klorida menggunakan elektrod karbon.

Electrode *Elektrod*	Observation *Pemerhatian*
Anode *Anod*	A greenish-yellow gas released *Gas berwarna kuning kehijauan terbebas*
Cathode *Katod*	A colorless gas which burns with a 'pop' sound is released *Gas yang tidak berwarna dan terbakar dengan bunyi pop terbebas*

Table 3
Jadual 3

Which of the following are the **correct** half equations at the anode and cathode?
Manakah di antara berikut adalah persamaan setengah yang betul pada anod dan katod?

	Anode ***Anod***	**Cathode** ***Katod***
A	$2Cl^- \longrightarrow Cl_2 + 2e$	$4OH^- \longrightarrow O_2 + 2H_2O + 4e$
B	$2Cl^- \longrightarrow Cl_2 + 2e$	$2H^+ + 2e \longrightarrow H_2$
C	$4OH^- \longrightarrow O_2 + 2H_2O + 4e$	$2H^+ + 2e \longrightarrow H_2$
D	$2H^+ + 2e \longrightarrow H_2$	$2Cl^- \longrightarrow Cl_2 + 2e$

36 The formula of the nitrate salt of M is $M(NO_3)_2$. What is the formula of the sulphate salt of M?
Formula bagi garam nitrat M ialah $M(NO_3)_2$. Apakah formula bagi garam sulfat M?

A MSO_4

B M_2SO_4

C $M(SO_4)_2$

D $M_2(SO_4)_2$

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

A $Na + Cl_2 \rightarrow NaCl$

B $Mg + O_2 \rightarrow MgO_2$

C $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

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

38 When substance P is added into latex, the latex remain in liquid state .
What is P and the correct the reason.
Apabila bahan P ditambah kepada latek, latek kekal dalam keadaan cecair.
Apakah P dan alasan yang betul.

	P	Reason *Sebab*
A	Ethanoic acid *Asid Etanoik*	Hydrogen ion from acid neutralise the negatively charge of protein membrane *Ion hidrogen daripada asid meneutralkan cas negatif pada membran protein*
B	Ammonia solution *Larutan ammonia*	Hydroxide ion from alkali neutralise the negatively charge of protein membrane *Ion hidroksida daripada alkali meneutralkan cas negatif pada membran protein*
C	Ethanoic acid *Asid Etanoik*	Hydrogen ion from acid neutralise the alkali produced by bacteria and sustain the negatively charge of protein membrane *Ion hidrogen daripada asid meneutralkan alkali yang dihasilkan oleh bakteria dan mengekalkan cas negatif pada membran protein*
D	Ammonia solution *Larutan ammonia*	Hydroxide ion from alkali neutralise the acid produced by bacteria and sustain the negatively charge of protein membrane *Ion hidroksida daripada alkali meneutralkan asid yang terhasil daripada bakteria dan mengekalkan cas negatif pada membran protein*

39 The following equation shows the decomposition of carbonate Y when heated strongly.
Persamaan berikut menunjukkan penguraian garam karbonat Y apabila dipanaskan dengan kuat.

$$YCO_3 \rightarrow YO + CO_2$$

What is the mass of YCO_3 needed to produce 8.0 g of YO?
Apakah jisim YCO_3 *yang diperlukan untuk menghasilkan* 8.0 g YO?

[Relative atomic mass: C = 12, O = 16, Y = 64]
[*Jisim atom relatif* : C = 12, O = 16, Y = 64]

A 3.7 g

B 6.2 g

C 8.0 g

D 12.4 g

40

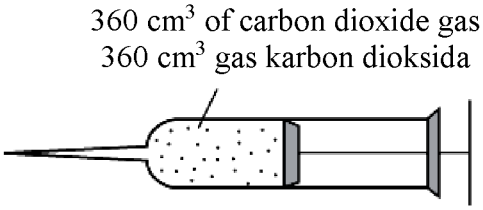


Diagram 13
Rajah 13

Diagram 13 shows a syringe containing Z g of carbon dioxide gas at room temperature. Calculate the value of Z.
[Relative atomic mass: C, 12; O, 16; molar volume = 24 dm^3 mol^{-1} at room temperature]
Rajah 13 *menunjukkan picagari yang mengandungi Z g gas karbon dioksida pada suhu bilik. Hitungkan nilai Z.*
[*Jisim atom relatif: C, 12; O, 16; isi padu molar = 24 dm³ mol⁻¹ pada suhu bilik*]

A 0.11

B 0.33

C 0.44

D 0.66

41 Diagram 14 shows the cation test in solution X.
Rajah 14 *menunjukkan ujian kation dalam larutan* X.

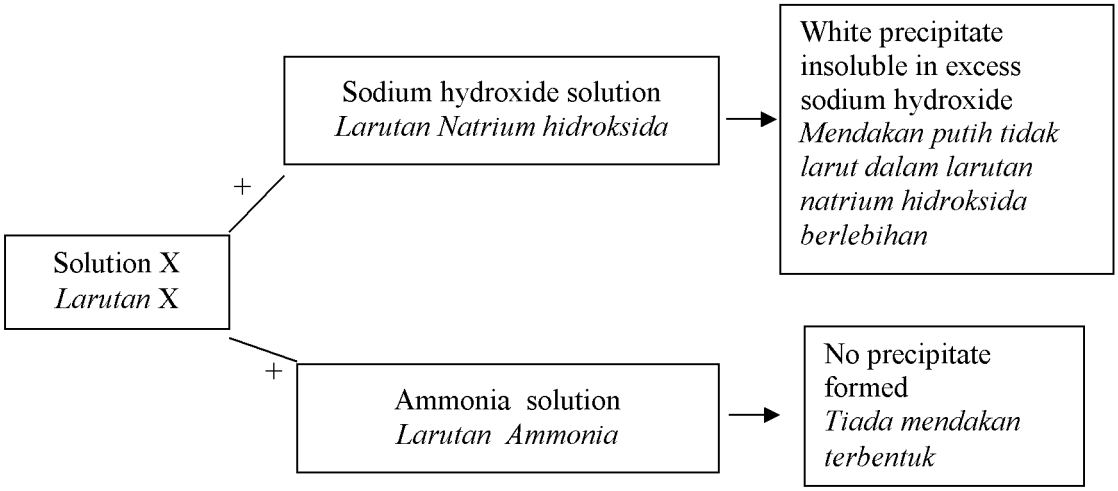


Diagram 14
Rajah 14

Which of the following ion is present in solution X?
Antara berikut, ion manakah yang mungkin terdapat dalam larutan X?

A Ca^{2+}

B Mg^{2+}

C NH_4^+

D Zn^{2+}

42 What is the number of moles of hydrogen ions in 200 cm^3 of 1.0 $moldm^{-3}$ sulphuric acid?
Berapakah bilangan mol ion hidrogen yang terdapat 200cm^3 1.0 $moldm^{-3}$ asid sulfurik?

A 0.2 mol

B 0.4 mol

C 0.5 mol

D 1.0 mol

43 Which of the following modern medicines is correctly matched?
Antara ubat moden berikut, yang mana satu dipadankan dengan betul?

	Type of modern medicine *Jenis ubat moden*	Example *Contoh*
I.	Hormone *Hormon*	Insulin *Insulin*
II.	Antibiotic *Antibiotik*	Paracetamol *Parasetamol*
III.	Analgesic *Analgisik*	Codeine *Kodeina*
IV	Psychoterapeutic medicine *Ubat psikoterapeutik*	Streptomycin *Streptomisin*

A I and III only
I dan III sahaja

B III and IV only
III dan IV sahaja

C I, II and III only
I,II dan III sahaja

D IV only
IV sahaja

Element *Unsur*	**J**	**O**
Mass/g **Jisim/g**	2.16	1.96
Relative atomic mass **Jisim atom relatif**	27	16

Table 4
Jadual 4

44 Table 4 shows the mass and the relative atomic mass of the element J and O. What is the empirical formula for this oxide?
Jadual 4 *menunjukkan jisim dan jisim atom relatif bagi unsur J dan O. Apakah formula empirik bagi oxida itu?*

A JO

B J_2O

C J_2O_3

D J_3O_2

45 Test I and Test II was conducted on an organic substance, G. The observation was recorded in Table 5
Ujian I *dan Ujian* II *telah dijalankan ke atas suatu sebatian organik,* G. *Pemerhatiannya direkodkan dalam Jadual* 5.

	Test / *Ujian*	Observation / *Pemerhatian*
I	Add acidified potassium manganate(VII) solution and then heat up *Campurkan larutan kalium manganat(VII) berasid dan panaskan*	Sour smell liquid is produced *Cecair berbau masam terhasil*
II	Add in ethanoic acid *Campurkan asid etanoik*	Sweet smell liquid is produced *Cecair berbau wangi terhasil*

Table 5
Jadual 5

Which of the following represent G ?
Antara berikut, yang manakah boleh mewakili G ?

A Ethane
Etana

B Ethanol
Etanol

C Ethanoic acid
Asid etanoik

D Ethyl ethanoate
Etil etanoat

46 Diagram 15 shows the set of apparatus of an experiment.
Rajah 15 *menunjukkan susunan radas bagi satu eksperimen.*

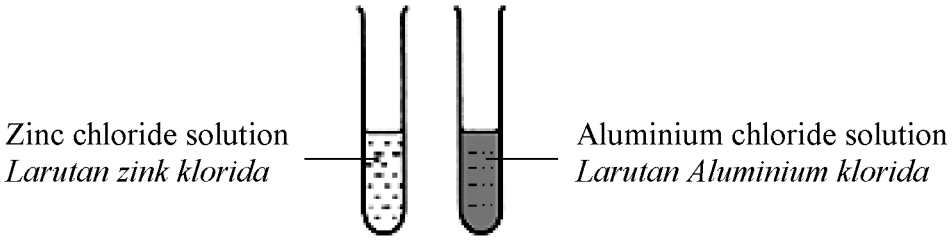


Diagram 15
Rajah 15

Which of the following can be used to differentiate both solutions?
Antara yang berikut, yang manakah boleh digunakan untuk membezakan kedua-dua larutan tersebut ?

A Ammonia solution
Larutan ammonia

B Barium nitrate solution
Larutan barium nitrat

C Silver nitrate solution
Larutan argentum nitrat

D Sodium hydroxide solution
Larutan natrium hidroksida

47 Table 6 shows information about three simple chemical cells.
Jadual 6 *menunjukkan maklumat tentang tiga sel kimia ringkas*

Pair of metals ***Pasangan logam***	**Potential difference/V** ***Beza upaya/V***	**Metal of negative terminal** ***Logam terminal negatif***
R and copper *R dan kuprum*	0.45	R
S and copper *S dan kuprum*	1.30	S
T and copper *T dan kuprum*	0.56	Cu

Table 6
Jadual 6

What is the value of potential difference between the pair of S and T?
Apakah nilai beza upaya antara pasangan logam S dan T?

A 0.74 V

B 0.85 V

C 1.01 V

D 1.86 V

48 Diagram 16 shows the set up of the apparatus to elecctroplate the iron spoon.
Rajah 16 *menunjukkan susunan radas bagi menyadurkan sudu besi*

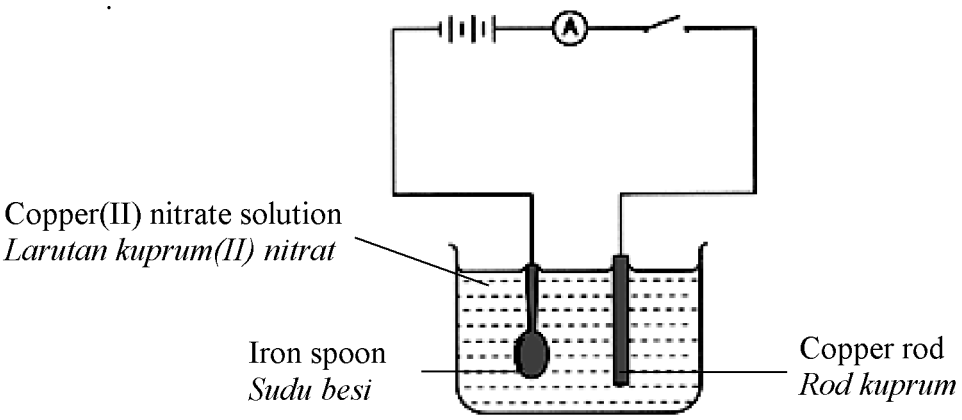


Diagram 16
Rajah 16

What are the observations at the anode and cathode after electroplating is completed?
Apakah pemerhatian di anod dan katod selepas penyaduran selesai dijalankan?

	Anode ***Anod***	**Cathode** ***Katod***
A	Brown solid deposits *Enapan perang terbentuk*	Gas bubbles are released *Gelembung gas dibebaskan*
B	Brown solid deposits *Enapan perang terbentuk*	Copper rod becomes thicker *Rod kuprum menebal*
C	Copper rod becomes thinner *Rod kuprum menipis*	Brown solid deposits *Enapan perang terbentuk*
D	Gas bubbles are released *Gelembung gas dibebaskan*	Copper rod becomes thinner *Rod kuprum menipis*

49 Diagram 17 shows the set of apparatus of an experiment to investigate electron transfer at a distance.
Rajah 17 *menunjukkan susunan radas satu eksperimen pemindahan elektron pada satu jarak.*

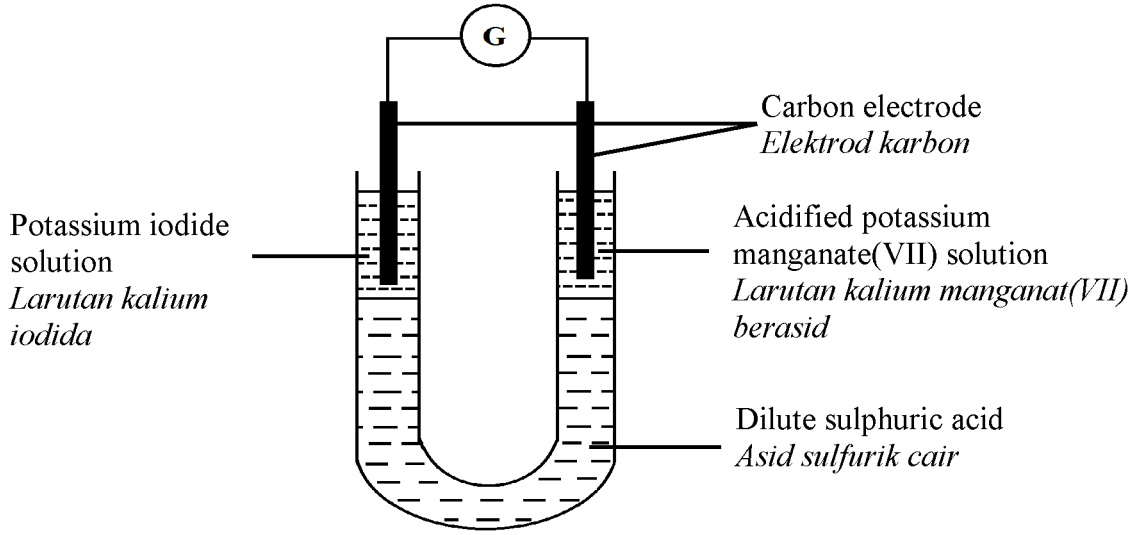


Diagram 17
Rajah 17

Which of the following statements is **true** about the experiment?
Antara pernyataan berikut yang manakah ***benar*** *tentang eksperimen ini?*

A Iodide ion is the reducing agent
Ion iodida bertindak sebagai agen penurunan.

B Oxidation number of iodine decreases from 0 to -1
Nombor pengoksidaan iodin menurun dari 0 ke -1

C Oxidation number of manganese increases from +2 to +7
Nombor pengoksidaan mangan bertambah dari +2 ke +7

D Electrons flow from potassium iodide solution to acidified potassium manganate(VII) through sulphuric acid
Elektron mengalir dari larutan kalium iodida ke larutan kalium manganat(VII) berasid melalui asid sulfurik

50 Diagram 18 shows the flow chart in producing compound X.
Rajah 18 *menunjukkan carta alir untuk menghasilkan sebatian X.*

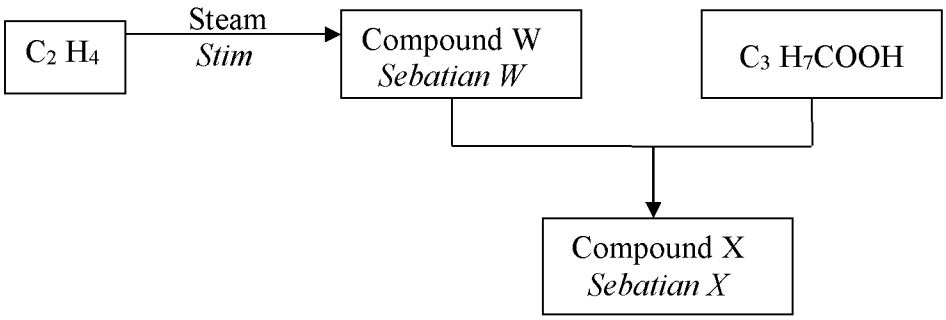


Diagram 18
Rajah 18

What is X ?
Apakah X ?

A Ethyl ethanoate
Etil etanoat

B Ethyl butanoate
Etil butanoat

C Propyl ethanoate
Propil etanoat

D Propyl buatanoate
Propil butanoat

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

NAMA: .....

NO. KAD PENGENALAN

PROGRAM GEMPUR KECEMERLANGAN
SIJIL PELAJARAN MALAYSIA 2016
ANJURAN BERSAMA
MAJLIS PENGETUA SEKOLAH MALAYSIA NEGERI PERLIS
DAN
MAJLIS GURU CEMERLANG NEGERI PERLIS

CHEMISTRY

Kertas 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan* **nombor kad pengenalan** *dan* **angka giliran** *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 Melayu atau bahasa Inggeris.*
5. *Calon dikehendaki membaca maklumat di halaman 2 atau halaman 3.*

Kod Pemeriksa			
Bahagian	Soalan	Markah Penuh	Markah Diperoleh
A	1	9	
	2	9	
	3	10	
	4	10	
	5	11	
	6	11	
B	7	20	
	8	20	
C	9	20	
	10	20	
Jumlah			

Kertas soalan ini mengandungi 29 halaman bercetak

INFORMATION FOR CANDIDATES

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

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

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

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

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

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

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

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

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

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

MAKLUMAT UNTUK CALON

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

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

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

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

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

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

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

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

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

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

Section A
Bahagian A

[60 *marks*]
[*60 markah*]

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

1. Table 1 shows information of the different types of medicine P, Q and R.
Jadual 1 menunjukkan maklumat tentang jenis-jenis ubat berbeza P, Q dan R.

Type of medicine ***Jenis ubatan***	**Function** ***Fungsi***	**Example** ***Contoh***
Analgesic *Analgesik*	To relief pain *Mengurangkan kesakitan*	Aspirin *Aspirin*
Antibiotic *Antibiotik*	.....	Penicilin *Penisilin*
R	To reduce tension and anxiety *Mengurangkan tekanan dan kegelisahan*	Tranquilizer *Tranquilizer*

Table 1
***Jadual* 1**

(a) (i) State the type of medicine R.
Nyatakan jenis ubat R.

.....

[1 mark]

(ii) What is the function of penicillin.
Apakah fungsi penisilin.

.....

[1 mark]

(iii) En. Azlan who has gastric problems is suffering toothache for a few days. Suggest **one** medicine that must be taken by him.
En. Azlan yang mempunyai masalah gastrik telah mengalami sakit gigi sejak beberapa lain. Cadangkan ***satu*** *ubat yang perlu diambil oleh beliau.*

.....

[1 mark]

b) The following equation shows the reaction that take place in the preparation of soap.
Persamaan berikut menunjukkan tindak balas yang berlaku dalam penyediaan sabun.

Palm oil	+	Concentrated Potassium hydroxide	Boil	Soap X	+	Gliserol
Minyak sawit	+	*Kalium hidroksida pekat*	*Pendidihan*	*Sabun X*	+	*Gliserol*

(i) Name soap X.
Namakan sabun X.

.....

[1 mark]

(ii) Diagram 1.2 shows the structural formula of a soap anion.
Rajah 1.2 menunjukkan struktur formula bagi suatu anion sabun.

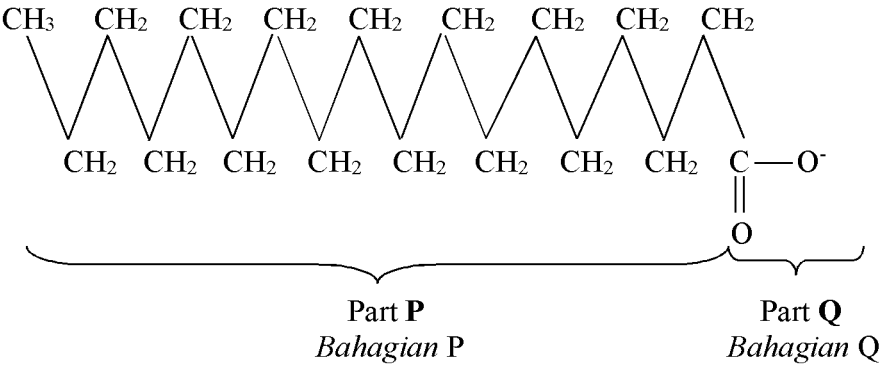


Diagram 1.2
Rajah 1.2

State the property of part P and Q of soap anion.
Nyatakan sifat bagi bahagian P dan Q dalam anion sabun.

.....

.....

[2 mark]

(c) Diagram 1.3 shows the label on a pack of food.
Rajah 1.3 menunjukkan label bagi satu bungkusan makanan.

Diagram 1.3
Rajah 1.3

(i) State **one** type of food additives found on the label and st*ate the function.*
*Nyatakan **satu** jenis bahan tambah yang terdapat pada label itu dan nyatakan fungsinya.*

.....

.....
[2 marks]

(ii) Sugar is not suitable for diabetic patient.Suggest another food additive that can give the same sweetness but has a lower calorie content.
Gula tidak sesuai bagi pesakit diabetik. Cadangkan bahan tambah makanan lain yang dapat memberi kemanisan yang sama tetapi mempunyai kandungan kalori yang lebih rendah.

.....
[1 mark]

2 Table 2 shows the number of proton and the number of neutron in atom R, S and T.
Jadual 2 menunjukkan bilangan proton dan bilangan neutron dalam atom R, S dan T.

Atom *Atom*	Number of proton *Bilangan proton*	Number of neutron *Bilangan neutron*
R	11	12
S	11	13
T	12	12

Table 2
Jadual 2

(a) State **three** subatomic particles of an atom.
Nyatakan tiga zarah sub atom.

.....

[1 mark]

(b) (i) What is meant by isotope?
Apakah yang dimaksudkan dengan isotop?

.....

.....

[1 mark]

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

.....

[1 mark]

(iii) State the radioisotope that is used to treat cancer diseases.
Nyatakan radioisotop yang digunakan untuk merawat penyakit kanser.

.....

[1 mark]

(c) (i) Write the electron arrangement of atom R.
Tuliskan susunan elektron bagi atom R.

.....

[1 mark]

(ii) What is valence electron of atom R?
Apakah elektron valens bagi atom R?

.....

[1 mark]

(d) Write the symbol for atom S in the form of ${}^{A}_{Z}\mathbf{S}$.

Tuliskan simbol bagi atom S dalam bentuk ${}^{A}_{Z}\mathbf{S}$.

.....

[1 mark]

(e) (i) Draw the electron arrangement of atom T.
Lukiskan susunan elektron bagi atom T.

[1 mark]

(ii) State the position of element of atom T in the Periodic Table of Element.
Nyatakan kedudukan unsur bagi atom T dalam Jadual Berkala Unsur.

.....

[1 mark]

3 Diagram 3.1 shows the structural formulae of compound Q.
Rajah 3.1 menunjukkan formula struktur sebatian Q.

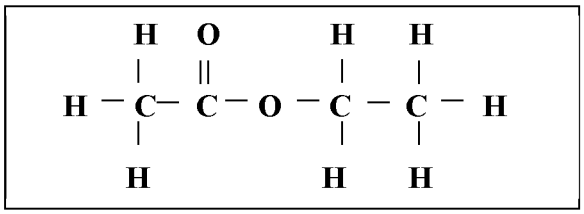


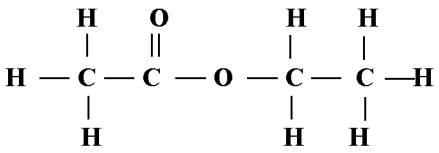
Diagram 3.1
Rajah 3.1

(a) (i) What is meant by molecular formulae?
Apa yang dimaksudkan dengan formula molekul?

.....

[1 mark]

(ii) Complete the table 3 below.
Lengkapkan jadual 3 dibawah.

Structural formula Formula struktur	Molecular formula *Formula molekul*	Empirical formula *Formula empirik*
	.....	.....

[2 marks]

(iii) The relative molecular mass of $Mg_3(XO_4)_2$ ialah 262. What is the relative atomic mass of element X.
[Relative atomic mass: Mg; 24, O; 16]
Jisim molekul relative bagi $Mg_3(XO_4)_2$ adalah 262. Apakah jisim atom relatif bagi elemen X.
[*Jisim atom relative : Mg;24, O; 16*]

[2 marks]

(b) Diagram 3.2 shows the apparatus set-up for the heating of copper (II) carbonate, $CuCO_3$ powder.
Rajah 3.2 menunjukkan susunan radas bagi pemanasan serbuk kuprum (II) karbonat,$CuCO_3$.

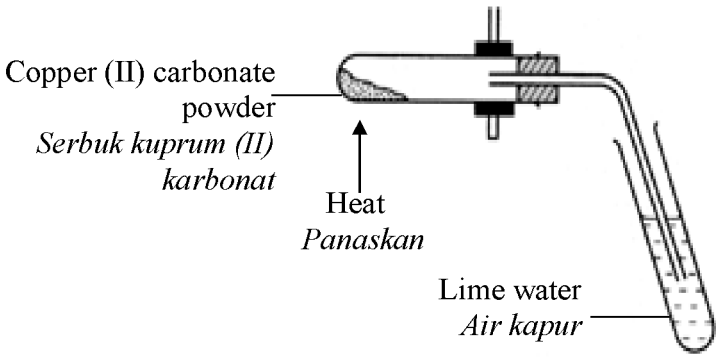


Diagram 3.2
Rajah 3.2

(i) State **one** observation of this experiment
*Nyatakan **satu** pemerhatian dalam eksperimen ini.*

.....

[1 mark]

(ii) Name the gas released in this experiment.
Namakan gas yang dibebaskan dalam eksperimen ini.

.....

[1 mark]

(iii) Write a balanced equation for this reaction.
Tulis persamaan kimia yang seimbang bagi tindakbalas ini.

.....

[1 mark]

(iv) 6.4 g of cuprum (II) carbonate powder, $CuCO_3$ is heated during this experiment.
Calculate the volume of gas released.
[Relative atomic mass:C=12; O=16;Cu=64; 1 mol gas occupies 24 dm^3 at room temperature]
6.4g serbuk kuprum(II) karbonat, $CuCO_3$ *dipanaskan semasa eksperimen ini.*
Hitung isipadu gas yang dibebaskan.
[*Jisim atom relatif*:C=12; O=16;Cu=64; 1 mol gas occupies 24 dm^3 *pada suhu bilik*]

[2 marks]

4 Diagram 4 showsa flow chart of conversion of compound P to cpmpound Q and R.
Rajah 4 menunjukkan carta alir bagi penukaran sebatian P kepada sebatian Q dan R.

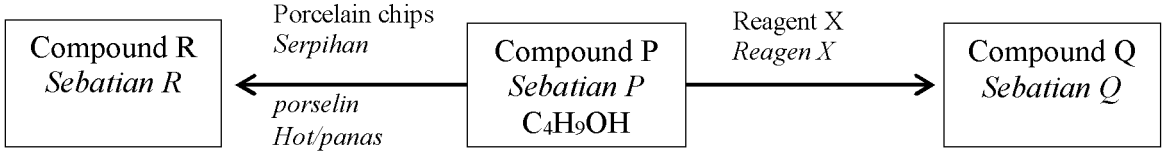


Diagram 4
Rajah 4

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

(a) (i) Write the general formula of the homologous series of compound P.
Tuliskan formula umum bagi siri homolog sebatian P.

.....
[1 mark]

(ii) State the functional group for compound P.
Nyatakan kumpulan berfungsi bagi sebatian P.

.....
[1 mark]

(b) When bromine water is added to compound R, the brown bromine water is decolourised.
Apabila air bromin ditambah kepada sebatian R, warna perang air bromin diyahwarnakan.

(i) Name a compound R.
Namakan sebatian R.

.....
[1 mark]

(ii) Draw a structural formula for compound R
Lukiskan formula struktur bagi sebatian R

[1 mark]

(c) (i) Whenthe mixture of compound P,reagent X and concentrated sulfuric acid is gently heated it will produced compound Q. Compound Q also turns the colour of blue litmus paper to red.
Apabila campuran sebatian P, reagen X dan asid sulfurik dipanaskan secara perlahan-lahan ia akan menghasilkan sebatian Q. Sebatian Q juga dapat menukarkan warna kertas litmus biru kepada merah.

Name the Reagent X
Namakan Reagent X

.....
[1 mark]

(ii) State the colour change of the reagent at 4(c)(i) during the reaction.
Nyatakan perubahan warna bagi reagen di 4(c)(i) *semasa tindakbalas berlaku.*

.....
[1 mark]

(d) (i) Propanic acid react with compound P with the presence of the concentrated sulphuric acid to form a compound.
Asid propanoik bertindak balas dengan sebatian P dengan kehadiran asid sulfurik pekat bagi menghasilkan suatu sebatian.

Name the compound formed.
Namakan sebatian yang terbentuk.

.....
[1 mark]

(ii) Write a balanced chemical reaction at 4(d)(i)
Tuliskan persamaan kimia yang seimbang bagi tindakbalas di 4(d)(i)

.....

[1 mark]

(e) Compound R burns in excess oxygen to produce carbon dioxide and water.
Sebatian R terbakar dalam oksigen berlebihan menghasilkan carbon dioksida dan air.

Calculate the numbers of carbon dioxide molecules are formed when 11.2 g of compound R burned in excess oxygen.
Hitungkan bilangan molekul carbon dioksida yang terbentuk apabila 11.2 g sebatian R terbakar dalam oksigen berlebihan,

[Relative atomic mass C = 12, O = 16 ; Avogadro number = 6.03×10^{23}]
[*Jisim atom relatif C* = 12, *O* = 16; *Nombor Avogadro* = 6.03×10^{23}]

[2 marks]

5 Diagram 5 shows the set up of the apparatus of an experiment to investigate the transfer of electrons at a distance. Solution X is an oxidising agent and turns colour from purple to colourless after a few minutes reacted.
Rajah 5 menunjukkan susunan radas eksperimen bagi mengkaji pemindahan elektron pada satu jarak. Larutan X ialah agen pengoksidaan dan bertukar warna dari ungu kepada tidak berwarna selepas beberapa minit bertindak balas.

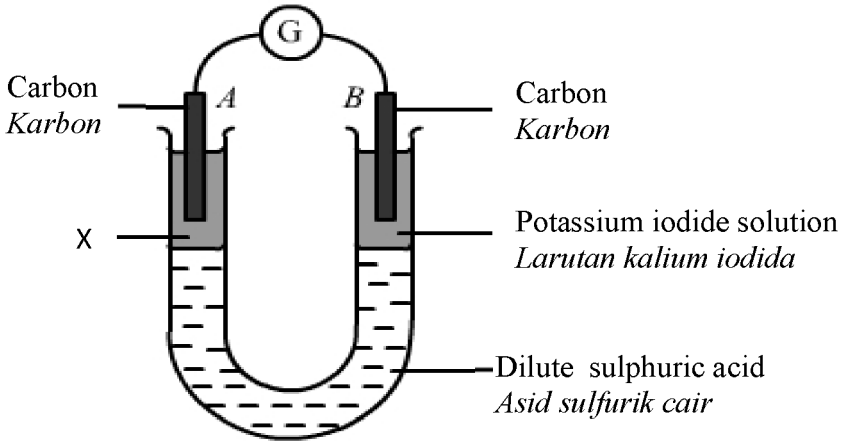


Diagram 5
Rajah 5

The overall ionic equation that occurs at electrodes A and B is,
Persamaan ion keseluruhan bagi tindak balas yang berlaku pada elektod A *dan* B *adalah,*

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

(a) Name the solution X.
Namakan larutan X.

……..
[1 mark]

(b) Calculate the oxidation number of manganese in MnO_4^- ion.
Hitungkan nombor pengoksidaan bagi mangan dalam ion MnO_4^-.

[1 mark]

(c) State the type of reaction that occurs at electrode A.
Nyatakan jenis tindakbalas yang berlaku pada elektod A.

.....

[1 mark]

(d) Referring to the reaction that takes place at electrode B.
Merujuk kepada tindak balas yang berlaku pada elektrod B.

(i) State the observation?
Nyatakan pemerhatian?

.....

[1 mark]

(ii) Write the half equation for the reaction.
Tulis setengah persamaan bagi tindakbalas.

.....

[2 marks]

(iii) Explain the reaction that occurs in term of transfer of electron.
Terangkan tindak balas yang berlaku dari segi pemindahan elektron.

.....

[1 mark]

(e) State the function of the dilute sulphuric acid in this experiment.
Nyatakan fungsi bagi asid sulfurik cair dalam eksperimen ini.

.....

[1 mark]

(f) In other experiment you are given zinc strip, copper strip, copper (II) sulphate solution and all apparatus required.
Draw a labelled diagram to show another set up of apparatus to investigate the transfer of electron at a distance. In your diagram show the direction of electron flow.
Di dalam eksperimen lain anda dibekalkan dengan kepingan zink, kepingan kuprum, larutan kuprum(II) sulfat dan semua radas yang diperlukan.
Lukiskan satu gambarajah berlabel untuk menunjukkan susunan radas bagi menyiasat pemindahan elektron pada satu jarak. Tunjukkan arah pergerakan elektron pada rajah anda.

[3 marks]

6 Diagram 6 shows the conversion of lead(II) nitrate.
Rajah 6 menunjukkan pertukaran bagi plumbum(II) nitrat.

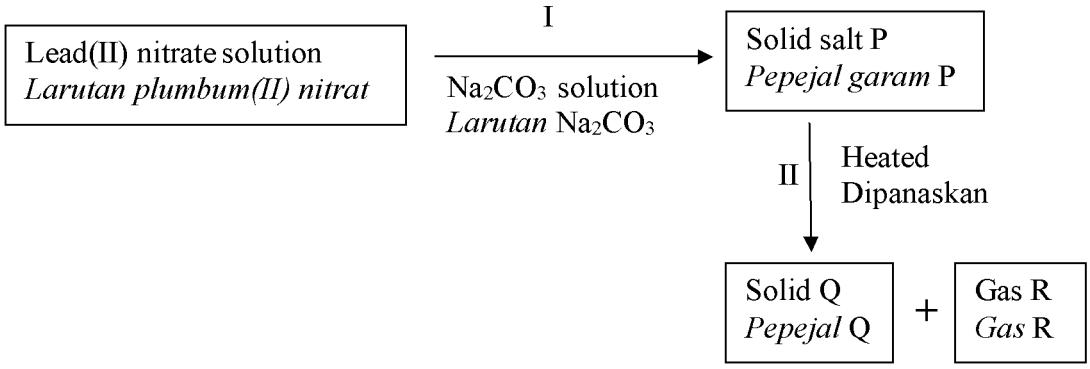


Diagram 6
Rajah 6

(a) (i) Write the chemical formulae of lead(II) nitrate.
Tuliskan formula kimia untuk plumbum(II) *nitrat.*

.....

(ii) State the name of reaction I
Nyatakan nama tindak balas I

.....

[2 marks]

(b) Based on Diagram 6, identify salt P, solid Q and gas R.
Berdasarkan Rajah 6, *kenal pasti garam* P, *pepejal* Q *dan gas* R.

P: .....

Q: .....

R: .....

[3 marks]

(c) State the colour of solid Q.
Nyatakan warna pepejal Q.

.....

[1 mark]

(d) (i) Draw a labelled diagram for heating solid salt P in Reaction II.
Lukiskan gambar rajah berlabel untuk pemanasan pepejal garam P *dalam tindak balas* II.

[2 marks]

(ii) Write a chemical equation for reaction (d)(i).
Tuliskan persamaan kimia bagi tindak balas di (d)(i).

.....

[1 mark]

(e) Marina has heated 2.67 g salt P in the laboratory.
Calculate volume of gas R released at room condition.
[Molar mass solid salt P = 267 g mol^{-1} ; 1 mol gas occupies 24 dm^3 at room conditions]
Marina telah memanaskan 2.67 g *garam P dalam makmal.*
Hitungkan isipadu gas R *yang dibebaskan dalam keadaan bilik.*
[*Jisim molar pepejal garam* P = 267 g mol^{-1} ; 1 *mol gas menempati* 24 dm^3 *pada keadaan bilik*]

[2 marks]

Section B
Bahagian B

[20 *marks*]
[*20 markah*]

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

7. Table 7.1 shows thermochemical equation for two sets of experiments.
Jadual 7.1 menunjukkan persamaan termokimia bagi dua set eksperimen.

Set	Themochemical equation *Persamaan termokimia*
I	$HCl + KOH \longrightarrow KCl + H_2O \quad \Delta H = -57 kJmol^{-1}$
II	$NH_4NO_3 \xrightarrow{H_2O} NH_4^+ + NO_3^- \quad \Delta H = +57 kJmol^{-1}$

Table 7.1
Jadual 7.1

(a) (i) Determine the type of reaction for Set 1 and Set II. Explain why?
Tentukan jenis tindakbalas bagi Set I and Set II. Jelaskan mengapa?

[4 marks]

(ii) Construct energy level diagram for Set II.
Give **three** statements to interprete the energy level diagrams.
Bina gambarajah aras tenaga untuk Set II.
*Berikan **tiga** penyataan untuk mentafsirkan gambar rajah aras tenaga tersebut.*

[6 marks]

(b) Diagram 7 shows the set-up of the apparatus used to carry out an experiment to determine the heat of combustion for a liquid hydrocarbon, X.
Gambar rajah menunjukkan susunan radas untuk menjalankan satu eksperimen bagi menentukan haba pembakaran suatu hidrokarbon cecair, X.

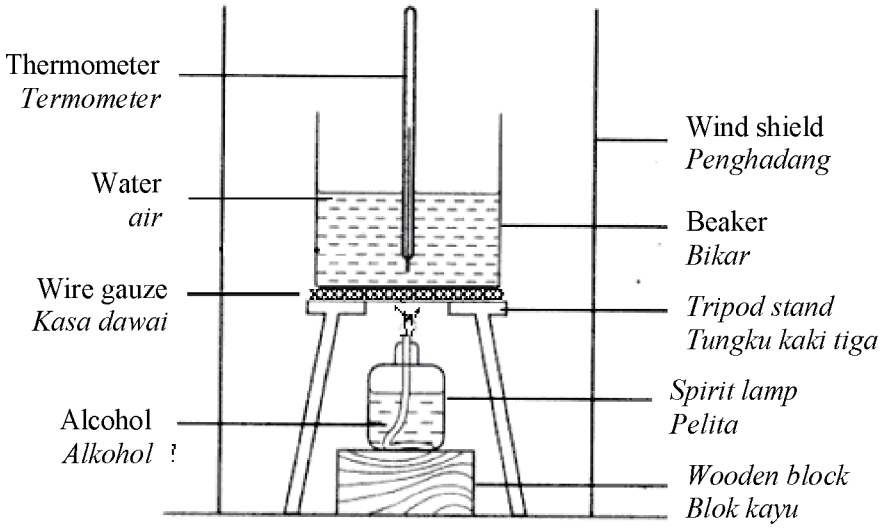


Diagram 7
Rajah 7

(i) State **two** errors in the above set-up.
*Nyatakan **dua** kesalahan dalam susunan radas di atas.*

[2 marks]

(ii) Calculate the heat released when the temperature of the water increases by 30 °C.
[Specific heat capacity of water = 4.2 J g^{-1} $°C^{-1}$, density of water = 1 g cm^{-3}]
Hitungkan haba yang dibebaskan apabila suhu air itu meningkat sebanyak 30 °C.
[*Muatan haba tentu air = 4.2 J g^{-1} $°C^{-1}$, ketumpatan air = 1 g cm^{-3}*]

[2 marks]

(iii) 1.72g of X was burnt to raise the temperature of the water by 30 °C.
Calculate the heat of combustion for X.
[Molar mass of X = 86gmol^{-1}]
1.72 g X telah terbakar untuk menaikkan suhu air sebanyak 30 °C.
Hitungkan haba pembakar bagi X.
[Jiism molar bagi X = 86 gmol^{-1}*]*

[3 marks]

(c) Table 7.2 shows the relative molecular mass and heat of combustion of two alcohols.
Jadual 7.2 menunjukkan jisim molekul relatif dan haba pembakaran bagi dua alohol.

Alcohol *Alkohol*	Relative molecular mass *Jisim molekul relatif*	Heat of combustion /kJ mol^{-1} *Haba pembakaran / kJ mol^{-1}*
Ethanol *Etanol*	46	– 1376
Butan-1-ol *Butan-1-ol*	74	– 2675

Table 7.2
Jadual 7.2

(i) Calculate the fuel value (kJ/g) for the two alcohols.
Based on your answer, state which fuel is more efficient.
Hitungkan nilai bahanapi (kJ/g) bagi dua alcohol tersebut.
Berdasarkan jawapan anda, nyatakan bahan api yang lebih efesien

[3 marks]

8 (a) Lemon juice was electrolysed using carbon electrode. State the product obtained at the cathode. Write the half equation for reaction.
Jus lemon dielektrolisiskan dengan menggunakan elektrod karbon. Nyatakan hasil yang diperolehi di katod. Tulis setengah persamaan untuk tindakbalas yang berlaku.

[2 marks]

(b) Table 8 shows the apparatus set-up and observations of two sets of experiment. The aim of experiment is to study the factors of electrode in cell M and chemical cell in cell N.
Jadual 8 menunjukkan susunan radas dan pemerhatian bagi dua set eksperimen. Tujuan eksperimen ini ialah untuk mengkaji faktor elektrod di dalam sel M dan sel kimia di dalam sel N.

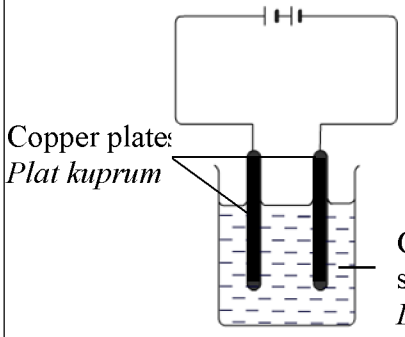
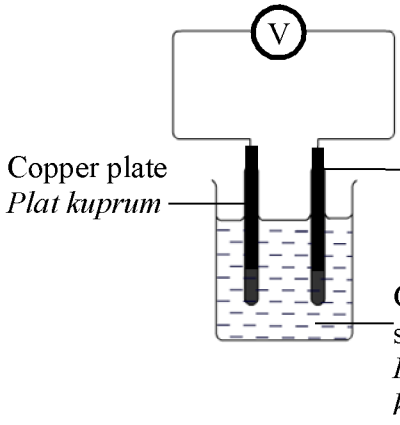
Set	Apparatus set-up	Observation
Cell M		Anod: Electrode copper becomes thinner *Elektrod kuprum menipis* Cathode: Brown solid deposited Enapan perang terbentuk
Cell N		Anode: Magnesium becomes thinner *Magnesium semakin menipis* Cathode: Brown solid deposited Enapan perang terbentuk

Table 8
Jadual 8

Based on Table 8, explain the differences in the observation for both sets of experiment.
Write **one** half equation involved.
Berdasarkan Jadual 8, terangkan perbezaan dalam pemerhatian bagi kedua-dua eksperimen.
*Tuliskan **satu** setengah persamaan yang terlibat.*

[8 marks]

(c) Fara wants to electroplate an iron key with copper to prevent it from rusting.
Plan one laboratory experiment to electroplate the iron key.
Your answer should include the following:
Fara mahu menyadur satu kunci besi dengan kuprum untuk mengelakkan ia daripada berkarat.
Rancang satu eksperimen makmal untuk menyadur kunci besi itu.
Jawapan anda perlu mengandungi perkara berikut:

- A list of materials and apparatus
  Senarai bahan dan radas
- Procedure of the experiment
  Prosedur eksperimen
- A labelled diagram showing the apparatus set-up
  Gambarajah berlabel yang menunjukkan susunan radas
- The half equations for the reactions at the cathode and the anode
  Setengah persamaan bagi tindak balas di katod dan di anod

[10 marks]

Section C
Bahagian C

[20 *marks*]
[*20 markah*]

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

9 Diagram 9 shows the atomic structure of three elements X, Y and Z.
Rajah 9 menunjukkan struktur atom bagi tiga unsur X, Y dan Z.

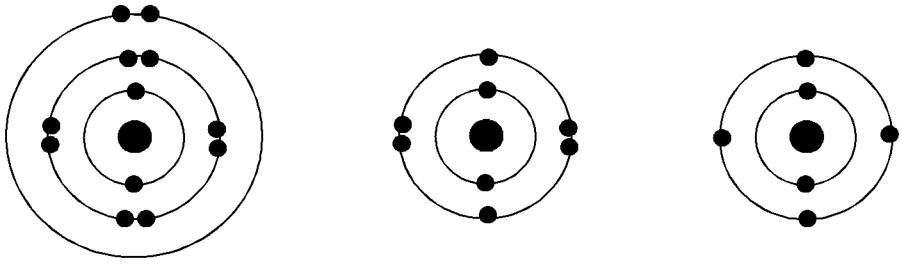


Diagram 9
Rajah 9

(a) Based on Diagram 9, two types of compounds can be formed.
Explain the differences between the two compounds formed in terms of
- Types of chemical bonds, and
- Boiling and melting points.

Berdasarkan Rajah 9, dua jenis sebatian boleh terbentuk.
Terangkan perbezaan di antara dua sebatian tersebut dari segi
- *jenis ikatan kimia yang terbentuk, dan*
- *takat lebur dan takat didihnya.*

[4 marks]

(b) Draw the electron arrangement of the compound formed between X and Y, and explain the formation of the compound.

Lukiskan susunan elektron untuk pembentukan sebatian di antara X dan Y, dan terangkan pembentukan sebatian tersebut.

[6 marks]

(c) You are given two samples of chemical substances, P and Q.
Both of them are white solids. P is a covalent compound and Q is an ionic compound.
Describe a laboratory experiment to investigate the electrical conductivity of P and Q. Include the observations in your answer.
Suggest a suitable example for each substance P and substance Q.

Anda diberi dua sampel bahan kimia, P dan Q.
Kedua-duanya berwarna putih.P adalah sebatian kovalen dan Q adalah sebatian ion.
Huraikan satu eksperimen makmal untuk mengkaji kekonduksian arus elektrik sebatian P dan Q. Sertakan pemerhatian yang diperolehi dalam jawapan anda.
Cadangkan satu contoh yang sesuai bagi setiap bahan P dan bahan Q .

[10 marks]

10 (a) Two experiments were carried out by a student to investigate the factors that affect the rate of reaction between the metal X and Y acid.
Dua eksperimen telah dijalankan oleh seorang pelajar untuk mengkaji faktor yang mempengaruhi kadar tindak balas antara logam X dan asid Y.

Table 10 shows the reactants and the time taken to collect 30 cm^3 of hydrogen gas released.
Jadual 10 menunjukkan bahan tindakbalas dan masa yang diambil untuk mengumpul 30cm^3 gas hidrogen yang terbebas.

Experiment *Eksperimen*	Reactants *Bahan tindakbalas*	Time taken *Masa yang diambil (s)*
I	Excess powdered metal X + 50 cm^3 of 1.0 mol dm^{-3} acid Y *Serbuk logam* X *berlebihan* + 50 cm^3*asid* Y 1.0 *mol* dm^{-3}	10
II	Excess powdered metal X + 100 cm^3 of 0.5 mol dm^{-3} acid Y *Serbuk logam* X *berlebihan* + 100 cm^3*asid* Y 0.5 *mol* dm^{-3}	20

Table 10
Jadual 10

(i) Name **one** example of metal X and **one** example of acid Y.
Nyatakan satu contoh logam X *dan satu contoh asid* Y.

By using the metal X and acid Y, write a balanced chemical equation for the reaction occured.
Menggunakan logam X *dan asid* Y, *tulis persamaan kimia yang seimbang bagi tindakbalas yang berlaku.*

[4 marks]

(ii) Calculate the average rate of reaction for Experiment I and Experiment II.
Hitung kadar tindakbalas purata bagi Eksperimen I *dan Eksperimen* II.

[2 marks]

(iii) Explain the difference in the rate of reaction between Experiment I and Experiment II.
Terangkan perbezaan kadar tindakbalas antara Eksperimen I *dan Eksperimen* II.

Explain your answer by using the Collision Theory.
Terangkan jawapan anda dengan menggunakan Teori Perlanggaran.

[4 marks]

(iv) Describe an experiment how the factors size of reactant or temperature affecting the rate of reaction.
Huraikan satu eksperimen bagaimana faktor saiz bahan tindak balas atau suhu mempengaruhi kadar tindak balas.

[10 *marks*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

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									

10 — Proton number
Ne — Symbol
Neon — Name of element
20 — Relative atomic mass

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 : ……

PROGRAM GEMPUR KECEMERLANGAN
SIJIL PELAJARAN MALAYSIA 2016
ANJURAN BERSAMA
MAJLIS PENGETUA SEKOLAH MALAYSIA
NEGERI PERLIS
DAN
MAJLIS GURU CEMERLANG NEGERI PERLIS

SIJIL PELAJARAN MALAYSIA 2016
4541/3
KIMIA
Kertas 3
Ogos
1 ½ jam

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.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*

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

Kertas soalan ini mengandungi **7** halaman bercetak termasuk muka depan

1. Diagram 1.1 and 1.2 shows the initial and final burette readings for two experiments. The aim of the experiments is to determine the concentration of acid .
Rajah 1.1 dan 1.2 menunjukkan bacaan awal dan bacaan akhir buret bagi dua eksperimen .Tujuan eksperimen ialah untuk menentukan kepekatan asid.

Experiment I
Eksperimen I

Titration of sulphuric acid of unknown concentration with 20 cm^3 of sodium hydroxide solution 1.0 mol dm^{-3} using phenolftalein as indicator.
Pentitratan asid sulfurik yang tidak diketahui kepekatannya dengan 20 cm^3 larutan natrium hidroksida 1.0 mol dm^{-3} menggunakan penunjuk fenolftalein.

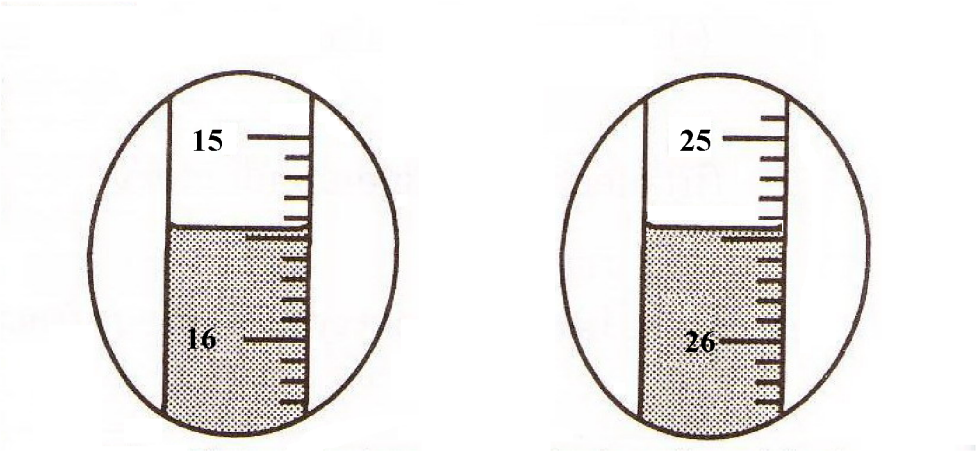


Diagram 1.1
Rajah 1.1

Initial burette reading: ..... cm^3
Bacaan awal buret:

Final burette reading: ..... cm^3
Bacaan akhir buret:

Volume of acid used: ..... cm^3
Isipadu asid yang digunakan:

Experiment II
Eksperimen II

Titration of hydrochloric acid of same concentration as in Experiment I with 20 cm^3 of sodium hydroxide solution 1.0 mol dm^{-3} using phenolftalein as indicator.
Pentitratan asid hidroklorik yang kepekatan yang sama dalam Eksperimen I dengan 20 cm^3 larutan natrium hidroksida 1.0 mol dm^{-3} menggunakan penunjuk fenolftalein.

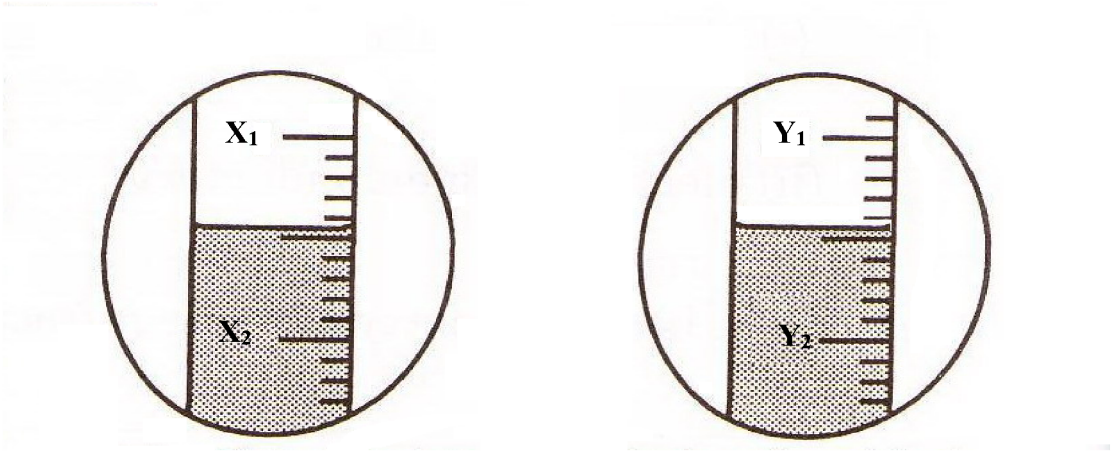


Diagram 1.2
Rajah 1.2

Initial burette reading:
Bacaan awal buret: . ..... cm^3

Final burette reading:
Bacaan akhir buret: ..... cm^3

Volume of acid used:
Isipadu asid yang digunakan: ..... cm^3

(a) Write the initial, final burette reading and the volume of acid used for both experiments in the spaces provided.
Tulis bacaan awal,akhir dan isipadu asid yang digunakan untuk kedua-dua eksperimen dalam ruang yang disediakan.

[3 marks]

(b) Construct a table that consists of the initial, final burette reading and the volume of acid for both experiments.
Bina satu jadual yang mengandungi bacaan awal, bacaan akhir buret dan isipadu asid dalam kedua-dua eksperimen.

[3 marks]

(c) Why must the initial and the final burette reading be recorded in these experiments?
Mengapakah bacaan awal dan akhir buret perlu direkodkan dalam eksperimen ini?

.....

[3 marks]

(d) The equation shows the reaction between sulphuric acid and sodium hydroxide solution.
Persamaan menunjukkan tindak balas antara asid sulfurik dengan larutan natrium hidroksida.

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

Determine the concentration of sulphuric acid used in Experiment 1.
Tentukan kepekatan asid sulfurik yang digunakan dalam eksperimen I.

[3 marks]

(e)(i) Based on the volume and concentration of sulphuric acid in Experiment I, predict the volume of hydrochloric acid used to neutralise 20 cm^3 1.0 mol dm^{-3} sodium hydroxide solution in Experiment II.
Berdasarkan isipadu dan kepekatan asid sulfurik dalam Eksperimen I, ramalkan isipadu asid hidroklorik yang diperlukan untuk meneutralkan 20 cm^3 1.0 mol dm^{-3} larutan natrium hidroksida.

.....

[3 marks]

(ii) Explain the answer in 1(e)(i)
Terangkan jawapan dalam 1(e)(i)

.....

.....

[3 marks]

(f) State three observations that you could obtain **other than burette reading** and related inferences in both experiments.
*Nyatakan tiga pemerhatian yang boleh diperoleh **selain dari bacaan buret** dan inferens yang berkaitan dalam kedua-dua eksperimen.*

Observation *Pemerhatian*	Inference *Inferen*
(i)	(i) .....
(ii)	(ii) .....
(iii).....	(iii) .....

[6 marks]

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

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

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

(iii) Constant variable:
Pembolehubah dimalarkan: .....

[3 marks]

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

.....

.....

[3 marks]

(i) The addition of acid to the sodium hydroxide solution in the experiment is stopped when the end point of titration is achieved. Give the **operational definition** for **the end point of titration.**
Penambahan asid kepada larutan natrium hidroksida dalam eksperimen dihentikan apabila takat akhir pentitratan telah tercapai. Beri ***definisi secara operasi*** *bagi* ***takat akhir pentitratan.***

.....

.....

.....

[3 marks]

  [*Lihat halaman sebelah***]**

2 Diagram 2 shows how fresh latex produced from rubber tree and a coagulated latex transform into rubber sheets .
Rajah 2 menunjukkan bagaiman susu getah diperolehi dari pokok getah dan latek yang telah dibekukan ditukarkan menjadi getah keping.

Diagram 2
Rajah 2

Referring to the diagram, plan a laboratory experiment to investigate the effect of acids and alkali on the coagulation of latex.
Merujuk kepada rajah di atas, rancang satu eksperimen makmal untuk mengkaji kesan asid dan alkali ke atas pengumpalan lateks.

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

(a) Statement of problem
Pernyataan masalah

(b)All the variables
Semua pembolehubah

(c) Statement of the hypothesis
Pernyataan hipotesis

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

(e)Procedure of the experiment
Prosedur eksperimen

(f)Tabulation of data
Penjadualan data

[17 marks]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

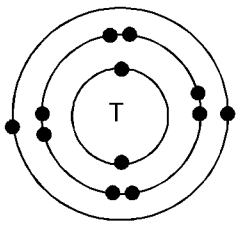
SKEMA KERTAS 1
https://cikguadura.wordpress.com/

1	A
2	B
3	C
4	D
5	D
6	C
7	C
8	C
9	B
10	D
11	D
12	A
13	A
14	C
15	B
16	D
17	B
18	D
19	A
20	A
21	C
22	B
23	C
24	C
25	A

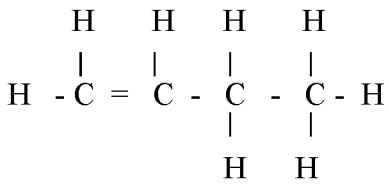
26	B
27	C
28	B
29	C
30	A
31	B
32	C
33	C
34	D
35	B
36	A
37	C
38	D
39	D
40	D
41	A
42	B
43	A
44	C
45	B
46	A
47	D
48	C
49	A
50	B

SKEMA PEMARKAHAN KERTAS 2
GEMPUR KIMIA PERLIS 2016
https://cikguadura.wordpress.com/

Question Number		Answer	Mark
1	(a)(i)	Psychotherapeutic	1
	(ii)	To treat infections caused by bacteria or fungi.	1
	(iii)	Paracetamol	1
	(b)(i)	Potassium palmitate	1
	(ii)	P: soluble in grease/oil Q: soluble in water.	1 1
	(c)(i)	Ethyl butanoat - flavouring agent // Sunset Yellow – colouring //Ascobic acid – Antioxidant	1+1
	(ii)	Aspartame	1
		Total	**9**

2	(a)	Proton, electron and neutron			1
	(b)	(i)	Isotopes are atoms of the same element with the same number of proton but different number of neutrons		1
		(ii)	R and S		1
		(iii)	Cobalt-60		1
	(c)	(i)	2.8.1		1
		(ii)	1		1
	(d)	$^{24}_{11}S$			1
	(e)	(i)			1
		(ii)	Group 2 , Period 3		1
				TOTAL	**9**

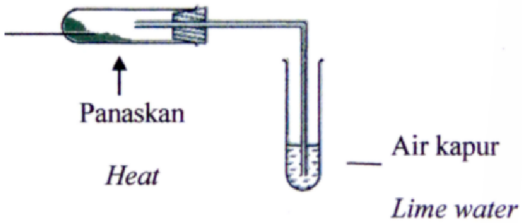
Question Number		Answer	Mark
3	(a)(i)	The chemical formula which shows the actual number of atoms of each combining elements in one molecule of the compound.	1
	(ii)	Molecular formula – $C_4H_8O_2$ Empirical formula – C_2H_4O	1 1
	(iii)	$Mg_3(XO_4)_2 = 262$ $3(24) + 2X + 8(16) = 262$ $2X = 262 - 200$ $X = 31$	 1 1
	(b)(i)	Colourless air bubbles released // lime water turn cloudy	1
	(ii)	Carbon dioxide	1
	(iii)	$CuCO_3 \longrightarrow CuO + CO_2$	1
	(iv)	No. of mol $= \frac{6.4}{64 + 12 + 3(16)}$ $= 0.0516$ mol. From equation 1 mol $CuCO_3$: 1 mol CO_2 0.0516 mol $CuCO_3$: 0.0516 mol CO_2 No of mol $= \frac{\text{Volume}}{\text{Molar volume}}$ $0.0516 \text{ mol} = \frac{\text{Volume}}{24 \text{ dm}^3/\text{mol}}$ Volume $= 1.2384 \text{ dm}^3$ // 1234.8 cm^3	 1 1 1
		Total	**10**

Question Number		Answer	Mark
4	(a)(i)	$CnH_{2n+1}OH$	1
	(ii)	Hydroxyl / -OH	1
	(b)(i)	Butene	1
	(ii)		1
	(c)(i)	Potassium dichromate (VI) solution// Potassium mangganate (VII) solution	1
	(ii)	Orange to green // Purple to clourless	1
	(d)(i)	Butyl propanoate	1
	(ii)	$C_2H_5COOH + C_4H_9OH \longrightarrow C_2H_5COOC_4H_9 + H_2O$	1

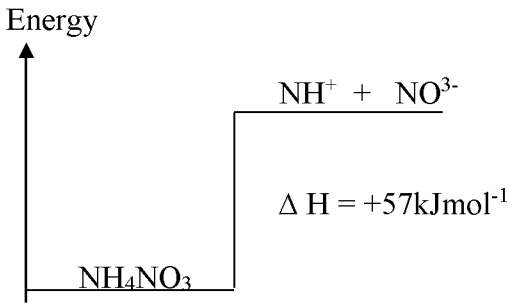
	(e)	Number of mole of butene = 11.2/56 = 0.2 mol 1.0 mole of butene burnt to produce 4.0 mole of carbon dioxide 0.2 mole of butene burnt to produce 0.8 mole of carbon dioxide Number of carbon dioxide molecules = 0.8 mol x 6.02 x 10^{23} = 4.816 x 10^{23} molecules	1 1 1
		Total	**11**

Question Number		Answer	Mark
5	(a)	Acidified Potassium manganate(VII)	1
	(b)	+7	1
	(c)	reduction	1
	(d)(i)	Colourless solution turn brown	1
	(ii)	$2I^- \rightarrow I_2 + 2e$	2
	(iii)	Iodide ion release electron	1
	(e)	To allow the flow of ion from both electrolytes	1
	(f)	Functional diagram of simple cell Label	1 1
		Total	**10**

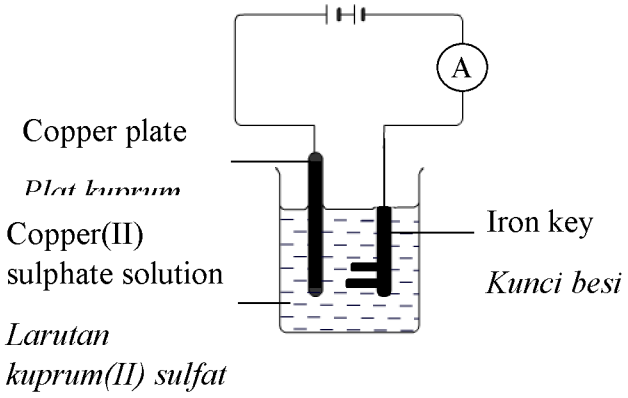
https://cikguadura.wordpress.com/

QUESTION			DESCRIPTION	SUB MARK	TOTAL MARK
6	(a)	(i)	$Pb(NO_3)_2$	1	
		(ii)	Double decomposition reaction/ Penguraian ganda dua	1	2
	(b)		P: Lead(II) carbonate Q: Lead(II) oxide R: Carbon dioxide	1 1 1	3
	(c)		Brown when hot, yellow when cold	1	1
	(d)	(i)	Salt P *Garam* P  Functional Labelled	 1 1	 2
		(ii)	$PbCO_3 \rightarrow PbO + CO_2$	1	1

	(e)		Bilangan mol = 2.67/ 267 // 0.1 mol Isipadu = 0.1 X 24 // 2.4 dm^3	1 1	2
				Total	11

Question Number		Answer	Mark
7	(a)(i)	*Able to state the type of reaction and explain* Set I: Exothemic The sign of ***heat of reaction,*** Δ H is negative Set II: Endothemic The sign of ***heat of reaction,*** Δ H is positive	 1 + 1 1 + 1
	(ii)	 - Label Energy, correct level of reactants & product - correct chemical equations - Δ H with positive symbol and unit • heat absorbed from the surrounding • The quantity of heat energy absorbed for bond breaking in the reactants is higher than energy than heat energy released from the formation of bonds in the products. • The total energy content of reactants is lower than the product.	 1 1 1 1 1 1
	(b)(i)	*Able to state two errors in the apparatus set-up correctly* 1. Metal container and not beaker 2. replace wire gauze with pipe clay triangle	 1 + 1

	(ii)	*Able to calculate the heat released correctly* Heat released = mcΘ = 200 x 4.2 x 30 = 25200 J / 25.2 kJ (must show unit, J / kJ)	 1 1
	(iii)	*Able to calculate the heat of combustion correctly* 1. mol = $\frac{1.72}{86}$ // 0.02 2. ΔH = $\frac{25.2}{0.02}$ 3. = -1260 kJmol- 1 negative sign & unit (kJmol- 1)	 1 1 1
	(c)(i)	*Able to calculate the fuel value correctly:* 1. Fuel value of ethanol is 1376/46 = 29.9 kJ g-1 2. Fuel value of butan-1-ol 2675/74 = 36.1 kJ g-1	 1 1
	(ii)	*Able to choose which is the better fuel correctly:* Butan-1-ol is the better fuel as 1 g of it releases 36.1 kJ	 1
		Total	**20**

8	(a)	- Hydrogen gas	1	
		- $2H^+ + 2e \rightarrow H_2$	1	2
	(b)	The ions present in both cell are Cu^{2+}, SO_4^{2-}, H^+ and OH	1	
		In Cell M		
		At anode, Copper atom ionises //Copper atom ionises form Cu^{2+}	1	
		At cathode, Cu^{2+} discharge and form **copper atom**	1	
		Cu^{2+} discharge because the position is lower than H^+ in ECS	1	
		½ equation		
		Anode: $Cu \rightarrow Cu^{2+} + 2e$ // Cathode: $Cu^{2+} + 2e \rightarrow Cu$	1	
		In Cell N		
		At negative terminal/Anode	1	
		Mg atom ionises// Mg atom ionises and form Mg^{2+}	1	
		Mg atom is more electropositive than copper // the position of Mg is higher than Copper in ECS	1	
		// ½ equation		
		$Mg \rightarrow Mg^{2+} + 2e$		8
	(c)	**Materials:** Iron key, copper plate, copper(II) sulphate solution (0.5 mol dm^{-3}) and sand paper	1	
		Apparatus: battery, connecting wires, beaker, ammeter	1	
		Procedur:		
		1 The iron key is cleaned with sand paper	1	
		2 The iron key is then connected to the negative terminal of the battery while the copper plate is connected to the positive terminal of the battery. Both are immersed in the copper(II) sulphate solution.	1	
		3 A 0.5 A current is supplied for about 30 minutes.	1	
		4 The iron key is rotated slowly while the experiment is conducted.	1	
			1 + 1	
		Half equation:		
		Anode : $Cu(s) \rightarrow Cu^{2+}(aq) + 2e$	1	
		Cathode: $Cu^{2+}(aq) + 2e \rightarrow Cu(s)$	1	10
			TOTAL	20

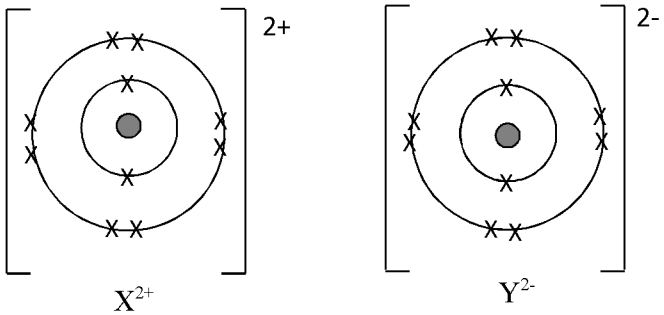
Question Number		Answer	Mark
9	(a)		

	Compound formed between X and Y	Molecule formed between Z and Y
Types of chemical bonds	Ionic bond is formed because X atom donates electrons and Y atom receives electrons to achieve stable electron arrangement //X is metal and Y is non-metal	Covalent bond is formed because Z and Y atoms share the electrons to achieve stable electron arrangement // Y and Z are non-metal
Boiling point and melting point	High because a lot of energy needed to overcome the strong electrostatic forces between ions	Low because less energy is needed to overcome the weak forces of attraction between molecules

Mark: 2 2

(b)

Correct electron arrangement of 2 ions
Correct charges and nuclei are shown



Mark: 2

- X atom with an electron arrangement of 2.8.2 donates 2 valence electrons to achieve the stable octet electron arrangement, 2.8. X^{2+} ion is formed // $X \longrightarrow X^{2+} + 2e^-$ — 1
- Y atom with an electron arrangement of 2.6 accept 2 electrons to achieve the stable octet electron arrangement, 2.8. Y^{2-} ion is formed // $Y + 2e^- \longrightarrow Y^{2-}$ — 1
- The oppositely-charged ions, X^{2+} and Y^{2-} are attracted to each other by a strong electrostatic force. — 1
- An ionic compound XY is formed — 1
-

(c)

1. A crucible is filled with solid P until it is half full. — 1
2. Two carbon electrodes are dipped in the solid P and connected to the batteries. — 1
3. Switch is turned on and observation is recorded. — 1
4. The solid P is then heated until it melts completely. — 1
5. The switch is turned on again and observation is recorded. — 1

		6. Steps 1 to 5 are repeated using solid Q to replace solid P. 7. Observations: P does not light up the bulb in both solid and molten states. Q lights up the bulb in molten state only. P: naphthalene // any suitable answer Q: lead(II) bromide // any suitable answer	1 1 1 1 1
		Total	20

Question Number		Answer	Mark
10	(a)(i)	▪ **X**: (Name of any metal situated above Cu in the electrochemical series) ▪ **Y**: (Name of any acid) Sample answer: **X:** Magnesium // Zinc // Aluminium [**Reject**: Sodium // Potassium] **Y:** Hydrochloric acid // Sulphuric acid // Nitric acid [**Accept:** weak acid] ▪ Chemical equation: Correct formula of reactants and products Balanced Sample answer: $Mg + 2HCl \rightarrow MgCl_2 + H_2$	1 1 1 1 4

	(ii)	Experiment I Average Rate of Reaction = 30/10 = 3.0 cm^3s^{-1} Experiment II Average Rate of Reaction = 30/20 = 1.5 cm^3s^{-1} [With correct unit]	1 1 ...2
	(iii)	▪ Rate of reaction in Experiment I is higher than Experiment II ▪ The concentration of acid in Experiment I is higher than Experiment II // The number of hydrogen ions per unit volume in Experiment I higher than Experiment II ▪ Frequency of collision between hydrogen ions and atoms of **X** in Experiment I is higher than in Experiment II ▪ Frequency of effective collision between the particles in Experiment I is higher than in Experiment II	1 1 1 1 4

	(iv)	Size of Reactants: 1. (25-50) cm^3 of (0.1-1.0) mol dm^{-3} of hydrochloric acid is measured and poured into a conical flask. 2 About 5.0 g of zinc granules is weigh. 3. A burette is filled with water and inverted into a basin containing water 4 The water level in the burette is adjusted to 50 cm^3 mark. 5. The granulated zinc is added into the conical flask. 6. Immediately the conical flask is closed and connect it using delivery tube to the burette 7. The stopwatch is started. 8. The conical flask is shaken steadily. 9. Record volume of hydrogen gas every 30 seconds interval. 10. The experiment is repeated using 5.0 g of zinc powder to replace 5.0 g of zinc granules. **OR** Temperature: 1. (20 – 100) cm^3 of (0.1 – 1.0) mol dm^{-3} sodium thiopsulphate solution is measured 2. Sodium thiopsulphate solution is then poured into a conical flask 3. The initial temperature of sodium thiosulphate is recorded 4. The conical flask is placed on the top of a piece of white paper marked with "X" 5. 5.0 cm^3 of (0.1 – 1.0) mol dm^{-3} hydrochloric acid is measured 6. The hydrochloric acid is poured quickly into the conical flask. 7. A stopwatch is started immediately 8. The conical flask is swirled throughout the experiment 9. The time taken for the mark "X" to disappear from sight is recorded 10. The experiment is repeated using sodium thiosulphate solution solution at 35°C, 40°C,45°C and 50°C.	1 1 1 1 1 1 1 1 1 1 ...10 **OR** 1 1 1 1 1 1 1 1 1 1 1 ...10
		Total	20

PEPERIKSAAN PERCUBAAN BERSAMA SPM
TINGKATAN 5
2016
https://cikguadura.wordpress.com/

CHEMISTRY

PAPER 3

MARKING SCHEME

FOR EXAMINER'S USE ONLY

The marking scheme consists of 11 printed pages

MARKING GUIDELINES
PAPER 3

Symbol		Meaning
//	-	replace the whole sentence
/	-	replace the previous word
[ ]	-	can be summarized from explanation
___ or bold	-	key word
adp	-	avoid double penalty
wcr	-	wrong cancel right
a.	-	accept
r.	-	reject
ecf	-	error carry forward

<table>
<tr><th>Question number</th><th>Answers
https://cikguadura.wordpress.com/</th><th>Score</th></tr>
<tr><td>1(a)</td><td>Able to write all the readings are correct with two decimal place accurately
<table>
<tr><td></td><td>Experiment I</td><td>Experiment II</td></tr>
<tr><td>Initial burette reading(cm^3)</td><td>15.45</td><td>X_1.45</td></tr>
<tr><td>Final burette reading(cm^3)</td><td>25.45</td><td>Y_1.45</td></tr>
<tr><td>Volume of acid(cm^3)</td><td>10.00</td><td>Y_1.45- X_1.45</td></tr>
</table></td><td>3</td></tr>
<tr><td></td><td>Able to write only four readings with two decimal places correctly// all the readings are correct with one decimal place
(Hanya empat bacaan dengan dua tempat perpuluhan adalah betul //semua bacaan betul dengan satu tempat perpuluhan)</td><td>2</td></tr>
<tr><td></td><td>Only two readings with two decimal places are correct/ all the readings are correct with no decimal places.
(Hanya dua bacaan dengan dua tempat perpuluhan adalah betul / semua bacaan betul tanpa tempat perpuluhan)</td><td>1</td></tr>
<tr><td></td><td>No response or wrong response (Tiada respons atau respons salah)</td><td>0</td></tr>
</table>

<table>
<tr><th>Question number</th><th>Answers</th><th>Score</th></tr>
<tr><td>1(b)</td><td>Able to constuct a table that contains the following information:
(Dapat membina jadual yang mengandungi maklumat berikut):
1. Heading in the table: Experiment, Initial reading, final reading and volume of acid.
2. Transfer all readings from (a)(i) correctly.
(Pemindahan semua bacaan daripada (a)(i) dengan betul).
3. With unit(at heading)
(Berunit(pada tajuk)).
Sample answer:
<table>
<tr><th>Experiment</th><th>Initial reading/ cm^3</th><th>Final reading/ cm^3</th><th>Volume of acid/ cm^3</th></tr>
<tr><td>I</td><td>15.45</td><td>25.45</td><td>10.00</td></tr>
<tr><td>II</td><td>X_1.45</td><td>Y_1.45</td><td>Y_1.45- X_1.45</td></tr>
</table></td><td>3</td></tr>
<tr><td></td><td>Able to constuct a table that contains the following information:
(Dapat membina jadual yang mengandungi maklumat berikut):
1. Heading in the table: Experiment, Initial reading,final/reading and volume of acid.
(Tajuk dalam jadual: Eksperimen, bacaan awal,bacaan akhir dan isipadu asid)
2. Transfer all readings from (a)(i) correctly.
(Pemindahan semua bacaan suhu daripada (a)(i) dengan betul).</td><td>2</td></tr>
</table>

	3. Without unit. *(tanpa unit).* sample answer: Experiment / Initial reading / Final reading / Volume of acid I: 15.45 / 25.45 / 10.00 II: X_1.45 / Y_1.45 / Y_1.45- X_1.45 Note: jika pemindahan suhu cacat satu//ada satu bacaan tak betul: kekal skor 2	
	Able to construct a table that contains the following information: *(Dapat membina jadual yang mengandungi maklumat berikut):* *1. suitable headings.* *(tajuk sesuai)* *2. 2 columns* *(2 lajur)*	**1**
	No response or wrong response *(Tiada respons atau respons salah)*	**0**

Question number	**Answers**	**Score**
1(c)	*Able to state why initial and the final burette reading is recorded correctly.* *Dapat menyatakan* ***dengan tepat*** *mengapa bacaan awal dan bacaan akhir buret perlu direkodkan.* Contoh jawapan: Untuk mendapatkan isipadu asid .	**3**
	Dapat menyatakan **betul** mengapa bacaan awal dan bacaan akhir perlu direkodkan. Contoh jawapan: 1. Untuk mendapatkan perubahan asid. 2. Untuk menentukan kuantiti asid.	**2**
	Dapat menyatakan idea dengan betul kegunaan mengapa suhu awal dan suhu tertinggi perlu direkodkan. Contoh jawapan: 1. Untuk menentukan takat akhir/peneutralan.	**1**
	Tiada respons atau respons salah	**0**

Question number	Answers	Score
1(d)	Able to show the step to calculate the concentration of sulphuric acid accurately Sample answer: From the equation, $\frac{M_A V_A}{M_B V_B} = \frac{1}{2}$ $M_A = \frac{M_B V_B}{V_A} = \frac{1.0 \times 20}{10 \times 2} = 1 \text{ mol dm}^{-3}$ // 1. Mol NaOH = 1 x2/1000 = 0.002 2. Nisbah NaOH : H_2SO_4 2 : 1 3. M_{H2SO4} = 0.001 x 1000 //1 mol dm-^{3}	**3**
	Able to state the step to calculate the concentration of sulphuric acid correctly. Sample answer: $M_A = \frac{M_B V_B}{V_A} = \frac{1.0 \times 20}{10} = 2.0 \text{ mol dm}^{-3}$	**2**
	Able to give an idea on the concentration of sulphuric acid. Sample answer: [1- 2] mol dm^{-3} // no calculation is shown	**1**
	No response or wrong response *(Tiada respons atau respons salah)*	**0**

Question number	Answers	Score
1(e) (i)	Able to predict the volume of hydrochloric acid used to neutralise 20cm^3 1.0 mol dm^{-3} sodium hydroxide . Double the volume of acid compared to experiment I// 20cm^3 *Dua kali ganda isipadu asid berbanding eksperimen I//20 cm^3*	**3**
	Able to predict a change on the volume of asid less accuartely Menyatakan satu isipadu dalam julat 11 hg 19 cm^3	**2**
	Able to give an idea of predicting a volume of asid The volume of acid changed *Isipadu asid berubah //lebih dari 10 cm^3*	**1**
	No response or wrong response *(Tiada respons atau respons salah)*	**0**

Question number	Answers	Score
1(e) (ii)	Able to state the reason in (e)(i) Sample answer: 1. Hydrochloric acid is monoprotic acid while sulphuric acid is diprotic acid. 2.At the same volume and concentration of both acids, hydrochloric acid contains half the number of mole of H^+ as in sulphuric acid.// 1 mole of sulphuric acid ionises to two mole of H^+, whereas 1 mole of hydrochloric acid ionises to one mole of H^+.	**3**
	Able to state any one point from the answer in score 3.	**2**
	Able to state an idea of the reason. Sample answer: Hydrochloric acid/suphuric acid is strong acid	**1**
	No response or wrong response *(Tiada respons atau respons salah)*	**0**

Question number	Answers	Score
1(f)	Able to state three different observations and three corresponding inferences correctly Sample answer: Observations (Pemerhatian) / Inferences(inferens) (i) The pink colour of the solution turns colourless *Warna merah jambu larutan menjadi tanpa warna* / (i) The alkali solution turns neutral. *Larutan beralkali menjadi neutral* (ii) The conical flask is hot *Kelalang kon menjadi panas* / (ii) Heat is released/ Exothermic reaction occurs (iii) the level of acid in the burette decreases *Aras asid dalam buret berkurang* / (iii) acid is added to neutralise the alkali *Asid ditambah untuk meneutralkan alkali*	**6**
	Able to state any 3 observations and any two inferences correctly//any two observation and any three inferences correctly	5
	Able to state any 2 observations and any two inferences correctly	4
	Able to state any 3 observations or any three inferences correctly	3
	Able to state any 2 observations or any two inferences correctly	2
	Able to state any 1 observation or any one inference correctly	1
	No response or wrong response	0

Question number	Answers	Score
1(g)	Able to state the three variables correctly Sample answer: Manipulated variable: sulphuric acid and hydrochloric acid//Basicity of acid//concentration of hydrogen ion Responding variable: Volume of acid used Fixed variable: NaOH //volume and concentration of alkali/NaOH// concentration of acid//concentration of alkali	**3**
	Only two variables are correct *(Hanya dua pembolehubah sahaja yang betul)*	**2**
	Only one variable is correct *(Hanya satu pembolehubah sahaja yang betul)*	**1**
	No response or wrong response *(Tiada respons atau respons salah)*	**0**
1(h)	Able to state the hypothesis correctly. * **[Correct MV] and [correct RV]** Hypothesis When sulphuric acid is used to neutralise NaOH solution, the volume of acid needed is half than using hydrochloric acid.	**3**
	Able to state the hypothesis less accurately. Sample answer 1.When sulphuric acid is used , the volume of acid needed is half 2. The volume of sulphuric acid needed is half than using hydrochloric acid when react with NaOH..	**2**
	Able to state an idea of hypothesis Sampe answer: 1. The volume of hydrochloric acid needed is [20cm^3] // The volume of sulphuric acid needed is [10cm]^3	**1**
	No response or wrong response *(Tiada respons atau respons salah)*	**0**

Question number	Answers	Score
1(i)	Able to state the meaning of the end point correctly What to observe: pink solution change to colourless What to do: acid added to react exactly with alkali Sample answer: A point at which pink colour of in the solution turns colourless when acid is added to react **exactly** with alkali.	**3**
	Able to state the meaning of end point less accurately Sample answer: 1. The point at which pink colour of in the solution turns colourless when	**2**

	acid is added to alkali. //Pink colour of the solution turns colourless// acid is added to alkali.	
	Able to give an idea for meaning of end point Sample answer: The colour of the solution changes *(Warna larutan berubah)*	**1**
	No response or wrong response *(Tiada respons atau respons salah)*	**0**

Question	Rubric https://cikguadura.wordpress.com/	Score
2(a)	*Able to give the problem statement correctly* Sample Answer How does acids and alkalis affects on the coagulation of latex?// Does acids and alkalis affects on the coagulation of latex?// What is the effect of acids and alkalis on the coagulation of latex?// Does latex coagulate when acid is added and does not coagulate when alkali ia added?	3
	Able to state the problem statement less accurate. Sample Answer Acids and alkalis affect the coagulation of latex // To investigate the effect of acids and alkalis on the coagulation of latex	2
	Able to give an idea of problem statement. Sample answer: Acids and alkalis affect the coagulation	1
	No response or wrong response	0

Question	Rubric	Score
2(b)	*Able to state the three variables correctly* Sample Answer Manipulated variable Type of acids and alkalis // ammonia solution and ethanoic acid Responding variable coagulation of latex//coagulate or not Constant variable Volume of latex / acid / (ammonia solution) / alkali // latex / temperature *Isipadu lateks/asid/(larutan ammonia)/alkali // lateks/suhu*	3
	Able to state any two variables correctly.	2
	Able to state any one variable correctly.	1
	No response or wrong response	0

Question	Rubric	Score
2(c)	*Able to state the relationship between the manipulated variable and the responding variable correctly with direction.* Sample Answer The presence of ethanoic acid, latex coagulate and the presence of ammonia , latex does not coagulate // When ethanoic acid is added to the latex, coagulation occur but when ammonia solution is added to the latex, coagulation do not occur.	3
	Able to state the relationship between the manipulated variable and the responding variable correctly without stating the direction. Sample answer When ethanoic acid is added , coagulation occur // The presence of acids affects the coagulation of latex// When ammonia solution is added no change to the latex.	2
	Able to state an idea of hypothesis. Sample answer Acids affect the coagulation of latex.	1
	No response or wrong response	0

Question	Rubric	Marks
2(d)	*Able to list the materials and apparatus completely* <u>Sample Answer</u> Materials: Latex, ethanoic acid, ammonia solution Apparatus: beaker, glass rod	3
	Able to list incompletely materials and apparatus <u>Sample answer</u> Materials: Latex, ethanoic acid, ammonia solution Apparatus: [Any suitable container]	2
	Able to give an idea of materials and apparatus <u>Sample answer</u> Materials: Latex, ethanoic acid/ ammonia solution// any acid or alkali Apparatus: [Any suitable container]	1
	No response or wrong response	0

<table>
<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td rowspan="4">2(e)</td><td>Able to state all the steps correctly

Sample Answer

1. latex is poured is into a beaker.
2. ethanoic acid is added into the beaker
3. The mixture is stirred with a glass rod.
4. The changes occurred are observed and recorded.
5. The step 1 to 4 are repeated by replacing ethanoic acid with ammonia solution.</td><td>3</td></tr>
<tr><td>Able to state the steps 1,2, 4 and 5 correctly</td><td>2</td></tr>
<tr><td>Able to give an idea of the procedure

Sample answer
Add aqueous ethanoic acid/ ammonia solution into a beaker containing latex</td><td>1</td></tr>
<tr><td>No response or wrong response</td><td>0</td></tr>
</table>

<table>
<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td rowspan="3">2(f)</td><td>Able to construct a table that includes the following information:

1 Heading for the manipulated variable
2 Heading for the responding variable

Sample Answer
<table><tr><td>Mixture//substance added to latex</td><td>Observation//coagulate or not atau ikut RV or procedure calon</td></tr><tr><td>Latex + ethanoic acid//ethanoic acid</td><td></td></tr><tr><td>Latex + ammonia solution//ammonia</td><td></td></tr></table></td><td>2</td></tr>
<tr><td>Able to construct a table that includes

1 Heading for the manipulated variable
2 Heading for the responding variable

Sample answer
<table><tr><td>Mixture //</td><td>Observation//coagulate or not atau ikut RV or procedure calon</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table></td><td>1</td></tr>
<tr><td>No response or wrong response</td><td>0</td></tr>
</table>