4541/1
Kimia
Kertas 1
Ogos
2010
1¼ jam

JABATAN PELAJARAN NEGERI JOHOR

PEPERIKSAAN PERCUBAAN SIJIL PELAJARAN MALAYSIA 2010

KIMIA

Kertas 1

Satu jam lima belas minit

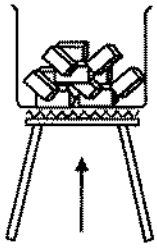
JANGAN BUKA KERTAS SOALAN INI HINGGA DIBERITAHU

1. *Kertas soalan ini adalah dalam dwibahasa.*
2. *Soalan di bahagian atas adalah dalam bahasa Inggeris. Soalan di bahagian bawah adalah yang sepadan dalam bahasa Melayu.*
3. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

Kertas soalan ini mengandungi 40 halaman bercetak

1 Diagram 1 shows the apparatus set-up for heating ice to 60°C.

Rajah 1 menunjukkan susunan radas bagi pemanasan ais sehingga 60 °C.

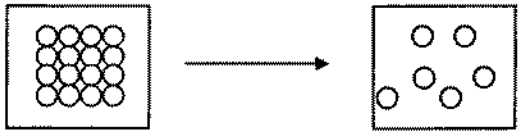


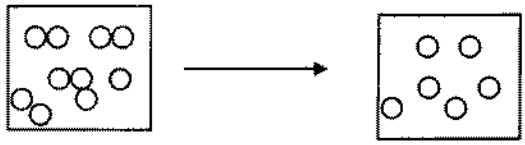
Heat
Panaskan

Diagram 1
Rajah 1

Which of the following shows the change in the arrangement of particles when ice is heated?

Antara berikut yang manakah menunjukkan perubahan susunan zarah apabila ais dipanaskan?

A 

B 

C 

D 

2. Which of the following statement is **true** for 1 mole of substance?

*Antara pernyataan berikut yang manakah **benar** bagi 1 mol bahan?*

A 1 mol of zinc contains 6.02×10^{23} molecules
1 mol zink mengandungi 6.02×10^{23} molekul

B 1 mol of ammonia contains the same number of atoms as in 12g of carbon-12.
1 mol ammonia mengandungi bilangan atom yang sama seperti dalam 12g karbon-12

C 1 mol of carbon dioxide contains the same number of molecules as the number of atoms in 12g carbon-12.
1 mol karbon dioksida mengandungi bilangan molekul yang sama dengan bilangan atom dalam 12g karbon-12

D 1 mol of oxygen gas contains 6.02×10^{23} atoms.
1 mol gas oksigen mengandungi 6.02×10^{23} atom.

3. Diagram 2 shows the symbol for element X.

Rajah 2 menunjukkan simbol bagi unsur X.

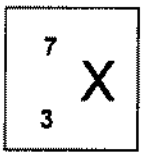


Diagram 2
Rajah 2

Determine the position of element X in the Periodic Table.

Tentukan kedudukan unsur X dalam Jadual Berkala.

	Group *Kumpulan*	Period *Kala*
A	1	2
B	3	7
C	7	3
D	15	2

4. What type of chemical bond exists in sodium chloride, NaCl?

Apakah jenis ikatan kimia yang wujud dalam natrium klorida, NeCl?

A Covalent bond
Ikatan kovalen

B Ionic bond
Ikatan ionik

C Metallic bond
Ikatan logam

D Single bond
Ikatan tunggal

5. Which of the following is an electrolyte?

Antara berikut yang manakah merupakan elektrolit?

A Molten lead (II) iodide
Leburan plumbum (II) iodida

B Liquid nitrogen
Cecair nitrogen

C Tetrachloromethane
Tetraklorometana

D Benzene
Benzena

6. Which of the following will show acidic property?

Antara berikut yang manakah menunjukkan sifat asid?

A Glacial ethanoic acid
Asid etanoik glasial

B Aqueous ethanoic acid
Larutan akuas asid etanoik

C Solid ethanedioic acid
Pepejal asid etanadioik

D Solid ethanedioic acid in dry propanone
Pepejal asid etanadioik dalam propanon kering

7. Which of the following is a soluble salt?

Antara berikut yang manakah merupakan garam terlarutkan?

A Potassium sulphate
Kalium sulfat

B Barium sulphate
Barium sulfat

C Calcium sulphate
Kalsium sulfat

D Lead (II) sulphate
Plumbum (II) sulfat

8. The following are the uses of sulphuric acid in our daily life **except**

Yang berikut adalah kegunaan asid sulfurik dalam kehidupan seharian ***kecuali***

A To make fertilizers
Untuk membuat baja

B As electrolyte in car batteries
Sebagai elektrolit dalam bateri kereta

C To make detergents
Untuk membuat detergen

D To make vinegar
Untuk membuat cuka

9. Zinc powder reacts faster with hydrochloric acid than a zinc strip because

Serbuk zink bertindak balas lebih cepat dengan asid hidroklorik berbanding kepingan zink kerana

A there is a layer of zinc oxide on the zinc strip
terdapat lapisan zink oksida di atas permukaan jalur zink

B the zinc powder has a larger total surface area
serbuk zink mempunyai jumlah luas permukaan yang lebih besar

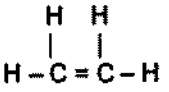
C the particles of zinc powder have more kinetic energy
zarah-zarah serbuk zink mempunyai lebih banyak tenaga kinetik

D the particles in the zinc strip are packed more closely together
zarah-zarah dalam kepingan zink tersusun dengan lebih rapat

10. Which of the following is an alkane ?

Antara berikut yang manakah alkana ?

A



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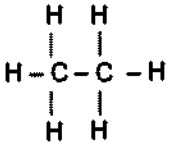

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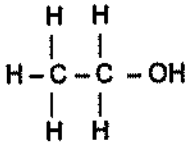
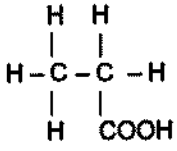


D



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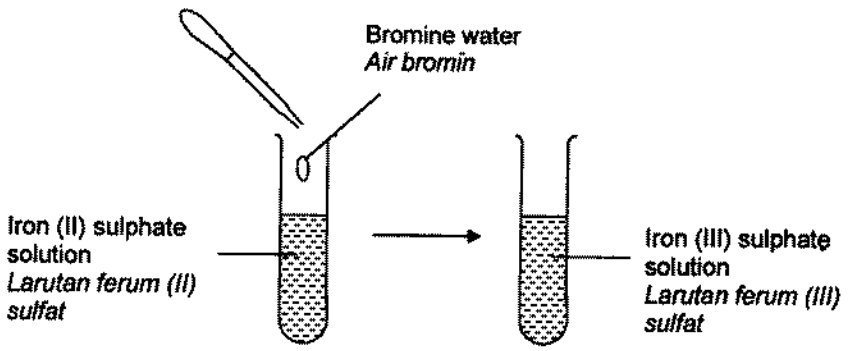


Diagram 3
Rajah 3

Based on Diagram 3, what is the role of bromine water?
Berdasarkan Rajah 3, apakah peranan air bromin?

A Hydration agent
Agen penghidratan

B Dehydration agent
Agen pendehidratan

C Reducing agent
Agen penurunan

D Oxidising agent
Agen pengoksidaan

12. The chemical equation for a reaction is given as below:

Persamaan kimia bagi satu tindak balas adalah diberi seperti berikut:

$$Zn + 2HCl \rightarrow ZnCl_2 + H_2 \qquad \Delta H = -120 \text{ kJ mol}^{-1}$$

Which of the statement below **cannot** be obtained from this equation?

*Antara pemyataan berikut, yang manakah **tidak** dapat diperolehi daripada persamaan tersebut?*

A Copper (II) sulphate solution is used as a catalyst
Larutan kuprum (II) sulfat digunakan sebagai mangkin

B This reaction released energy to the surrounding
Tindak balas ini membebaskan tenaga ke persekitaran

C This reaction produced 1 mole of zinc chloride salt.
Tindak balas ini menghasilkan 1 mol garam zink klorida

D This is a reaction between acid and metal
Tindak balas ini adalah antara suatu asid dengan logam

13. A patient hearing voices which other people do not hear.
Which of the following medicine is suitable to treat this patient?

Seorang pesakit selalu mendengar suara yang tidak didengari oleh orang lain.
Antara ubat berikut yang manakah sesuai untuk merawat pesakit tersebut?

A Barbiturates
Barbiturat

B Tranquilizers
Trankuiliser

C Methyphenidate
Metifenidat

D Chlorpromazine
Klorpromazin

14. Which of the following scientist proposed the structure of atom shown in Diagram 4?
Saintis yang manakah telah mencadangkan struktur atom yang ditunjukkan pada Rajah 4 ?

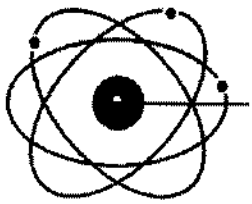


Diagram 4
Rajah 4

A Neils Bohr

B J.J Thomson

C James Chadwick

D Ernest Rutherford

15. Table 1 shows two elements and their respective relative atomic masses. The letters do not represent the actual symbol of the elements.

Jadual 1 menunjukkan dua unsur dan jisim atom relatif masing-masing. Huruf yang digunakan bukanlah simbol sebenar bagi unsur tersebut.

Element *Unsur*	Relative atomic mass *Jisim atom relatif*
X	12
Y	6

Table 1
Jadual 1

Which of the following is true about atoms of element X and Y?

Antara kenyataan berikut yang manakah benar tentang atom-atom bagi unsur X dan Y?

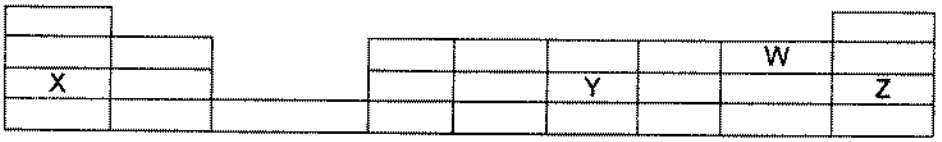
A The mass of an atom of X is 12g and the mass of an atom of Y is 6g.
Jisim bagi atom X ialah 12g dan jisim bagi atom Y ialah 6g.

B The number of moles of 12g of atom X is equal to the number of moles in 6g atom Y.
Bilangan mol bagi 12g atom X adalah sama dengan bilangan mol bagi 6g atom Y.

C 1 mol of atom X has the same mass as 1 mol of atom Y.
1 mol atom X mempunyai jisim yang sama dengan 1 mol atom Y.

D The mass of 1 mol of atom X is half of the mass of 1 mol of atom Y.
Jisim bagi 1 mol atom X adalah separuh dari jisim 1 mol atom Y.

16. Diagram 5 shows parts of the Periodic Table.
Rajah 5 menunjukkan sebahagian Jadual Berkala.



Daigram 5
Rajah 5

The arrangement of elements W, X, Y and Z in an increasing order of atomic size is
Susunan saiz atom bagi unsur-unsur W, X, Y dan Z secara menaik ialah

A W, X, Y, Z

B W, Z, Y, X

C X, Y, Z, W

D Z, Y, X, W

17. Electron arrangement of atom T is 2.8.3 and electron arrangement of atom U is 2.8.6. Elements T and U react to form a compound. Which of the following shows the correct formula and chemical bond for the compound formed?

Susunan elektron bagi atom T ialah 2.8.3 dan susunan elektron bagi atom U ialah 2.8.6.Unsur T dan U bertindak balas untuk membentuk sebatian. Antara berikut, yang manakah menunjukkan formula dan ikatan kimia yang betul bagi sebatian yang terbentuk?

A Covalent bond, TU
Ikatan kovalen, TU

B Covalent bond, T_2U_3
Ikatan kovalen, T_2U_3

C Ionic bond, TU
Ikatan ionik, TU

D Ionic bond, T_2U_3
Ikatan ionik, T_2U_3

18. Diagram 6 shows the electrolytic cell used for the extraction of aluminium.

Rajah 6 menunjukkan sel elektrolisis yang digunakan bagi pengestrakan aluminium.

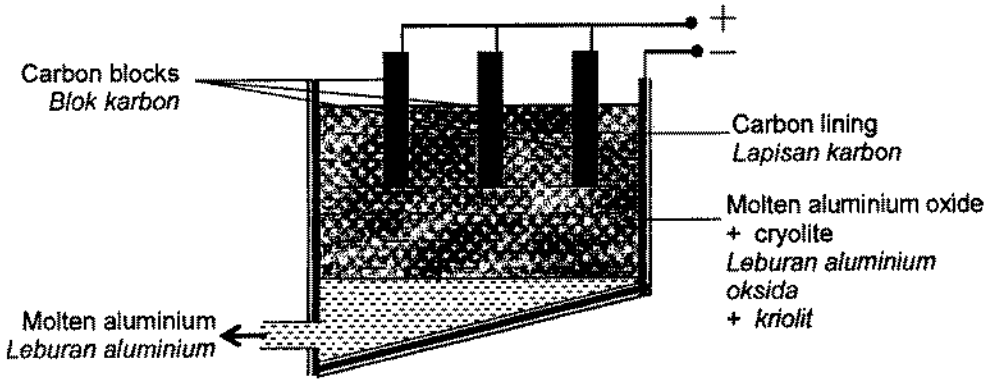


Diagram 6
Rajah 6

What is the purpose of adding cryolite to aluminium oxide?

Apakah tujuan menambahkan kriolit ke dalam aluminium oksida?

A To coagulate the impurities in the mixture
Untuk menggumpalkan bendasing dalam campuran

B To reduce the melting point of aluminium oxide
Untuk merendahkan takat lebur aluminium oksida

C To increase the rate of reaction
Untuk meningkatkan kadar tindak balas

D To increase the electrical conductivity
Untuk meningkatkan kekonduksian elektrik

19. An ammonia solution of 0.1 mol dm^{-3} has a pH value of 10, while a solution of sodium hydroxide 0.1 mol dm^{-3} has a pH value of 13. Which statement **best** explains the observations above?

Suatu larutan ammonia 0.1 mol dm^{-3} mempunyai nilai pH 10 manakala suatu larutan natrium hidroksida 0.1 mol dm^{-3} mempunyai nilai pH 13. Antara pernyataan berikut yang manakah paling ***tepat*** *menerangkan pemerhatian di atas?*

A Both ammonia and sodium hydroxide solutions are weak alkalis.
Kedua-dua larutan ammonia dan larutan natrium hidroksida merupakan alkali lemah

B Ammonia and sodium hydroxide solutions undergo incomplete dissociation in water
Kedua-dua larutan ammonia dan larutan natrium hidroksida tercerai dengan tidak lengkap dalam air.

C Sodium hydroxide solution undergoes complete dissociation in water
Larutan natrium hidroksida mengalami penceraian lengkap dalam air

D Ammonia solution undergoes complete dissociation in water
Larutan ammonia mengalami penceraian lengkap dalam air

20. What are the products formed when an acid reacts with a metal carbonate?

Apakah hasil tindak balas apabila suatu asid bertindak balas dengan suatu karbonat logam?

A Salt and water only
Garam dan air sahaja

B Salt and carbon dioxide gas
Garam dan gas karbon dioksida

C Water and carbon dioxide gas
Air dan gas karbon dioksida

D Salt, water and carbon dioxide gas
Garam, air dan gas karbon dioksida

21. Which statements regarding polymer is **incorrect**?
*Antara pernyataan berikut, yang manakah adalah **tidak benar** mengenai polimer?*

A Raw *m*aterials for synthetic polymer are obtained from petroleum.
Bahan mentah bagi bahan polimer sintetik adalah terdapat daripada petroleum.

B Polymers are large *m*olecules made up from smaller *m*olecules called *m*onomer
Polimer adalah molekul besar yang dibina daripada molekul-molekul kecil

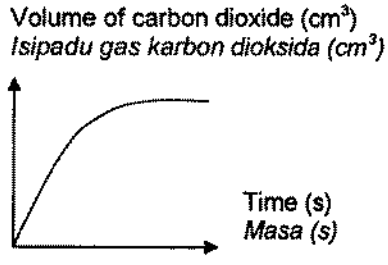
C Isoprene is a *m*onomer for natural rubber.
Isoprena adalah monomer bagi getah semulajadi.

D Polystyrene is a polymer that is used to make plastic bottles and bags.
Polistirena ialah satu polimer yang digunakan untuk membuat botol plastik dan beg.

22. An experiment was conducted to investigate the rate of reaction between calcium carbonate end hydrochloric acid.The volume of gas produced was recorded at every 30 second intervals. Which of the following graphs will be obtained?

Satu eksperimen telah dijalankan untuk mengkaji kadar tindak balas antara kalsium karbonat dengan asid hidroklorik. Isipadu gas yang terhasil direkodkan setiap 30 saat. Manakah graf berikut akan diperolehi ?

A



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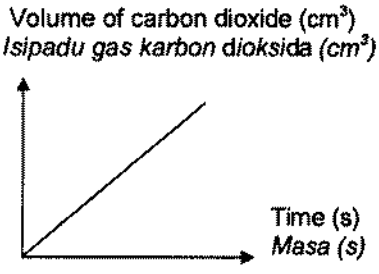

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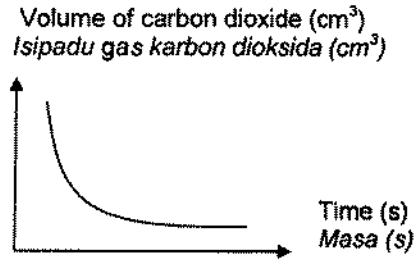
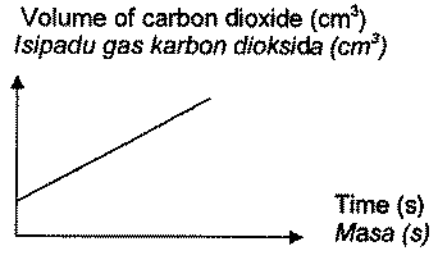


D



23. The equation below shows the addition reaction of alkenes.

Persamaan di bawah menunjukkan tindakbalas penambahan bagi alkena

$$CH_2 = CH_2 + H_2 \xrightarrow[180°C]{\text{catalyst X / mangkin X}} CH_3 - CH_3$$

What is catalyst X ?

Apakah mangkin X?

A Nickel
Nikel

B Phosphoric acid
Asid fosforik

C Aluminium Oxide
Aluminium Oksida

D Concentrated hydrochloric acid
Asid hidroklorik pekat

24. Diagram 7 shows an apparatus set-up to investigate the effect of metal on rusting.

Rajah 7 menunjukkan satu susunan radas untuk mengkaji kesan logam ke atas pengaratan.

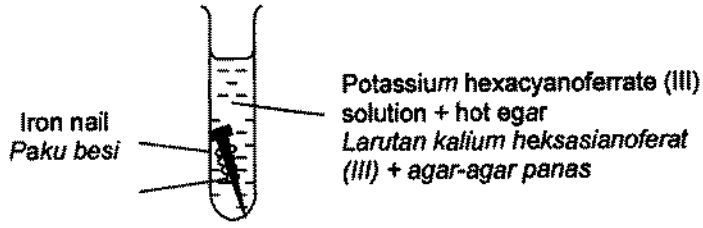


Diagram 7
Rajah 7

Which of the following metal will produce blue colouration after one day?

Antara logam berikut yang manakah akan menghasilkan warna biru selepas satu hari?

A Zinc
Zink

B Copper
Kuprum

C Magnesium
Magnesium

D Aluminium
Aluminium

25. The thermochemical equation of acids and alkalis are given as below:

Persamaan termokimia bagi asid dan alkali adalah seperti di bawah:

$HCl + NaOH \rightarrow NaCl + H_2O \quad \Delta H = -57 \text{ kJ mol}^{-1}$

$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O \quad \Delta H = -55 \text{ kJ mol}^{-1}$

Heat of neutralisation of HCl is higher because

Haba peneutralan bagi HCl adalah lebih tinggi kerana

A HCl is *monoprotic* acid
HCl adalah asid monoprotik

B CH_3COOH is diprotic acid
CH_3COOH adalah asid diprotik

C HCl is a strong acid
HCl adalah asid kuat

D CH_3COOH is strong acid
CH_3COOH adalah asid kuat

26. Which of the following ions reduce the effectiveness of soaps in hard water?

Antara ion berikut yang manakah dapat mengurangkan keberkesanan sabun dalam air liat?

A Magnesium ion and potassium ion
Ion magnesium dan ion kalium

B Calcium ion and magnesium ion
Ion kalsium dan ion magnesium

C Calcium ion and sodium ion
Ion kalsium dan ion natrium

D Zinc ion and magnesium ion
Ion zink dan ion magnesium

27. Diagram 8 shows the electron arrangement of an ion X.

Rajah 8 menunjukkan susunan elektron bagi suatu ion X.

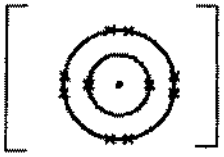


Diagram 8
Rajah 8

How many valence electrons are there in atom X ?

Berapakah elektron valens yang ada pada atom X ?

A 2
B 3
C 5
D 8

28. The formula of nitrate ion is NO_3^- and carbonate ion is CO_3^{2-} . If the formula of nitrate salt M is $M(NO_3)_2$, what is the formula of carbonate salt M?

Formula bagi ion nitrat ialah NO_3^- *dan ion karbonat ialah* CO_3^{2-} . *Jika formula bagi garam nitrat M ialah* $M(NO_3)_2$, *apakah formula bagi garam karbonat M?*

A $M(CO_3)_3$
B $M(CO_3)_2$
C M_2CO_3
D MCO_3

29. Which of the following has the same number of electrons as argon?

Antara berikut yang manakah mempunyai bilangan elektron yang sama dengan argon?

[Proton number : F, 9 ; Cl, 17 ; O , 8 ; Ar ,18; K, 19]
[Nombor proton: F, 9 ; Cl, 17 ; O , 8 ; Ar , 18; K, 19]

A F

B K

C Cl^-

D O^{2-}

30. Diagram 9 shows the electron arrangement of an ion, Y^-

Rajah 9 menunjukkan susunan elektron bagi ion, Y^-.

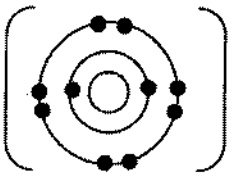


Diagram 9
Rajah 9

Which of the following statement is true about the Y ion, Y^-?

Antara berikut yang manakah benar tentang ion Y, Y^-?

I Y ion is a cation
Ion Y ialah kation

II Y atom receives one electron to form Y ion
Atom Y menerima satu elektron untuk membentuk ion Y

III Y ion can form an ionic compound with sodium ion
Ion Y boleh membentuk sebatian ionik dengan ion natrium

IV Electron arrangement of Y ion is 2.7
Susunan elektron bagi ion Y ialah 2.7

A I and II only
I dan II sahaja

B II and III only
II dan III sahaja

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

D II, III and IV only
II, III dan IV sahaja

31. Diagram 10 shows the set up of apparatus for a displacement reaction.

Rajah 10 menunjukkan susunan radas bagi tindak balas penyesaran.

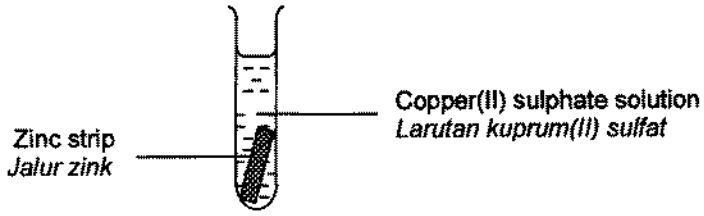


Diagram 10
Rajah 10

What is observed after 30 minutes?

Apakah yang diperhatikan selepas 30 minit?

A Gas bubbles is released
Gelembung gas terbebas

B A brown solid is deposited
Pepejal perang terenap

C The colourless solution becomes blue
Larutan tak berwarna bertukar menjadi biru

D Zinc strip becomes bigger
Jalur zink menjadi besar

32. Which of the following is a suitable indicator to determine the end point for the neutralisation reaction between 0.1 mol dm^{-3} sulphuric acid and 0.1 mol dm^{-3} sodium hydroxide solution?

Antara berikut yang manakah merupakan petunjuk yang sesuai untuk menentukan takat akhir bagi tindak balas penautralan di antara asid sulfurik 0.1 mol dm^{-3} dan larutan natrium hidroksida 0.1 mol dm^{-3}?

A Red litmus paper
Kertas litmus merah

B Blue litmus paper
Kertas litmus biru

C Phenolphtalein
Fenolftalein

D Tetrachloromethane
Tetraklorometana

33. Diagram 11 shows the steps involved to obtain pure salt crystals.

Rajah 11 menunjukkan langkah-langkah untuk mendapat kristal garam yang tulen.

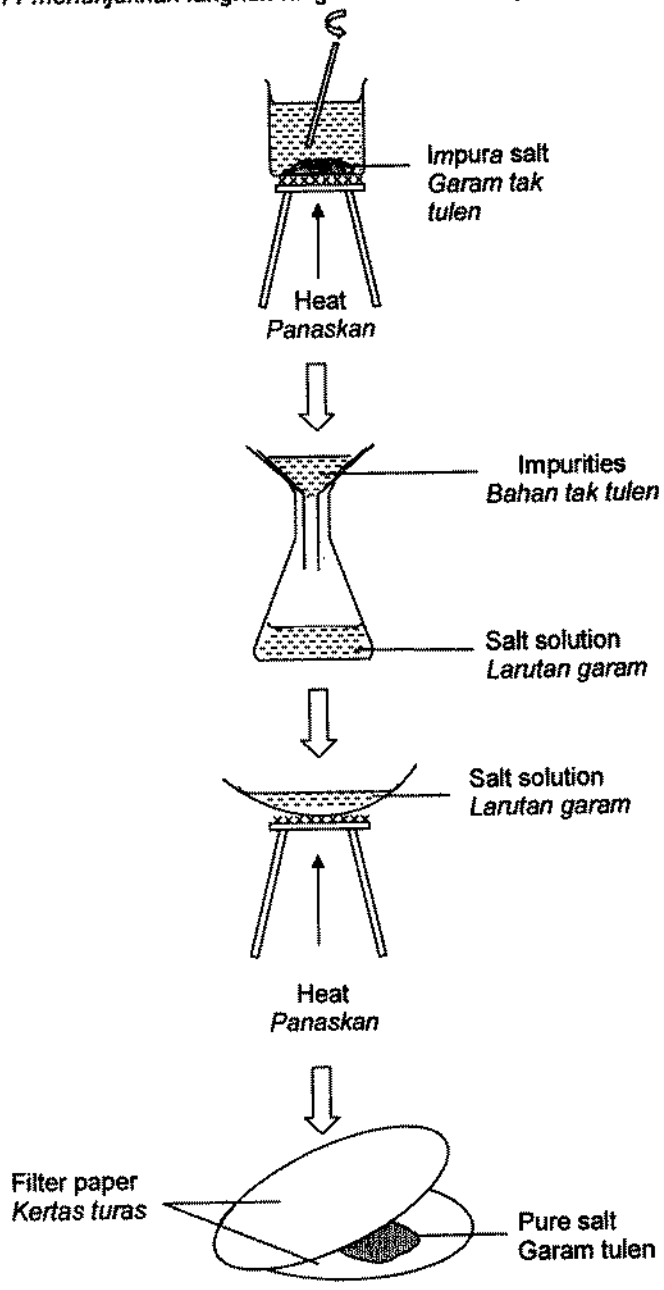


Diagram 11
Rajah 11

What is the name of the above process?

Apakah nama proses di atas?

A Crystallisation
Penghabluran

B Recrystallisation
Penghabluran semula

C Precipitation
Pemendakan

D Displacement
Penyesaran

34. Diagram 12 shows the arrangement of atom in alloy.

Rajah 12 menunjukkan susunan atom dalam aloi.

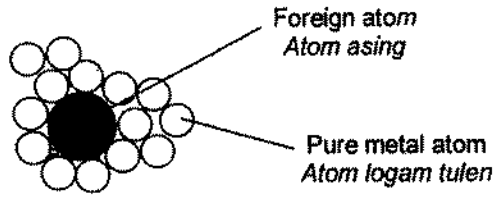


Diagram 12
Rajah 12

Which statement explains diagram 12 **correctly**?

*Antara pernyataan berikut yang manakah menerangkan Rajah 12 dengan **betul**?*

A Foreign atoms form covalent bond with pure metal atoms
Atom asing membentuk ikatan kovalen dengan atom logam tulen.

B Foreign atoms will not prevent the pure metal atoms from sliding.
Atom asing tidak dapat menghalang atom logam tulen mengelongsor antara satu sama lain.

C Foreign atoms fill the empty spaces in pure metal atoms.
Atom asing memenuhi ruang antara atom logam tulen.

D Foreign atoms will make the metals lighter.
Atom asing akan membuatkan logam itu lebih ringan.

35.

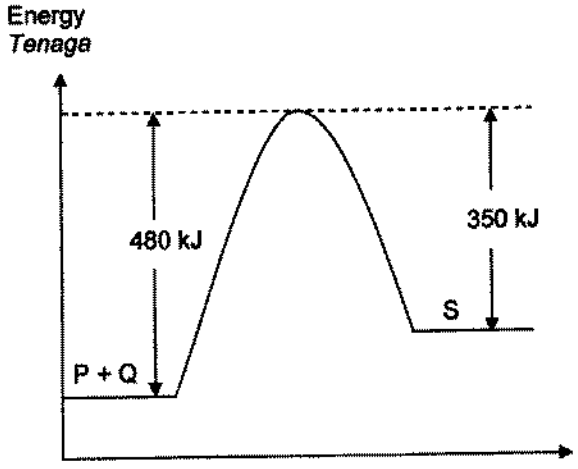


Diagram 13
Rajah 13

Diagram 13 shows an energy level for the reaction P + Q → S. What is the activation energy for this reaction?

Rajah 13 menunjukkan aras tenaga untuk tindak balas P + Q → S. Apakah tenaga pengaktifan untuk tindak balas in?

A 480 kJ mol^{-1}
480 kJ mol^{-1}

B 350 kJ mol^{-1}
350 kJ mol^{-1}

C 130 kJ mol^{-1}
130 kJ mol^{-1}

D 830 kJ mol^{-1}
830 kJ mol^{-1}

36. Which of the following steps shows how palm oil is extracted from oil palm fruits?

Antara berikut yang manakah menunjukkan langkah bagaimana minyak kelapa sawit diekstrakkan daripada buah kelapa sawit?

I Sterilising the fruits
Mensterilkan buah

II Separate oil from water
Mengasingkan minyak dari air

III Separate the individual fruits from the bunches
Mangasingkan biji dari tandannya

IV Pressing out the oil from the fruits
Menekan minyak keluar dari buah

V Purifying the oil
Menulankan minyak

A II → IV → V → III → I

B II → I → IV → IV → V

C I → III → II → IV → V

D I → III → V → II → IV

37. What is the oxidation number of sulphur in $S_2O_3^{2-}$?

Apakah nombor pengoksidaan sulfur dalam $S_2O_3^{2-}$?

A +2

B +3

C +4

D +6

38. The heat of combustion of ethanol is 1371 kJ mol^{-1}. The chemical reaction is given in the equation below.

Haba pembakaran etanol adalah 1371 kJ mol . Tindak balas kimia ditunjukkan seperti persamaan di bawah.

$$C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O \qquad \Delta H = -1371 \text{ kJ mol}^{-1}$$

If 8.9 g of ethanol is burnt is excess oxygen, how much is the heat released?

Jika 6.9 g etanol membakar dalam oksigen berlebihan, berapakah tenaga haba yang dibebaskan?

[Relativa atomic mass : C = 12; H = 1, O = 16]
[Jisim atom relatif : C = 12; H = 1, O = 16]

A 9459.9 kJ mol^{-1}

B 205.65 kJ mol^{-1}

C 198.69 kJ mol^{-1}

D 0.15 kJ mol^{-1}

39. Below are types of food additives, examples and their functions. Which of the following pair is **not true**?

Di bawah menunjukkan jenis bahan tambah dalam makanan, contoh dan fungsinya. Antara padanan berikut yang manakah ***tidak benar****?*

	Fooh Additives *Bahan Tambah Makanan*	Example *Contoh*	Functions *Fungsi*
A	Antioxidants *Pengantioksida*	Ascorbic acid *Asid askorbik*	To prevent oxidation that causes fruits to becoma brown. *Menghalang prosas pengoksidaan yang menyebabkan buah menjadi perang*
B	Preservatives *Pengawet*	Sodium benzoate *Natrium banzoate*	To slow down or prevent the growth of microorganisms *Memperlahankan dan menghalang pembiakan mikroorganisma.*
C	Stabilizers *Penstabil*	Gelatine *Gelatin*	To prevent an emulsion from separating out. *Menghalang proses emulsi daripada berlaku.*
D	Dyes *Pewarna*	Tatrazine *Tatrazin*	To improve the taste of food and restore taste loss because of processing. *Meningkatkan rasa makanan dan menghalang rasa asal makanan hilang semasa proses pemprosesan dilakukan.*

40. Which of the following substances match the type of particles listed ?

Antara bahan berikut yang manakah sepadan dengan jenis zarah yang disenaraikan ?

	Substances *Bahan*	Particle *Zarah*
I	Silver *Argentum*	Atom *Atom*
II	Ammonia Ammonia	Molecule *Molekul*
III	Sulphur trioxide *Sulfur trioksida*	Ion *Ion*
IV	Sodium nitrate *Natrium nitrat*	Ion *Ion*

A I only

B III and IV

C I, II and IV

D I, II , III and IV

41. The following equation shows the decomposition of hydrogen peroxide:

Persamaan kimia di bawah menunjukkan penguraian hidrogen peroksida:

$$2H_2O_2 \rightarrow 2H_2O + O_2$$

Which of tha following statement is correct when 1 mol of hydrogen peroxide decomposes at room condition?

Antara pernyataan berikut yang manakah benar apabila 1 mol hidrogen peroksida terurai dalam keadaan bilik?

[Relative atomic mass: O,16; H,1; 1 mol of gas occupies the volume of 24 dm^3 at room condition]
[Jisim atom relatif : O,16; H,1; 1; 1 mol gas menempati isipadu 24 dm^3 pada keadaan bilik]

A 2 moles of water produced
2 molekul air terhasil

B 1 molecule of oxygen gas is released
1 molekul gas oksigen dibebaskan

C $12cm^3$ of oxygen gas released
$12cm^3$ gas oksigen dibebaskan

D 18g of water is produced
18g air terhasil

42. Element W is placed below element V in the same group in the Periodic Table. If the proton number of element V is 9, what is the electron arrangament of atom W?

Unsur W terletak di bawah unsur V dalam kumpulan yang sama dalam Jadual Berkala. Jika nombor proton bagi unsur V ialah 9, apakah susunan elektron bagi atom W?

A 2.7
B 2.8.7
C 2.8.1
D 2.8.8.1

43 The information below describe tha properties of compound W.

Maklumat di bawah menghuraikan sifat-sifat sebatian W.

- Low melting and boiling points
  Takat lebur dan takat didih rendah
- Does not conduct electricity
  Tidak mengkonduksikan elektrik

Which of the following is compound W?

Antara berikut yang manakah ialah sebatian W?

A Zinc chlorida
Zink klorida

B Sodium chloride
Natrium klorida

C Carbon tetrachloride
Karbon tetraklorida

D Magnesium chloride
Magnesium klorida

44 Diagram 14 shows the set up of apparatus for voltaic cell.

Rajah 14 menunjukkan susunan radas bagi sel voltan.

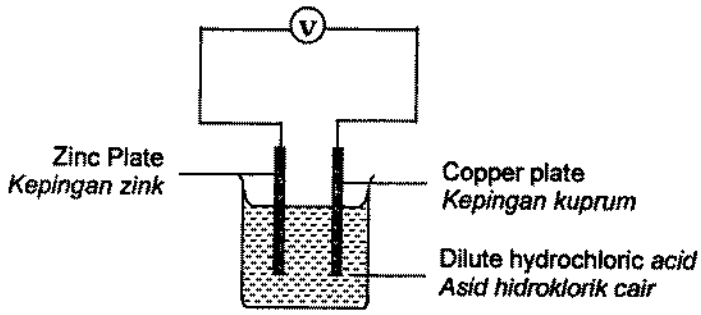


Diagram 14
Rajah 14

Which of the half equation represents the reactions at the positive and negative terminas?

Antara persamaan setengah berikut yang manakah mewakili tindakbalas di terminal positif dan terminal negatif?

	Positive terminal *Terminal positif*	Negative terminal *Terminal negatif*
A	$2H^+ + 2e \rightarrow H_2$	$Zn \rightarrow Zn^{2+} + 2e$
B	$Zn \rightarrow Zn^{2+} + 2e$	$Cu^{2+} + 2e \rightarrow Cu$
C	$Cu \rightarrow Cu^{2+} + 2e$	$Zn \rightarrow Zn^{2+} + 2e$
D	$Zn \rightarrow Zn^{2+} + 2e$	$2H^+ + 2e \rightarrow H_2$

45 Which of the following could ba W, X.Y and Z?

Antara berikut yang manakah mungkin W, X, Y dan Z?

Solid **W**	$\xrightarrow[\Delta]{}$	Brown gas **X** +	Colourless gas **Y** +	Black solid **Z**
Pepejal W	$\xrightarrow[\Delta]{}$	*Gas perang X* +	*Gas tak berwarna Y* +	*Papejal hitam Z*

	W	X	Y	Z
A	Copper(II)oxida *Kuprum(II) oksida*	Nitrogen dioxide *Nitrogen dioksida*	Oxygen *Oksigan*	Copper *Kuprum*
B	Copper(II) nitrate *Kuprum(II) nitrat*	Nitrogen dioxide *Nitrogen dioksida*	Oxygen *Oksigen*	Copper(II)oxide *Kuprum(II) oksida*
C	Sodium nitrate *Natrium nitrat*	Nitrogen dioxide *Nitrogen dioksida*	Oxygen *Oksigen*	Sodium oxide *Natrium oksida*
D	Potassium nitrata *Kalium nitrat*	Nitrogen dioxide *Nitrogen dioksida*	Oxygen *Oksigen*	Potassium *Kalium*

46 Excess zinc powder is reacted with 100 cm^3 of 0.1 mol dm^{-3} hydrochloric acid. Calculata tha volume of gas produced at room condition.

Serbuk zink berlebihan ditindakbalaskan dengan 100 cm^3 asid hidroklorik 0.1 mol dm^{-3}. Hitung isipadu gas yang terhasil pada kaadaan bilik.

[1 mole of gas occupies 24 dm^3 at room condition]
[1 mol gas menempati 24 dm^3 pada keadaan bilik]

A 0.03 dm^3

B 0.06 dm^3

C 0.12 dm^3

D 0.24 dm^3

47. Which of the following chemical fertilizer is the best fertilizer based on its percentage of nitrogen content?

Antara baja kimia berikut yang manakah paling baik berdasarkan peratus kandungan nitrogen?

[Relative atomic mass: N,14,Ca,40,O,16,H,1,S,32,P,31]
[*Jisim atom relatif : N,14,Ca,40,O,16,H,1,S,32,P,31*]

A Calcium nitrata, $Ca(NO_3)_2$
Kalsium nitrat, $Ca(NO_3)_2$

B Ammonium nitrate, NH_4NO_3
Ammonium nitrat, NH_4NO_3

C Ammonium sulphate, $(NH_4)_2SO_4$
Ammonium sulfat, $(NH_4)_2SO_4$

D Ammonium dihydrogen phosphate, $(NH_4)H_2PO_4$
Ammonium dihidrogen fosfat, $(NH_4)H_2PO_4$

48. Three experiments were conducted by a group of students to investigate the reaction between excess zinc and the acids as shown in the table below.

Tiga eksperimen telah dilakukan oleh sekumpulan pelajar untuk menyiasat tindakbalas di antara zink yang berlebihan dengan asid-asid seperti yang ditunjukkan dalam jadual.

Experiment *Eksperimen*	Hydrochloric acid *Asid hidroklorik*
P	25 cm^3 hydrochloric acid 2.0 mol dm^{-3} 25 cm^3 *asid hidroklorik* 2.0 *mol* dm^{-3}
Q	50 cm^3 hydrochloric acid 1.5 mol dm^{-3} 50 cm^3 *asid hidroklorik* 1.5 mol dm^{-3}
R	15 cm^3 sulphuric acid 1.5 mol dm^{-3} 15 cm^3 *asid sulfurik* 1.5 *mol* dm^{-3}

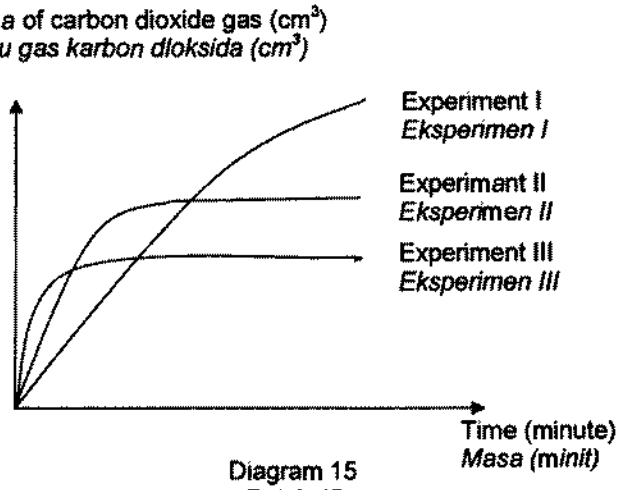


Diagram 15
Rajah 15

Which of the following represents the results of the experiments **correctly**?
Manakah di antara berikut mewakili keputusan-keputusan eksperimen dengan ***batul****?*

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

49. Which of the following chemical equation represent the complete combustion of propane?

Antara persamaan kimia berikut yang manakah mewakili pembakaran lengkap bagi propana?

A $C_3H_8 + 5\,O_2 \rightarrow 3\,CO_2 + 4\,H_2O$

B $C_3H_8 + 4\,O_2 \rightarrow 3\,CO_2 + 4\,H_2O$

C $C_5H_{12} + 8\,O_2 \rightarrow 5\,CO_2 + 6\,H_2O$

D $C_5H_{12} + 8\,O_2 \rightarrow 5\,CO_2 + 4\,H_2O$

50 Diagram 16 shows a set up of apparatus to investigate a redox reaction involving the transfer of electron at a distance.

Rajah 16 menunjukkan susunan radas untuk mengkaji tindak balas redoks yang melibatkan pemindahan elektron pada satu jarak

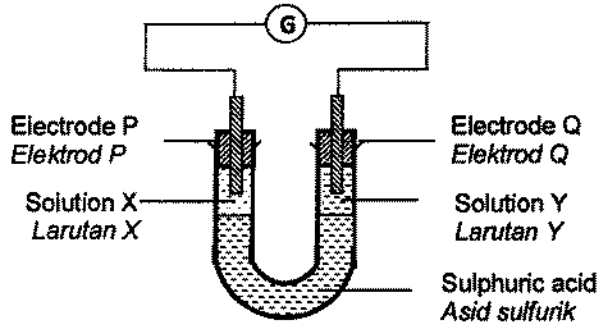


Diagram 16
Rajah 16

In diagram 16, electrons flow from electrode Q to electrode P. Which of the following show the correct solutions for X and Y?

Dalam rajah 16, elektron mengalir dari elektrod Q ke elektrod P. Yang mana antara berikut menunjukkan larutan yang betul untuk X dan Y?

	Solution X *Larutan X*	Solution Y *Larutan Y*
A	Acidified potassium menganate (VII) solution *Larutan kalium manganat (VII) berasid*	Potassium iodide *Kalium iodida*
B	Potassium bromide solution *Larutan kalium bromida*	Acidified potassium dichromate (VI) solution *Larutan kalium dikromat (VI) berasid*
C	Iron (II) sulphate solution *Larutan ferum (II) sulfat*	Bromine water *Air bromin*
D	Potassium iodide solution *Larutan kalium iodida*	Chlorine water *Air klorin*

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

Nama : ..... Kelas : .....

JABATAN PELAJARAN NEGERI JOHOR

PEPERIKSAAN PERCUBAAN SPM 2010 **4541/2**
CHEMISTRY
Kertas 2
August

2½ jam
Dua 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 bahasaInggeris atau bahasa Melayu.*
5. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

Untuk Kegunaan Pemeriksa			
Bahagian	Soalan	Markah Penuh	Markah Diperoleh
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 ini mengandungi 28 halaman bercetak

Section A
Bahagian A

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

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

1 Diagram 1 shows three industrial processas involved in manufacturing ammonium sulphate.
Rajah 1 manunjukkan tiga proses industri dalam penghasilan ammonium sulfat.

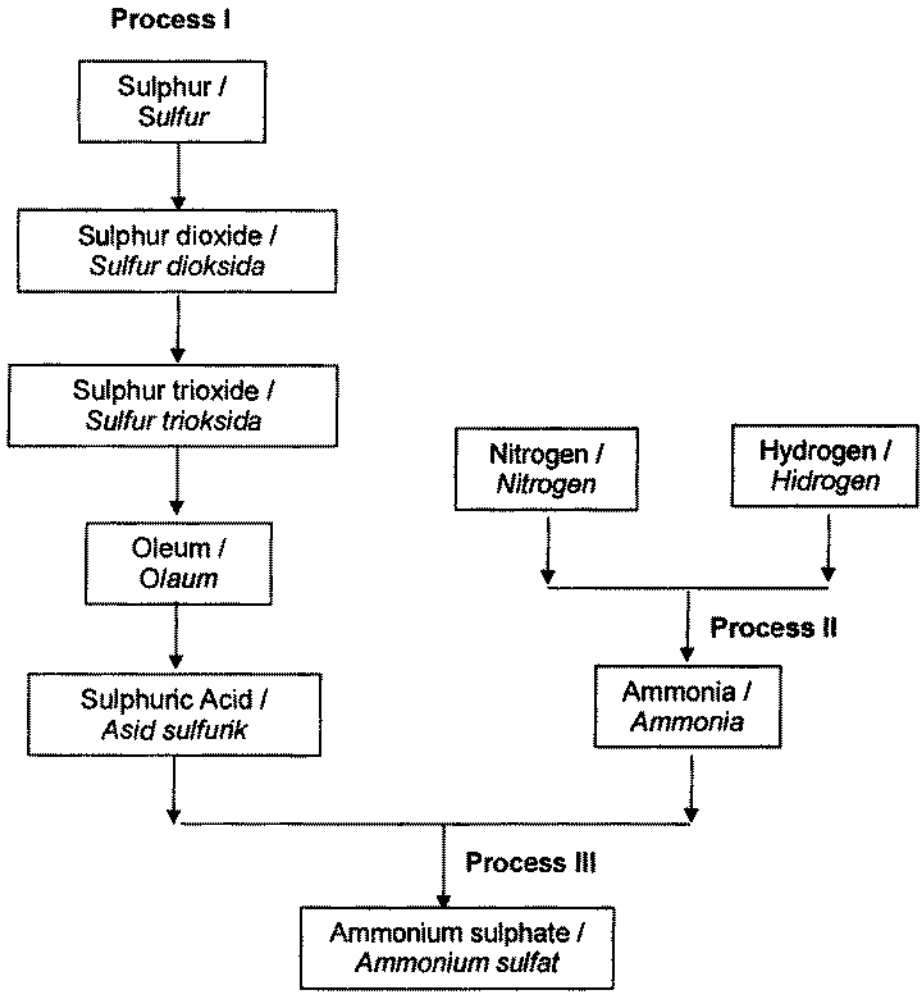


Diagram 1
Rajah 1

From the flow chart shown in Diagram 1, answer tha following questions.
Dari carta alir pada Rajah 1, jawab soalan berikut.

(a) For Procass I.
Untuk prosas I.

(i) Name the industrial process of producing sulphuric acid.
Namakan proses industri untuk membuat asid sulfurik

.....

[1 mark]

(ii) State how to produce sulphur dioxida from sulphur.
Nyatakan bagaimana untuk membuat sulfur dioksida dari sulfur

.....

.....

[1 mark]

(iii) Write the chemical formula of sulphur trioxide
Tuliskan formula kimia untuk sulfur dioksida

.....

[1 mark]

(iv) Sulphur trioxide dissolves in compound M to produce oleum. What is compound M ?
Sulfur trioksida melarut dalam sebatian M untuk menghasilkan oleum. Apakah sebatian M ?

.....

[1 mark]

(v) State how sulphuric acid is produced from oleum.
Nyatakan bagaimana asid sulfurik di basilkan dari oleum

.....

[1 mark]

(vi) Sulphuric acid produced is mixed with water in a beaker. State the observation if a piece of marble is dropped into the beakar.
Asid sulfurik yang terhasil dilarutkan ka dalam bikar berisi air. Nyatakan pemerhatian jika sebutir marmar dimasukkan ke dalam bikar itu.

.....

[1 mark]

[Lihat sebelah

(b) Name a suitable catalyst for Process II.
Namakan satu mangkin yang sesuai untuk Proses II.

.....

[1 mark]

(c) For Process III ,
Untuk Proses III,

(i) Write the chemical equation for the reaction of ammonia with sulphuric acid.
Tuliskan persamaan tindak balas untuk tindak balas ammonia dengan asid sulfurik.

.....

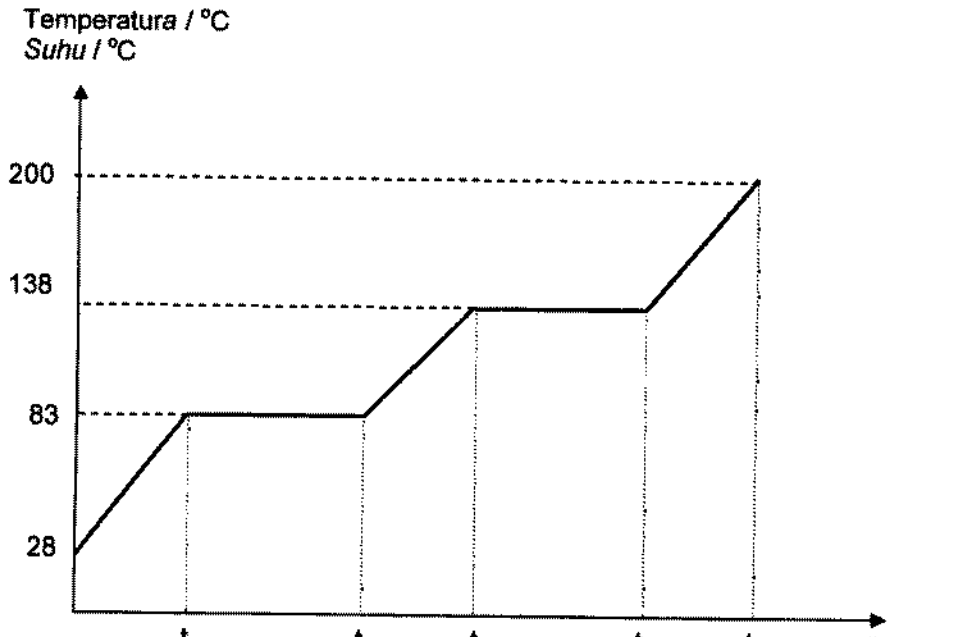
[2 mark]

(ii) State one use of ammonium sulphate in daily life.
Nyatakan satu kegunaan ammonium sulfat dalam kahidupan seharian

.....

[1 mark]

2 Graph 2 shows the temperature against time when solid P is heated.
Graf 2 manunjukkan graf suhu melawan masa bagi pemanasan pepejal P.



Graph 2
Graf 2

(a) Based on Graph 2 , answer the following questions:
Berdasarkan Graf 2, jawab soalan-soalan barikut :

(i) What is *meant* by *melting* point ?
Apakah yang dimaksudkan dengan takat lebur ?

.....

.....

..... [1 mark]

(ii) State the melting point of substance P .
Nyatakan takat labur bahan P.

.....

[1 mark]

(iii) State the physical state of P from time t_1 to t_2.
Nyatakan keadaan fizik P dari masa t_1 hingga t_2.

.....

[1 mark]

[Lihat sebelah

(iv) Explain why the temperature remains constant from time t_1 to t_2.
Terangkan kenapa suhu tidak berubah dari masa t_1 hingga t_2.

.....

.....

..... [2 marks]

(v) Diagram 2 shows the set-up of apparatus used by a student to determine the melting point of substance P.
Rajah 2 menunjukkan susunan radas yang digunakan oleh seorang pelajar untuk menentukan takat lebur bahan P.

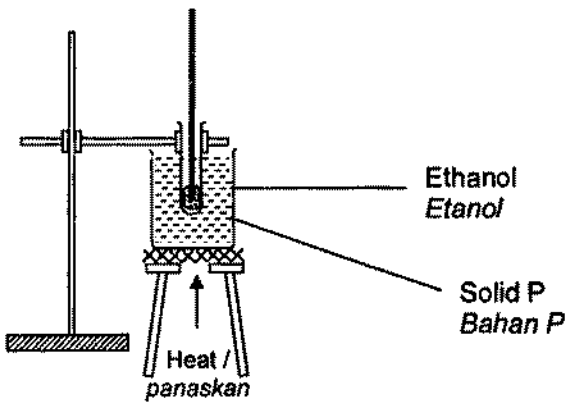


Diagram 2
Rajah 2

Identify one misteke in the diagram. Explain why.
Kenalpasti satu kesilapan dalam rajah tersebut. Jelaskan mengapa.

.....

.....

..... [2 marks]

(b) When solid iodina is heated, it changas to purple fume.
Apabila pepejal iodin dipanaskan , ia bertukar ke wasap ungu.

(i) Name the process involved.
Namakan proses yang terlibat.

.....
[1 mark]

(ii) Name **one** isotope of iodina and state its use.
*Namakan **satu** isotop untuk iodin dan nyatakan kegunaannya.*

.....

.....[2 marks]

3 Diagram 3 shows the set up of apparatus to investigate tha electrolysis of sodium chloride solution.
Rajah 3 menunjukkan susunan radas untuk mengkaji elektrolisis larutan natrium klorida. Gas yang terkumpul pada elektrod Y berwarna kuning dan melunturkan wama kertas litmus biru lembab.

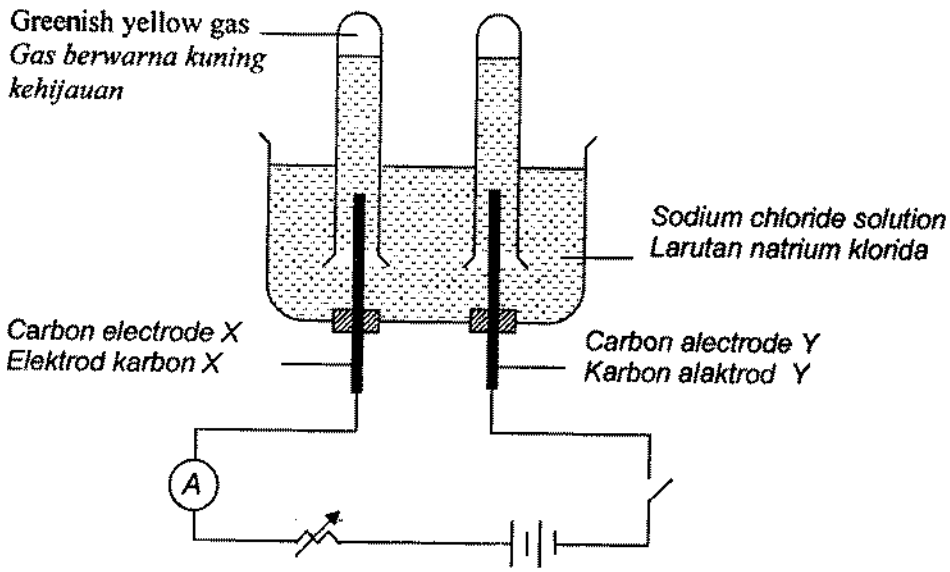


Diagram 3
Rajah 3

(a) (i) What is meant by anion?
Apakah yang dimaksudkan dengan anion?

.....

[1 mark]

(ii) Writa the formulae for all anions that are present in sodium chloride solution.
Tuliskan formula bagi semua anion yang hadir dalam larutan natrium klorida.

.....

[1 mark]

(iii) The gas collected at electrode X decolourises a damp blue litmus paper. Name the gas.
Gas yang terkumpul pada elektrod X melunturkan kertas litmus biru lembap. Namakan gas itu.

.....
[1 mark]

(b) By referring to diagrem 3 ,
Dengan merujuk kepada Rajah 3 ,

(i) Which electrode is tha cathode ?
Elektrod yang manakah merupakan katod ?

.....
[1 mark]

(ii) Write the half-equation for the reaction at the cathode.
Tuliskan parsamaan setangah bagi tindak balas di katod.

.....
[1 mark]

(iii) Describe a test to identify the gas collected at the cathode.
Huraikan satu ujian untuk mengenalpasti gas yang terkumpul di katod.

.....

.....

.....
[2 marks]

(c) The experimant is repeated by using 0.001 mol dm^{-3} sodium chloride solution.
Eksperimen ini diulangi dengan menggunakan larutan natrium klorida 0.001 mol dm^{-3}

(i) Name the ion that is selectively discharged at the anode.
Namakan ion yang didiscas secara pilihan di anod.

.....
[1 mark]

(ii) Give a reason for your answer in (c)(i)
Beri alasan bagi jawapan anda di (c)(i)

.....

.....

[1 mark]

(iii) Name the gas collected at the anode.
Namakan gas yang terkumpul di anod.

.....

[1 mark]

4 Table 4 shows the molecular formulae and observations for three compounds when they react with bromine water.
Jadual 4 menunjukkan formula molekul dan pemerhatian bagi tiga sebatian apabila bertindakbals dengan air bromin.

Compound ***Sebatian***	**Molecular Formula** ***Formula Molekul***	**Observation** ***Pemerhatian***
P	C_2H_4	Brown colour is decolourised *Warna perang menjadi tidak berwarna*
Q	C_2H_6	Brown colour remains *Warna perang tidak berubah*
R	C_4H_{10}	.....

Table 4
Jadual 4

(a) Name the homologous series for these compounds.
Namakan siri homolog bagi sebatian-sebatian ini.

i) Compound P : .....
Sebatian P

Compound Q : .....
Sebatian Q

[2 marks]

ii) What is the general formula for the homologous series of compound R?
Apakah formula am bagi siri homolog sebatian R?

.....

[1 mark]

iii) Complete the observation for compound R in Table 4.
Lengkapkan pemerhatian untuk sebatian R dalam Jadual 4.

[1 mark]

iv) Name a substance that can raplace bromine water.
Namakan satu bahan lain yang boleh menggantikan air bromin.

.....

[1 mark]

v) Explain why compound P is chemically more reactive than compound Q.
Jelaskan mengapa sebatian P lebih reaktif secara kimia berbanding sebatian Q.

.....

.....

[1 mark]

(b) Compounds P and Q can undargo completa combustion to form gas X and watar.
Sebatian P dan Q boleh mengalami pembakaran lengkap untuk menghasilkan gas X dan air.

i) Name gas X.
Namakan gas X.

.....

[1 mark]

ii) Write a balanced chemical equation whan compound P or Q reacts with oxygan.
Tulis persamaan kimia yang seimbang apabila sebatian P atau Q bertindak balas dengan oksigen.

.....

[1 mark]

iii) Compare the sootiness of tha flama when compound P and Q ara burnt in the air. Explain why.
Bandingkan kejelagaan nyalaan apabila sebatian P dan Q terbakar di udara. Terangkan mengapa.

.....

.....

[2 marks]

5 Diagram 5 shows tha set-up of apparatus to study the electron transfer at a distance.
Rajah 5 menunjukkan susunan radas eksperimen untuk mengkaji pemindahan electron pada satu jarak.

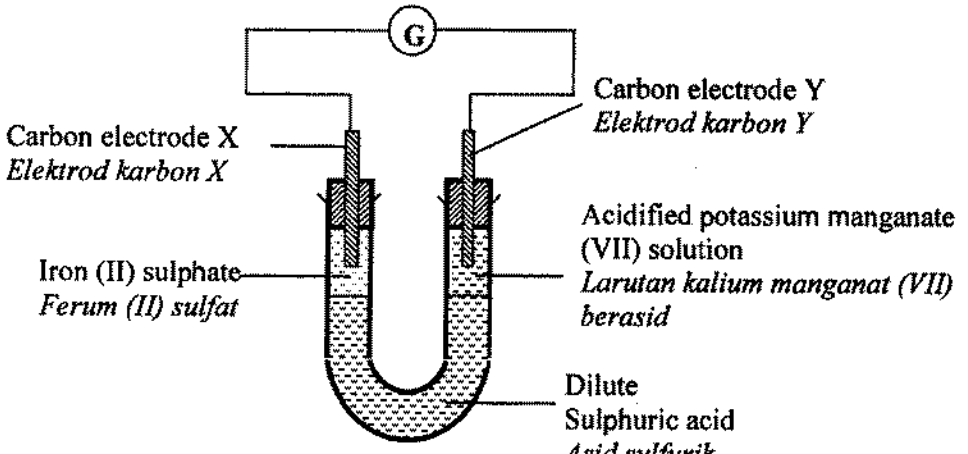


Diagram 5
Rajah 5

(a) What is the function of dilute sulphuric acid?
Apakah fungsi asid sulfurik cair?

.....
[1 mark]

(b) (i) Stata the observation at carbon electroda X.
Nyatakan pemerhatian di elektrod karbon X.

.....
[1 mark]

(ii) Write the half equation for the reaction in (b) (i)
Tuliskan persamaan setengah untuk tindak balas di (b) (i).

.....
[2 marks]

(iii) Describe a confirmatory test for the product formed at carbon electrode X.
Huraikan satu ujian pengesahan untuk hasil yang terbentuk di elektrod karbon X.

.....

.....
[2 marks]

[Lihat sebelah

(c) (i) State the observation at carbon elactrode Y.
Nyatakan pemerhatian di elektrod karbon Y.

.....
[1 mark]

(ii) What is the role of acidified potassium manganate (VII) solution in tha experiment?
Apakah peranan larutan kalium manganat (VII) berasid delam eksperimen ini ?

.....
[1 mark]

(iii) Giva a reason for your answer in (c) (ii).
Banikan satu penjelasan untuk jawapan anda pada (c) (ii).

.....

.....
[1 mark]

(d) Suggast another raagent that can replace acidified potassium manganate (VII) solution.
Cadangkan satu reagen lain yang boleh manggantikan larutan kalium manganat (VII) berasid.

.....
[1 mark]

6 Natural rubber is obtained from latex secreted by rubber tree. Latex is a whita milk-like fluid. Table 6 shows the results of latex coagulation.
Getah asli diparolehi daripada lateks yang didapati dari pokok getah. Susu getah merupakan cecair yang berwama putih seekan susu. Jadual 6 menunjukkan keputusan pembakuan susu getah.

Procedure *Prosedur*	**Obsarvation** *Pemerhatian*
X solution is added to latex *Larutan X ditambah kepada susu getah*	Latex coagulates immediately *Susu gatah membeku dengan cepat*
Latex is exposed to the eir *Susu getah dibiarkan terdedah di udara*	Latex coagulates slowly *Susu getah membeku dangan perlehen*

Table 6
Jadual 6

(*a*) Based on the Tabla 6, answer tha following questions.
Bardasarkan Jadual 6, jawab soalan-soalan berikut.

i) What is solution X ?
Apakah larutan X?

.....
[1 mark]

ii) The coagulation of latex will also occur when it is exposed to air. Explain why this happens.
Prosas pembakuan susu getah juga berlaku apabila ia terdedah kepada udara. Jelaskan mengapa ini terjadi.

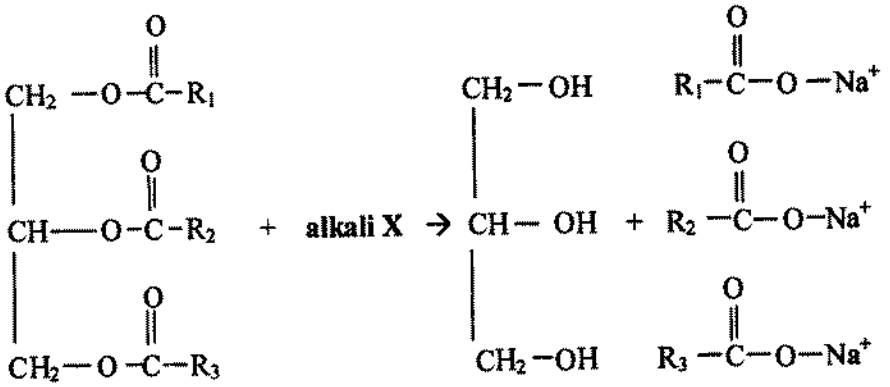
.....
[1 mark]

iii) Suggest *a* solution that can be used to prevent latax from coagulating.
Cadangkan setu larutan yang bolah digunakan untuk menghalang pembakuan susu getah.

.....
[1 mark]

b) During tha preparation of soap, *a* concentrated alkali X is added to oil or fat. The mixture is heated and then sodium chloride is added. The general equation for this reaction is shown below.
Semasa proses pembuatan sabun, larutan alkali pekat X di tambah kapada minyak atau lemak. Campuran kemudian di panaskan bersama dengen natrium klorida. Persamaan tindak balasnya adalah seperti di bawah.

[Lihat sebelah



Based on the equation above, answer the following questions.
Bardasarkan persamaan di atas, jawab soalan –soalan berikut.

i) What is the name of the process ?
Apakah nama proses tersebut?

.....
[1 mark]

ii) What is alkali X ?
Apakah alkali X ?

.....
[1 mark]

iii) Why is sodium chloride solution added to the mixture?
Mangapakah larutan natrium klorida ditambahkan kapada campuran?

.....
[1 mark]

iv) Describa briefly the cleansing action of soap.
Huraikan dengan ringkas tindakan pembersihan oleh sabun

.....

.....

.....
[2 marks]

c) Diagram 6 shows the structural formulae of two cleansing agents X and Y.
Rajah 6 menunjukkan formula struktur bagi dua agen pembarsih X dan Y.

Cleansing agent X:
Agen pambarsih X :

$CH_3CH_2CH_2CH_2CH_2CH_2CH_2CH_2CH_2CH_2CH_2CH_2CH_2COONa$

Clesnsing agent Y:
Agen pembersih Y :

$CH_3CH_2CH_2CH_2CH_2CH_2CH_2CH_2CH_2CH_2CH_2CH_2CH_2COSO_3Na$

Diagram 6
Rajah 6

Based on Diagram 6, compare the effectiveness of cleansing action of agent Y to agent X. Explain why.
Berdasarkan Rajah 6, bandingkan keberkasanan tindakan pembersihan agen pencuci Y berbanding agen X. Terangkan mengapa.

i. .....

ii. .....

[2 marks]

[Lihat sehelah

Section B
Bahagian B

[20 *marks*]

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

7 Diagram 7 shows parts of the Periodic Table of elements.
Rajah 7 menunjukkan sebahagian unsur dalam Jadual Berkala.

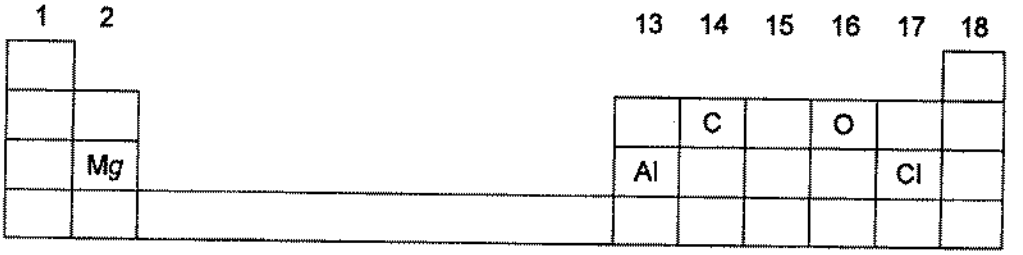


Diagram 7
Rejah 7

(a) Write the electron arrangements for aluminium ion *and* oxide ion.
Tuliskan susunan elektron bagi ion aluminium dan ion oksida

[2 marks]

(b) Describe the formation of the following chemical bonds end draw the electron arrangement of compounds formed.
Huraikan pembentukan bagi ikatan kimia berikut *dan lukis susunan elektron bagi sebetian yeng terbentuk.*

(i) Ionic bond between magnesium atom and chlorine atom.
Ikatan ionik di entara etom magnesium dengan etom klorin.

[5 marks]

(ii) Covalent bond between carbon atom and chlorine atom.
Ikatan kovalen di antara atom karbon dengan atom klorin.

[5 marks]

(c) Explain each of the following statements.
Terangkan setiap pernyataan berikut.

(i) Compound formed in (b)(i) can conduct electricity in the molten state while compound formed in (b)(ii) cannot conduct electricity in eny state.
Sebatian yang terbentuk dalam (b)(i) boleh mengkonduksikan elektrik dalam keadaan leburan manakale sebatian yang terbentuk dalam (b)(ii) tidak dapat mengkonduksikan elektrik dalam semua keadaan.

[4 marks]

(ii) The malting and boiling points for compound in (b)(i) is higher than compound in (b)(ii).
Takat lebur dan takat didih bagi sebatian dalam (b)(i) lebih tinggi daripada sebatien dalam (b)(ii).

[4 marks]

8 Teble 8 shows the haat of combustion of the first five alcohols.
Jadual 8 menunjukkan haba pembakaran untuk lima alkohol yang pertama.

Alcohol / *Alkohol*	Molecular Formula / *Formula molekul*	Heet of Combustion / *Haba Pembakaran* kJ mol^{-1}
Methanol *Metanol*	CH_3OH	- 715
Ethenol *Etanol*	C_2H_5OH	- 1376
Propanol *Propanol*	C_3H_7OH	- 2017
Butanol *Butanol*	C_4H_9OH	- 2675
Pentanol *Pantanol*	$C_5H_{11}OH$	*m*

Table 8
Jadual 8

The chemical equation for tha combustion of ethanol is as below.
Persamean kimia bagi pembakaran etanol adalah saperti di bawah.

$$C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O \qquad \Delta H = -715 \text{ kJ } mol^{-1}$$

(a) Based on the equation above, state the meaning of heat of combustion of ethanol.
Berdaserkan persamaan kimia di atas, nyatakan maksud haba pembakaran bagi etanol.

[2 marks]

(b) Based on Table 8 ,
Berdasarkan Jadual 8 ,

(i) Draw a graph of magnituda of heat of combustion against the number of carbon atoms.
Lukis graf magnitud haba pembakeran malawan bilangan atom karbon.

[3 marks]

[Lihat sebelah

(ii) State the relationship between the number of carbon atoms per molecule of alcohol to tha magnitude of the heat of combustion.
Nyatakan hubungan di antara bilangan atom karbon per molekul alkohol kepada magnitud haba pembakaran.

[1 mark]

(iii) From the graph, predict tha haat of combustion of pentanol in kJ mol $^{-1}$
Daripada graf, ramalkan haba pembakaran pentanol dalam kJ mol^{-1}

[2 marks]

(c) Compare the heat of combustion betwean athanol and butanol.
Explain why there is a difference in tha haat of combustion between ethanol and butanol.
Bandingkan haba pembakaran etanol dengan butanol.
Terangkan mengapa tardapat perbezaan di antara haba pembakaran etanol dan butanol.

[4 marks]

(d) Diagram 8 shows the energy level diagram of the heat of combustion of ethanol.
Rajah 8 menunjukkan gambarajah aras tanaga bagi haba pembakaran atanol.

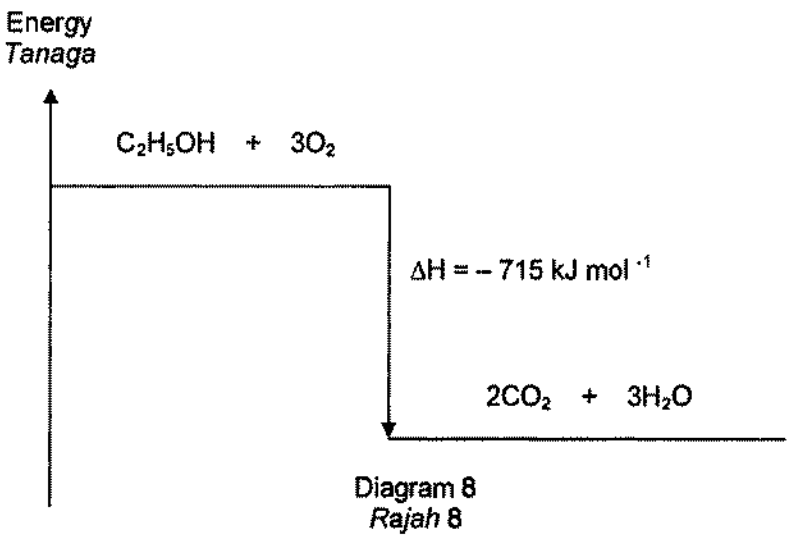


Diagram 8
Rajah 8

(i) Give four information that you can obtain from Diagram 8.
Berikan empat maklumat yang boleh diparolah daripada Rajah 8.

[4 marks]

(ii) Calculate the energy released if 6.9 grams of ethanol is bumt completely in air.
Kira haba yang di bebaskan jika 6.9 gram etanol di bakar dengan lengkap di dalam udara.

[4 marks]

Section C
Bahagian C

[20 *marks*]

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

9 (a) By using suitable example, explain what are meant by ampirical formula and molecular formula.
Dangan manggunakan contoh yang sesuai, terangkan apa yang dimaksudkan dengan formula empirik dan formula molekul.

[3 marks]

(b) The information below is for compound Q
Maklumat berikut adalah bagi sebatian Q.

• Carbon *Karbon*	40.00%
• Hydrogen *Hidrogan*	6.66%
• Oxygen *Oksigen*	53.33%
• Relative molacular mass *Jisim molekul relatif*	160

Based on the information of compound Q, determine:
Bardasarkan maklumat bagi sebatian Q, tentukan:

(i) The ampirical formula
Formula empiriknya

(ii) The molecular formula
Formula molekulnya
[Relative atomic mass: C,12; H,1; O,16]
[*Jisim atom relatif: C,12; H,1; O,16]*

[5 marks]

(c) Diagram 9 shows the sat-up of apparatus to determine the empirical formula of two different compounds.
Rajah 9 manunjukkan susunan radas bagi menentukan formula empirik dua sebatian yang barlainan.

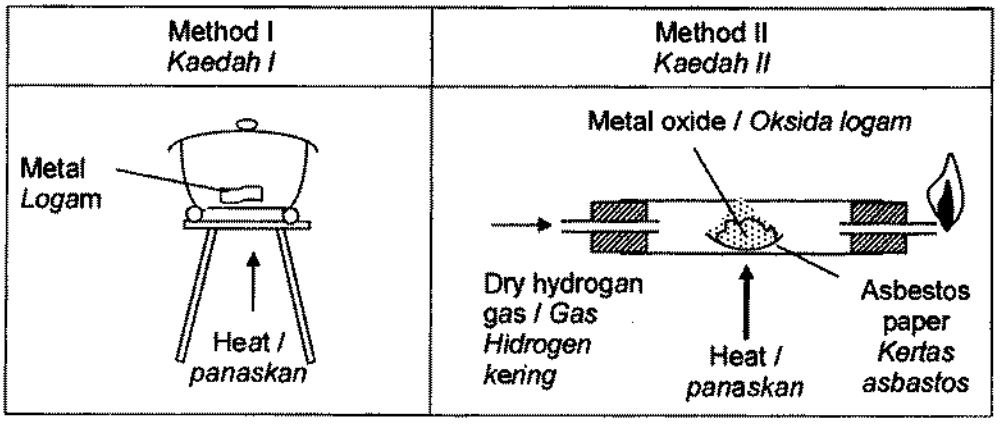


Table 9
Rajah 9

(i) Explain why method II is not suitable to determine the empirical formula of magnesium oxide?
Terangkan mengapa kaadah II tidak sesuai bagi menentukan formula empirik bagi magnesium oksida?

[1mark]

(ii) Suggest one metal oxide in method II.
Cadangkan satu oksida logam dalam kaedah II.

[1 mark]

(iii) Using a suitable example, describe a laboratory experiment to determine the empirical formula of an oxide of a reactive metal. Your explanation should include:
Dengan menggunakan contoh yang sesuai, huraikan suatu aksperimen di makmal untuk menentukan formula empirik bagi suatu oksida logam reaktif.. Penerangan anda mestilah meliputi :

- Procedure of the experiment
  Prosedur bagi eksperimen
- Tabulation of data
  Penjadualan data

[10 marks]

10 (a) Tabla 10 shows different concentrations of hydrochloric acid and the corresponding pH values.
Jadual 10 menunjukkan kepekatan berlainan bagi asid hidroklorik dan nilai pH yang sepadan.

Hydrochloric Acid *Asid hidroklorik*	Concentration of hydrochloric acid *Kepekatan asid hidroklorik* /mol dm^{-3}	pH
A	0.001	3
B	0.01	2
C	0.1	1
D	1	0

Table 10
Jadual 10

(i) Based on Table 10, state the relationship between the concentration of hydrochloric acid and tha pH value.
Berdasarkan Jadual 10, nyatakan hubungan antara kapekatan asid hidroklonk dan nilai pH.

(ii) Explain your answer in a (i) by referring to the number of hydrogen ions present in the acid.
Jalaskan jawapan anda di a (i) dengan merujuk kapada bilangan ion hidrogen yang terdapat dalam asid itu.

(iii) Arrange the hydrochloric acids in Table 10 according to increasing order of acidity.
Susun asid hidroklorik dalam Jadual 10 menurut susunan menaik kaasidan.

[4 marks]

[Libat sebelab

(b) The following information is about two different alkalis.
Maklumat di bawah adalah mengenai dua alkali yang berlainan.

Alkali *Alkali*	Concentration /mol dm^{-3} *Kepekatan /mol dm^{-3}*	pH *pH*
Sodium hydroxida solution *Larutan natrium hidroksida*	0.1	13
Ammonia solution *Larutan ammonia*	0.1	10

Explain why the two alkalis have different pH values.
Terangkan mengapa dua alkali tersebut mempunyai nilai pH yang berlainan.

[6marks]

(c) You are required to prepare dry barium sulphata salt.
Anda dikehendaki manyediakan garam barium sulfat kering.

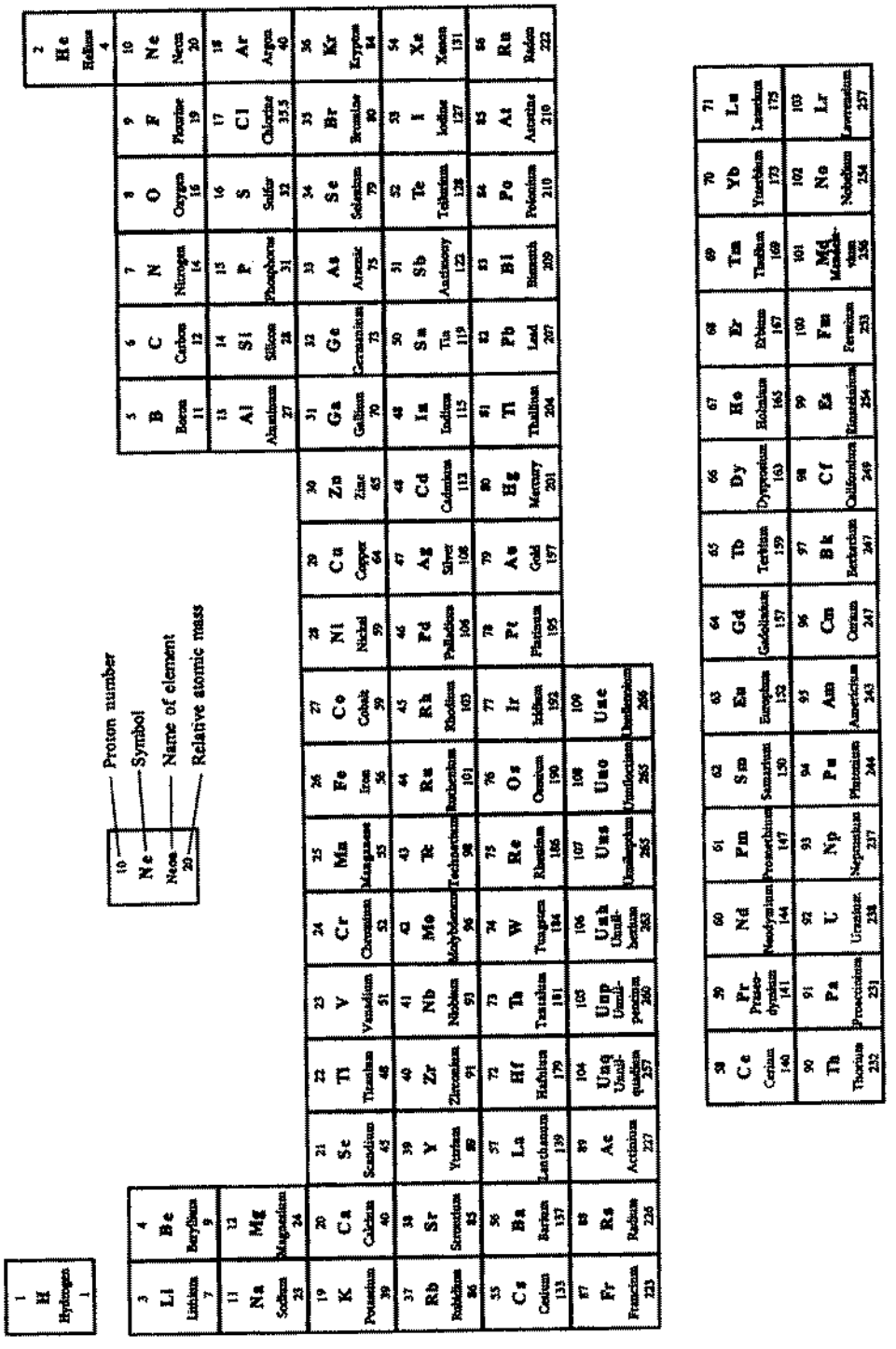
(i) Suggest two solutions to prepare barium sulphate salt.
Cadangkan dua larutan untuk menyediakan garam barium sulfat.

(ii) Describe a laboratory experiment to prepare the salt. In your description, includa the chemical equation and ionic equation.
Huraikan suatu eksperimen makmal untuk menyediakan garam tersebut..Huraian anda mesti mengandungi persamaan kimia dan persamaan ion.

[10marks]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

PERIODIC TABLE OF THE ELEMENTS



INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

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 lined pages at the end of the question paper. Answer questions in **Section B** and **Section C** in detail. You may use questions, 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 halaman bergaris di bahagian akhir kertas soalan ini. Jawab untuk 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 cancel any answer, neatly cross out the answer.

   Sekiranya anda hendak membatalkan sesuatu jawapan, buat garisan di atas jawapan itu.

6. The diagrams in the question 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 dan 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 this question paper at the end of the examination.

    Serahkan semua kertas jawapan anda di akhir peperiksaan.

Nama : ..... Kelas : .....

JABATAN PELAJARAN NEGERI JOHOR

PEPERIKSAAN PERCUBAAN SPM 2010
CHEMISTRY
Kertas 3
Ogos

4541/3

1½ 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 dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

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

Kertas soalan ini mengandungi 12 halaman bercetak

Answer **all** questions.

Jawab **semua** *soalan.*

1 Table 1.1 shows the observation in five test tubes used to investigate the effect of other metals on rusting. A mixture of jelly solution, potassium hexacyanoferrate(III), $K_3Fe(CN)_6$ solution and phenolphthalein were used as medium in each test tube.The observations were recorded after one day.

Jadual 1.1 menunjukkan pemerhatian dalam lima buah tabung uji yang digunakan untuk menyiasat kesan logam lain ke atas pengaratan. Medium yang digunakan di dalam setiap tabung uji adalah campuran larutan agar, larutan kalium heksasianoferat(III), $K_3Fe(CN)_6$ dan fenolftalein. Pemerhatian direkod selepas satu hari.

Test tube 1 *Tabung uji 1*	Iron nail *Paku besi*	Blue colour *Warna biru*
Test tube 2 *Tabung uji 2*	Iron nail coiled with magnesium ribbon *Paku besi dililit dengan pita magnesium*	High intensity of pink colour *Keamatan warna merah jambu tinggi*
Test tube 3 *Tabung uji 3*	Iron nail coiled with copper strip *Paku besi dililit dengan kepingan kuprum*	High intensity of blue colour *Keamatan warna biru tinggi*
Test tube 4 *Tabung uji 4*	Iron nail coiled with zinc strip *Paku besi dililit dengan kepingan zink*	Low intensity of pink colour *Keamatan warna merah jambu rendah*
Test tube 5 *Tabung uji 5*	Iron nail coiled with tin strip *Paku besi dililit dengan kepingan timah*	Low intensity of blue colour *Keamatan warna biru rendah*

Table 1.1
Jadual 1.1

(a) State the observation and inference for each test tube.
Nyatakan pemerhatian dan inferens untuk setiap tabung uji.

For Examiner's Use

Test tube *Tabung uji*	Observation *Pemerhatian*	Inference *Inferens*
1		
2		
3		
4		
5		

1(a) 6

(b) Based on this experiment, explain why there is a difference in observation between test tube 2 and 3.

Berdasarkan eksperimen ini, terangkan mengapa terdapat perbezaan pemerhatian di antara tabung uji 2 dan 3.

.....

.....

.....

[3 marks]
[3 markah]

1(b) 3

(c) State the hypothesis for the experiment.

Nyatakan hipotesis bagi eksparimen tersebut.

.....

.....

[3 marks]
[3 *markah*]

1(c) 3

(d) For this experiment, state:

Bagi eksperimen ini, nyatakan:

(i) The manipulated variable.

Pembolehubah dimanipulasi.

.....

(ii) The responding variable.

Pembolehubah bergerak balas.

.....

(iii) The constant variable.

Pembolehubah dimalarkan.

.....

1(d) 3

[3 marks]
[3 markah]

(e) State the operational definition for the rusting of iron nail.

Nyatakan definisi secara operasi bagi pengaratan paku besi.

.....

.....

1(e) 3

[3 marks]
[3 markah]

(f) Magnesium, copper, zinc and tin were used in this experiment to investigate the effect of other metals on the rusting of iron nails. Classify the metals by completing Table 1.2.

Magnesium, kuprum, zink dan timah digunakan dalam eksperimen ini untuk mengkaji kesan logam lain ke atas pengaratan paku besi. Kelaskan logam-logam dengan melengkapkan Jadual 1.2.

Metals that inhibit rusting *Logam yang melambatkan pengaratan*	Metals that speed up rusting *Logam yang mempercepatkan pengaratan*

Table 1.2
Jadual 1.2

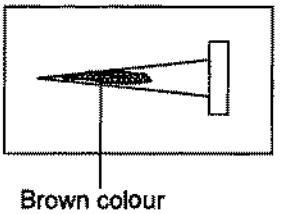
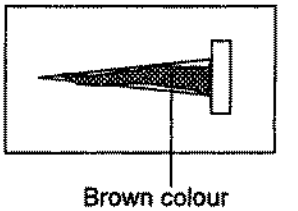
1(f) 3

[3 marks]

For Examiner's Use

(g) An iron nail was placed on *a moist* cotton to investigate the *time* taken for the iron nail to rust completely. The observations are shown below.

Sebatang paku besi diletakkan di atas kapas lembap untuk mengkaji masa yang diambil untuk paku besi itu berkarat dengan lengkap. Pemerhatian adalah ditunjuk seperti di bawah.

 Brown colour *Warna perang*	 Brown colour *Warna perang*
After one day *Selepas satu hari*	After two days *Selepas dua hari*

(i) State the relationship between the *time* taken and the *amount* of rust formed.

Nyatakan hubungan di antara masa yang diambil dan kuantiti karat yang terbentuk.

.....

.....

.....

[3 marks]
[3 *markah*]

1(g)(i) 3

(ii) The iron nail will take 5 days to rust completely in the water. Predict the *time* taken for the iron nail to rust completely if it is placed in salt solution.

Sebatang paku besi mengambil masa 5 hari untuk berkarat dengan lengkap. Ramalkan masa yang diambil untuk paku besi itu berkarat dengan lengkap jika diletakkan dalam larutan garam.

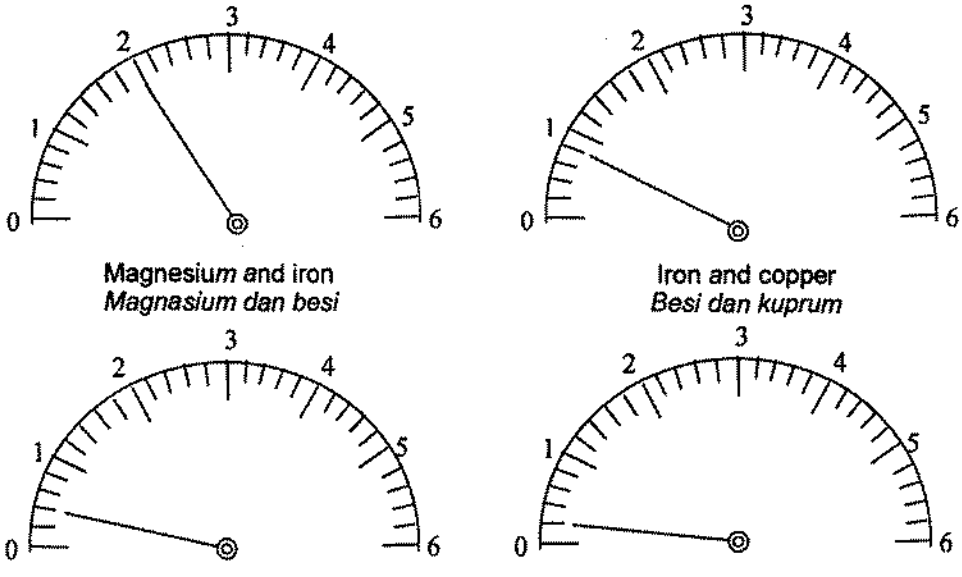
.....

[3 marks]
[3 *markah*]

1(g)(ii) 3

(h) In another experiment, the pairs of metals in test tube 2, 3, 4 and 5 were dipped into dilute sulphuric acid, H_2SO_4 and were connected to a voltmeter. The reading of the voltmeter are shown in Diagram 1.

Dalam eksperimen yang lain, pasangan logam dalam tabung uji 2, 3, 4 dan 5 dicelupkan ke dalam asid sulfurik cair, H_2SO_4 dan disambungkan kapada voltmeter. Bacaan voltmeter ditunjukkan dalam Rajah 1.



Magnesium and iron
Magnasium dan besi

Iron and copper
Besi dan kuprum

Iron and zinc
Besi dan zink

Iron and tin
Besi dan timah

Diagram 1
Rajah 1

(i) Based on diagram 1, record the voltmeter readings in Teble 1.3.
Berdasarkan rajah 1, rekod bacaan voltmeter dalam Jadual 1.3.

Pairs of metal *Pasangan logam*	Positive terminal *Terminal positif*	Voltmatar reading (V) *Bacaan voltmeter (V)*
Magnesium and iron *Magnesium dan besi*	Iron *Besi*	
Iron and copper *Basi dan kuprum*	Copper *Kuprum*	
Iron and zinc *Besi dan zink*	Iron *Besi*	
Iron and tin *Basi dan timah*	Tin *Timah*	

Table 1.3
Jadual 1.3

[3 marks]
[3 markah]

1(h)(i)
3

For Examiner's Use

(ii) Draw *a* labelled diagram *to* show the voltaic cell using magnesium *and* iron with dilute sulphuric acid as electrolyte.

Lukis gambarajah berlabel untuk menunjukkan sel voltan bagi magnesium dan besi dangan menggunakan asid sulfurik cair sebagai alektrolit.

1(h)(ii)

[3 marks]
[3 *markah*]

3

Total
1

33

For Examiner's Use

2 Diagram 2 shows a catalytic converter. Catalytic converter is a device used to reduce the toxicity of emissions in the exhaust gases from motor vehicles. Platinum, rhodium, palladium and cerium(III) oxide are used as catalysts in catalytic converter.

Rajah 2 menunjukkan alat pengubah bermangkin. Alat pengubah bermangkin ialah suatu alat yang digunakan untuk mengurangkan ketoksinan gas-gas yang dibebaskan melalui ekzos kenderaan bermotor. Platinum, rhodium, palladium and cerium(III) oksida digunakan sebagai mangkin dalam alat pengubah bermangkin.

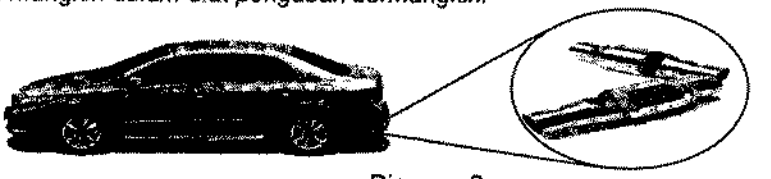


Diagram 2
Rajah 2

Manganese(IV) oxide, MnO_2, affects the rate of decomposition of hydrogen peroxide, H_2O_2. The decomposition of hydrogen peroxide is as follows:

Mangan(IV) oxide, MnO_2, mempengaruhi penguraian hidrogen peroksida, H_2O_2. Penguraian hidrogen peroksida adalah seperti berikut:

$$2H_2O_2 \rightarrow O_2 + 2H_2O$$

Plan an experiment to investigate the effect of catalyst on the rate of reaction. Your planning should include the following aspects:

Rancang satu eksperimen untuk mengkaji kesan mangkin ke atas kadar tindak balas tersebut. Perancangan anda hendaklah mengandungi aspek-aspek berikut:

(a) Problem statement
Pernyataan masalah

(b) All the variables
Semua pembolehubah

(c) Hypothesis
Hipotesis

(d) List of material and apparatus
Senarai bahan dan alat radas

(e) Procedure
Prosedur

(f) Tabulation of data
Penjadualan data

Total 2

[17 *marks*]
[17 *markah*]

17

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1 This question paper consists of three questions: **Question 1**, **Question 2** and **Question 3**.

Kertas soalan ini mengandungi tiga soalan: **Soalan 1**, **Soalan 2** *dan* **Soalan 3**.

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

Jawab **semua** *soalan. Jawapan anda bagi* semua soalan *hendaklah ditulis pada ruang yang disediakan dalam kertas soalan ini.*

3 You may use equations, diagrams, tables, graphs and other suitable methods to explain your answer.

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

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

Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

5 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.

6 If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.

Jika anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.

7 You may use a non-programmable scientific calculator.

Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.

8 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**.

END OF QUESTION
KERTAS SOALAN TAMAT

TRIAL EXAMINATION

CHEMISTRY 2010

JOHOR STATE

PAPER 1 ANSWER SCHEME

Question No.	Answer	Question No.	Answer
1	D	26	B
2	C	27	C
3	A	28	D
4	B	29	C
5	A	30	B
6	B	31	B
7	A	32	C
8	D	33	B
9	B	34	C
10	B	35	A
11	D	36	C
12	A	37	A
13	D	38	B
14	C	39	D
15	B	40	C
16	B	41	D
17	D	42	B
18	B	43	C
19	C	44	A
20	D	45	B
21	D	46	C
22	A	47	A
23	A	48	D
24	C	49	A
25	C	50	A

MARKING SCHEME OF CHEMISTRY TRIAL EXAMINATION
PAPER 2, 2010

Question	Mark Scheme	Mark	
		Sub mark	Total Mark
1. (a) (i)	Contact	1	1
(ii)	Burn sulphur in air /oxygen Heating of zinc sulphide/ ZnS	1	1
(iii)	SO_3	1	1
(iv)	Concentrated sulphuric acid	1	1
(v)	Dissolve / Dilute in water	1	1
(vi)	Bubbles of gas are released // Beaker becomes warm// the mass of marble decreases	1	1
(b)	Ferum / Iron	1	1
(c) (i)	$2NH_3 + H_2SO_4 \rightarrow (NH_4)_2SO_4$ Correct formula of reactants and product Balance equation	 1 1	 2
(ii)	As fertilizers	1	1
	Total		10

Question	Mark Scheme	Mark	
		Sub mark	Total Mark
2. (a) (i)	Temperature at which a solid changes to liquid.	1	1
(ii)	83°C	1	1
(iii)	solid and liquid	1	1
(iv)	1. Heat energy absorbed	1	
	2. is used to overcome the forces of attraction between the molecules / particles P.	1	2

(v)	1. Water bath should be used and not ethanol bath.	1	
	2. Melting point of P is higher than boiling point of ethanol / 78°C // Ethanol is flammable.	1	2
(b) (i)	Sublimation	1	1
(ii)	1. Iodine-131	1	
	2. To treat thyroid patients // Diagnosis of thyroid Glands	1	2
	Total		10

Question	Mark Scheme	Mark	
		Sub mark	Total Mark
3. (a) (i)	The negatively charged ion/ particle	1	1
(ii)	OH^- , Cl^-	1	1
(iii)	Chlorine	1	1
(b) (i)	Carbon electrode Y	1	1
(ii)	$2H^+ + 2e \rightarrow H_2$	1	1
(iii)	1. Insert a lighted wooden splinter into the test tube, 2. A 'pop' sound is produce/ can be heard	1 1	2
(c)(i)	Hydroxide ion	1	1
(ii)	Because hydroxide ion is located lower than chloride ion in electrochemical series.	1	1
(iii)	Oxygen gas	1	1
	Total		10

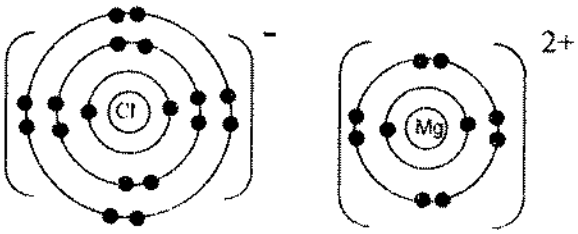
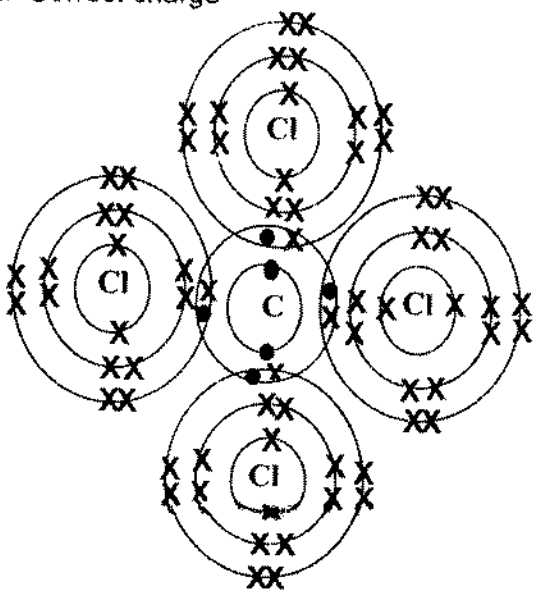
Question	Mark Scheme	Mark	
		Sub mark	Total Mark
4. (a) (i)	1. P : Alkene 2. Q : Alkane	1 1	2
(ii)	C_nH_{2n+2}	1	1
(iii)	Brown colour remains	1	1
(iv)	Acidified potassium manganate(VII) solution // Acidified potassium dichromate (VI) solution	1	1
(v)	In alkene carbon-carbon double bonds are more reactive than carbon-carbon single bonds.	1	1
(b) (i)	Carbon dioxide	1	1
(ii)	$C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$ OR $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$	1	1
(iii)	1. Compound Q produced mere soot. 2. Compound Q has higher percentage of carbon mass than compound P.	1 1	2
	Total		10

Question	Mark Scheme	Mark	
		Sub mark	Total Mark
5. (a)	To allow movement of ions // To complete the electric circuit	1	1
(b) (i)	Green colour solution turn to brown / yellow	1	1
(ii)	$Fe^{2+} \rightarrow Fe^{3+} + e$	2	2

(iii)	1. A few drops of sodium hydroxide solution/ ammonium hydroxide solution is added into the product formed around carbon Y.	1	
	2. Brown precipitate is formed.	1	2
	[OR]		
	1. A few drops of potassium hexacyanoferrate (II) solution is added into the product formed around carbon Y.		
	2. Dark blue colour / precipitate produced.		
(c) (i)	Purple solution is decolourised / turn colourless	1	1
(ii)	Act as oxidizing agent	1	1
(iii)	Potassium manganate (VII) solution/ MnO_4^- ion is oxidized.	1	1
(d)	Bromine water/ chlorine water/ acidified potassium dichromate (VI) solution	1	1
	Total		10

Question	Mark Scheme	Mark	
		Sub mark	Total Mark
6. (a) (i)	Ethanoic acid/ formic acid / any suitable dilute acid.	1	1
(ii)	Because bacteria from air enter the latex and it produces lactic acid that causes the coagulation.	1	1
(iii)	Ammonia, NH_3 solution	1	1
(b) (i)	Saponification (Spelling must be correct)	1	1
(ii)	Concentrated potassium hydroxide, KOH// concentrated sodium hydroxide, NaOH.	1	1

(iii)	To precipitate the soaps / to reduce the solubility of soap	1	1
(iv)	1. When a cloth with grease is dipped into soap, soap reduces the surface tension of water.	1	
	2. The hydrophobic part dissolves in the grease	1	
	3. The hydrophilic part dissolve in water	1	Max 2
(c)	1. Agent Y s more effective	1	
	2. Detergent do not form scum// Detergent can still perform its cleaning action in hard water // Detergent can still clean well in hard water.	1	2
	Total		10

Question	Mark Scheme	Mark	
		Sub mark	Total Mark
7(a)	Aluminium ion : 2.8 Oxide ion : 2.8	1 1	2
(b)(i)	1. Magnesium atom donates / releases 2 electron to form magnesium ion / Mg^{2+} // $Mg \rightarrow Mg^{2+} + 2e$	1	
	2. Chlorine atom accepts / receives one electron to form chloride ion / Cl^- // $Cl + e \rightarrow Cl^-$	1	
	3. Magnesium ion and chloride ion are attracted to one another by electrostatic force.	1	
	 Chloride ion, Cl^- magnesium ion, Mg^{2+}		
(ii)	1. Correct number of shells and number of electron	1	
	2. Correct charge	1	5
			

	1. Correct number of shell and electron	1	
	2. Correct number of atoms of elements	1	
	3. Carbon atom contribute / needs / requires 4 electrons to share	1	
	4. Chlorine atom contribute / needs / requires 1 electron to share	1	
	5. One carbon atom share 4 valence electrons with 4 chlorine atoms.	1	5
(c)(i)	1. Compound (b)(i) / $MgCl_2$ is an ionic compound	1	
	2. In molten state, $MgCl_2$ has freely moving ions	1	
	3. Compound (b)(ii) / CCl_4 is a covalent compound.	1	
	4. CCl_4 has no freely moving ions// only consist of molecules.	1	4
(ii)	1. Ions in $MgCl_2$ are held together by strong electrostatic force	1	
	2. A lot of heat energy is needed to overcome the strong electrostatic force	1	
	3. Molecules in CCl_4 are held together by weak intermolecular forces / van der Waals	1	
	4. Less heat energy is needed to overcome the forces	1	4
	Total		20

	1. Correct number of shell and electron	1	
	2. Correct number of atoms of elements	1	
	3. Carbon atom contribute / needs / requires 4 electrons to share	1	
	4. Chlorine atom contribute / needs / requires 1 electron to share	1	
	5. One carbon atom share 4 valence electrons with 4 chlorine atoms.	1	5
(c)(i)	1. Compound (b)(i) / $MgCl_2$ is an ionic compound	1	
	2. In molten state, $MgCl_2$ has freely moving ions	1	
	3. Compound (b)(ii) / CCl_4 is a covalent compound.	1	
	4. CCl_4 has no freely moving ions// only consist of molecules.	1	4
(ii)	1. Ions in $MgCl_2$ are held together by strong electrostatic force	1	
	2. A lot of heat energy is needed to overcome the strong electrostatic force	1	
	3. Molecules in CCl_4 are held together by weak intermolecular forces / van der Waals	1	
	4. Less heat energy is needed to overcome the forces	1	4
	Total		20

Question	Mark Scheme	Mark	
		Sub mark	Total Mark
8. (a)	Heat of combustion of ethanol is the heat released when 1 mole of ethanol is burnt completely in air to produced 715 kJ.	2	2
(b) (i)	Graph 1. Correct axis and labels 2. Plot data 3. Straight line	 1 1 1	 3
(ii)	The higher the number of carbon atoms per molecule of alcohol, the higher the magnitude of the heat of combustion.	1	1
(iii)	1. [3200 – 3300] kJ mol^{-1} 2. Dotted line in graph.	1 1	 2
(c)	1. The heat of combustion of butanol is higher than ethanol. 2. Butanol has higher number of carbon / hydrogen atoms per molecule// The relative mass of butanol is higher than ethanol 3. More carbon dioxide and water are formed. 4. The combustion of butanol produced more heat.	1 1 1 1	 4
(d) (i)	1. The energy level diagram shows exothermic reaction / heat released to the surrounding. 2. The energy level of reactants is higher than the products 3. The heat of combustion released 715 kJ per 1 mole of ethanol 4. Ethanol burnt in oxygen to produced carbon dioxide and water.	1 1 1 1	 4
(ii)	1. Number of mole of ethanol = $\frac{6.9}{46} = 0.15$ 2. 0.15 mole will released 0.15 x 715 = 107.25 kJ of heat	2 2	 4
	Total		20

<table>
<tr><th rowspan="2">Question</th><th rowspan="2">Mark Scheme</th><th colspan="2">Mark</th></tr>
<tr><th>Sub mark</th><th>Total Mark</th></tr>
<tr><td>9. (a)</td><td>1. Empirical formula is the formula that shows the simplest ratio of atoms of each element in the compound.</td><td>1</td><td></td></tr>
<tr><td></td><td>2. Molecular formula is the formula that shows the actual number of atoms of each element in the compound.</td><td>1</td><td></td></tr>
<tr><td></td><td>3. Example : empirical formula of ethene is CH_2 and the molecular formula is C_2H_4</td><td>1</td><td>3</td></tr>
<tr><td>(b)(i)</td><td>
<table>
<tr><td>Element</td><td>Carbon</td><td>Hydrogen</td><td>Oxygen</td></tr>
<tr><td>Percentage</td><td>40.00</td><td>6.66</td><td>53.33</td></tr>
<tr><td>Number of moles</td><td>$\frac{40}{12} = 3.33$</td><td>$\frac{6.66}{1} = 6.66$</td><td>$\frac{53.33}{16} = 3.33$</td></tr>
<tr><td>Ratio of moles</td><td>1</td><td>2</td><td>1</td></tr>
</table>
</td><td>1
1</td><td></td></tr>
<tr><td></td><td>Empirical formula is CH_2O</td><td>1</td><td>3</td></tr>
<tr><td>(ii)</td><td>$n(CH_2O) = 180$
$12n + 2n + 16n = 180$
$30n = 180$
$n=6$</td><td>1</td><td></td></tr>
<tr><td></td><td>molecular formula = $C_6H_{12}O_6$</td><td>1</td><td>2</td></tr>
<tr><td>(c)(i)</td><td>Because magnesium is more reactive than hydrogen// because magnesium oxide does not react with hydrogen gas.</td><td>1</td><td>1</td></tr>
<tr><td>(ii)</td><td>Lead oxide / Stanum oxide / iron oxide / copper oxide</td><td>1</td><td>1</td></tr>
</table>

<table>
<tr>
<td>(iii)</td>
<td>
1. Clean [5 – 15] cm magnesium ribbon with sandpaper and coil it.
2 Weigh an empty crucible with its lid.
3. Place the magnesium in the crucible and weigh again.
4. Record the reading.
5. Heat the crucible very strongly.
6. Open and close the lid very quickly.
7. When burning is complete stop the heating
8. Let the crucible cool and then weigh it again
9. The heating, cooling and weighing process is repeated until a constant mass is recorded.
<table>
<tr><th>Description</th><th>Mass(g)</th></tr>
<tr><td>Crucible + lid</td><td></td></tr>
<tr><td>Crucible + lid + Mg / Zn / Al</td><td></td></tr>
<tr><td>Crucible + lid + MgO / ZnO / Al_2O_3</td><td></td></tr>
</table>
</td>
<td>1
1
1
1
1
1
1
1
1
1
1</td>
<td>Max 10</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>20</td>
</tr>
</table>

Question	Mark Scheme	Mark	
		sub mark	Total Mark
10. (a)(i)	The higher the concentration of hydrochloric acid, the lower the pH value / vice versa	1	
(ii)	1. The pH value is actually a measure of the concentration of H^+ ions [and OH^- ions]	1	
	2. The higher the number of H^+ ion per unit volume of solution, the lower the pH value.	1	
(iii)	Increasing acidity of hydrochloric acid is: A , B , C , D	1	4
(b)	1. Sodium hydroxide is a strong alkali.	1	
	2. Ammonia is a weak alkali	1	
	3. Sodium hydroxide ionises completely in water to produce higher concentration of hydroxide ions,	1	
	3. Whereas ammonia ionises partially in water to produce lower concentration of hydroxide ions.	1	
	4 The concentration of hydroxide ions in sodium hydroxide is higher than in ammonia solution.	1	
	5. When the concentration of hydroxide ion is higher, the pH value is higher // pH of NaOH = 13 / 14 and pH of NH_3 = 10 / 11	1	6
(c)(i)	Barium nitrate/ Barium chloride	1	
	Sodium sulphate/ Potassium sulphate/ Any suitable sulphate solution	1	
(ii)	1. Pour [20 – 100] cm^3 of [0.1 – 1.0] mol dm^{-3} barium nitrate solution into a beaker	1	
	2. Add slowly [20 – 100] cm^3 of [0.1 – 1.0] mol dm^{-3} sodium sulphate solution into the beaker.	1	

	3. Stir the mixture. 4. Filter the mixture. 5. Rinse the residue with distilled water. 6. Dry the salt/ crystals by pressing between two pieces of filter papers, Chemical equation: $Na_2SO_4 + Ba(NO_3)_2 \rightarrow BaSO_4 + 2NaNO_3$ Note : If physical state is written, it must be correct. Ionic equation: $Ba^{2+} + SO_4^{2-} \rightarrow BaSO_4$	1 1 1 1 1 1	10
	Total		20

Marking Scheme Paper 3

Question	Mark Scheme	Marks
1(a)	**Able to state 5 correct observations.** **Able to state 3-4 correct observations.** **Able to state 1-2 correct observations.**	3 2 1
	Sample answer	

Test tube	Observation
1	Low intensity of blue colour /solutions
2	Low intensity of pink colour/ solutions
3	Low intensity of blue colour /solutions
4	High intensity of pink colour/ solutions
5	High intensity of blue colour /solutions

Mark Scheme	Marks
Able to state 5 correct inferences. **Able to state 3-4 correct inferences.** **Able to state 1-2 correct inferences.**	3 2 1

Sample answer

Test tube	Inference
1	Iron(II) / Fe^{2+} ions formed / produced in the solutions // Iron / Fe rusted/corroded/oxidised
2	Iron(II) / Fe^{2+} ions are not formed /produced in the solutions // Iron / Fe does not rust/ corrode/oxidised Magnesium/Mg rusted/corroded /oxidised
3	Iron(II) / Fe^{2+} ions formed / produced in the solutions // Iron / Fe rusted/ corroded/ oxidised
4	Iron(II) / Fe^{2+} ions are not formed /produced in the solutions // Iron / Fe does not rust/ corrode/oxidised // Zinc/Zn rusted/ corroded / oxidised
5	Iron(II) / Fe^{2+} ions formed / produced in the solutions // Iron / Fe is rusted / corroded/ oxidised

	Mark Scheme	Marks
1(b)	**Able to explain a difference in observation correctly between test tube 2 and 3** Sample answer Iron/Ferum/Fe in test tube 2 does not rust/ corrode/ oxidised because ferum is in contact with a more electropositive metal, but iron/Ferum/Fe in test tube 3 rusts/ corrodes/ is oxidised because ferum is in contact with a less electropositive metal.	3
	Able to explain a difference in observation between test tube 2 and test tube 3 incompletely. Sample answer Iron/Ferum/Fe in test tube 2 does not rust/ corrode/ oxidised, but iron/Ferum/Fe in test tube 3 rusts/ corrodes/ is oxidised.	2
	Able to state any idea of difference in observation. Sample answer Iron/Ferum/Fe/nail/metal does not rust / corrode/ oxidised // Iron/Ferum/Fe/nail/metal rusts / corrodes/ is oxidised	1
	No response or wrong response	0

Question	Mark Scheme	Marks
1(c)	**Able to state the hypothesis correctly.** Sample answer When a more/less electropositive metal is in contact with iron/ferum/Fe, the metal inhibits/(speeds up) rusting/corrosion of iron // When a more/less electropositive metal is in contact with iron/ferum/Fe, rusting of iron/ferum/Fe is faster/slower // If the metal in contact with iron is higher/lower than iron/ferum/Fe in electrochemical series, the rusting/corrosion of iron is slower/faster // The higher/lower the metal in contact with iron in electrochemical series/ than iron/ferum/Fe, the rusting/corrosion of iron/ferum/Fe is slower/faster	3
	Able to state the hypothesis less accurately. Sample answer When a more/less electropositive metal, the metal inhibits/(speeds up) rusting/corrosion of iron // If the metal in contact with iron is higher than iron/ferum/Fe in reactivity series, the rusting/corrosion of iron is slower/faster // The rusting of iron/ferum/Fe is faster/slower, if a more/less electropositive metal is in contact with iron/ferum/Fe	2
	Able to give an idea of hypothesis. Sample answer Different metal in contact with iron, will cause iron to rust // Metal can cause iron to rust.	1
	No response or wrong response	0

Question	Mark Scheme	Marks
1(d)	**Able to state all the variables in this experiment correctly.** Sample answer (i) Manipulated variables: Type/different metal // position of metal in electrochemical series (ii) Responding variable: Rusting / corrosion // presence of blue/pink colour (iii) Constant variable: Size/mass of iron nail // type of nail // clean iron nails // temperature // medium in which the iron nail are kept	3
	Able to state any two of the variables in this experiment correctly.	2
	Able to state any one of the variables in tbis experiment correctly.	1
	No response or wrong response	0

Questioo	Mark Scheme	Marks
1(e)	**Able to state the operational definition for the rusting of iron oail correctly.** Sample answer Rusting occurs when iron nail is in contact with copper/tin /less electropositive metal and form blue colouration in potassium hexacyanoferrate(III) solution	3
	Ahle to state the operational defioitioo for the rusting of iron nail less accurately Sample answer: Rusting occurs when iron nail is in contact with copper/tin /less electropositive metal and form blue colouration	2
	Ahle to state any idea of operational definition. Sample answer: Rusting occurs when iron nail is in contact with cpoper/tin /less electropositive metal// Rusting occurs when blue colouration is formed // Rusting occurs when the colour of solution changes.	1
	No response or wrong respoose	0

<table>
<tr><th>Question</th><th>Mark Scheme</th><th>Marks</th></tr>
<tr><td rowspan="4">1(f)</td><td>Able to classify all the metals correctly.

Sample answer

<table><tr><td>Metals that inhibit rusting</td><td>Metals that speed up rusting</td></tr><tr><td>Magnesium/Mg
Zinc/Zn</td><td>Tin/Sn
Copper/Cu</td></tr></table></td><td>3</td></tr>
<tr><td>Able to classify at least three metals correctly.</td><td>2</td></tr>
<tr><td>Able to classify any one of the metals correctly.</td><td>1</td></tr>
<tr><td>No response or wrong response</td><td>0</td></tr>
<tr><td rowspan="4">1(g)(i)</td><td>Able to state tbe relationship between the time taken and the amount of rust formed correctly.

Sample answer

The longer the time taken, the greater/bigger/larger the rust formed // The longer the time taken, more rust is formed // The rust formed is greater/bigger/larger, when the time taken is longer.</td><td>3</td></tr>
<tr><td>Able to state tbe relationship between the time taken and tbe amount of rust formed less accurately.

Sample answer:

The rust formation is directly proportional with time. //

The rust formed is greater/bigger/larger after two days compared to one day. //

The rust formed in two days is more than in one day [vice-versa]</td><td>2</td></tr>
<tr><td>Able to state any idea of the relationship between the time taken and the amount of rust.

Sample answer:

The rust formed in two days is greater/bigger/larger. //

The rust formed in one day is lesser/smaller</td><td>1</td></tr>
<tr><td>No response or wrong response</td><td>0</td></tr>
</table>

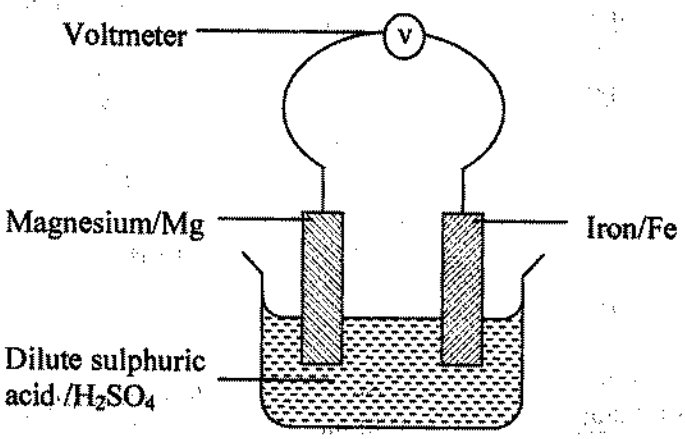
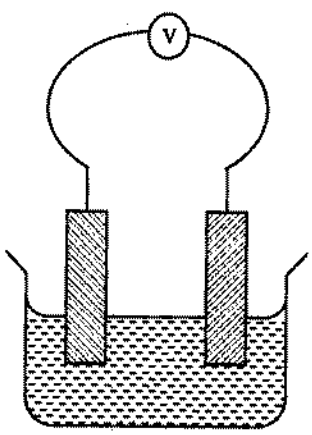
Question	Mark Scheme	Marks
1(g)(ii)	**Able to predict tbe time taken for the Iron nail to completely rust correctly.** Answer Less than 5 days	3
	Able to predict the time taken for the iron nail to completely rust less accurately Answer: 5 days	2
	Able to glve an idea of the time taken. Sample answer: More than 5 days	1
	No response or wrong response	0

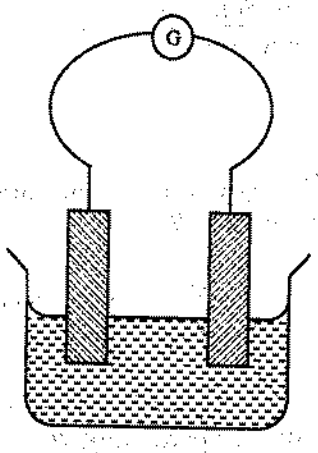
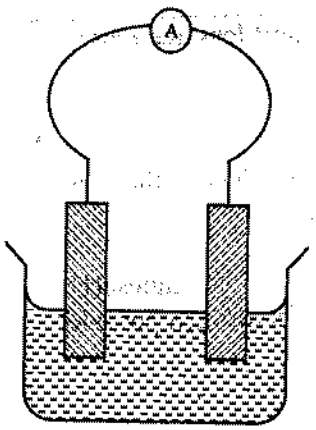
<table>
<tr><th>Question</th><th>Mark Scheme</th><th>Marks</th></tr>
<tr><td>1(h)(i)</td><td>
Able to record the voltmeter readings correctly in one decimal place.

Answer
<table>
<tr><th>Pairs of metal</th><th>Positive terminal</th><th>Voltmeter reading (V)</th></tr>
<tr><td>Magnesium and iron</td><td>Iron</td><td>2.0</td></tr>
<tr><td>Iron and copper</td><td>Copper</td><td>0.8</td></tr>
<tr><td>Iron and zinc</td><td>Iron</td><td>0.4</td></tr>
<tr><td>Iron and tin</td><td>Tin</td><td>0.2</td></tr>
</table>
</td><td>3</td></tr>
<tr><td></td><td>
Able to record tbe voltmeter readings less accurately.

Sample answer:
<table>
<tr><th>Pairs of metal</th><th>Positive terminal</th><th>Voltmeter reading (V)</th></tr>
<tr><td>Magnesium and iron</td><td>Iron</td><td>2</td></tr>
<tr><td>Iron and copper</td><td>Copper</td><td>0.8</td></tr>
<tr><td>Iron and zinc</td><td>Iron</td><td>0.4</td></tr>
<tr><td>Iron and tin</td><td>Tin</td><td>0.2</td></tr>
</table>
//
<table>
<tr><th>Pairs of metal</th><th>Positive terminal</th><th>Voltmeter reading (V)</th></tr>
<tr><td>Magnesium and iron</td><td>Iron</td><td>2.00</td></tr>
<tr><td>Iron and copper</td><td>Copper</td><td>0.80</td></tr>
<tr><td>Iron and zinc</td><td>Iron</td><td>0.40</td></tr>
<tr><td>Iron and tin</td><td>Tin</td><td>0.20</td></tr>
</table>
</td><td>2</td></tr>
<tr><td></td><td>
Able to record at least one voltmeter reading less accurately.

Sample answer:
<table>
<tr><th>Pairs of metal</th><th>Positive terminal</th><th>Voltmeter reading (V)</th></tr>
<tr><td>Magnesium and iron</td><td>Iron</td><td>2 // 2.00</td></tr>
<tr><td>Iron and copper</td><td>Copper</td><td></td></tr>
<tr><td>Iron and zinc</td><td>Iron</td><td></td></tr>
<tr><td>Iron and tin</td><td>Tin</td><td></td></tr>
</table>
</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(h)(ii)	Able to draw a labelled diagram accurately. Sample Answer  	3
	Able to draw a diagram correctly without label. Sample Answer  	2

	Able to draw a diagram less accurately with galvanometer or ammeter. Sample answer:  //  	1
	No response or wrong response	0
	Total Mark	33

Questiou	Mark Scheme	Marks
2(a)	**Able to give the problem statement correctly** Sample Answer Does catalyst / (manganese(IV) oxide) affect the rate of reaction / (decomposition of hydrogen peroxide)? // How does a catalyst / (manganese(IV) oxide) affect the rate of reaction / (decomposition of hydrogen peroxide)? // What is the effect of catalyst / (manganese(IV) oxide) on the rate of reaction / (decomposition of hydrogen peroxide)? //	3
	Able to state the problem statement less accurate. Sample Answer Catalyst / (manganese(IV) oxide) affects the rate of reaction / (decomposition of hydrogen peroxide) // To investigate the effect of catalyst / (manganese(IV) oxide) on the rate of reaction / (decomposition of hydrogen peroxide).	2
	Able to give an idea of problem statement. Sample answer: Catalyst affects the decomposition.// Catalyst affects the reaction	1
	No response or wrong response	0

Question	Mark Scbeme	Marks
2(b)	**Able to state tbe tbree variables correctly** Sample Answer Manipulated variable Catalyst Responding variable Rate of reaction / (decomposition of hydrogen peroxide) Contant variable Volume / concentration of hydrogen peroxide	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)	**Ahle to state the relationship between the manipulated va riable and the respondlng va riable correctly with direction.**
	
	Sample Answer
	
	Catalyst / (manganese(IV) oxide) increases / decreases the rate of reaction / (decomposition of hydrogen peroxide) //
	
	The presence of catalyst / (manganese(IV) oxide) increases / decreases the rate of reaction / (decomposition of hydrogen peroxide) //
	
	When catalyst / (manganese(IV) oxide) is present, the rate of reaction / (decomposition of hydrogen peroxide) increases/decreases
		3

	Able to state the relationship between the manipulated variable and the responding variable correctly without stating the direction.
	
	Sample answer
	
	Catalyst / (manganese(IV) oxide) affects / changes the rate of reaction / (decomposition of hydrogen peroxide) //
	
	The presence of catalyst / (manganese(IV) oxide) affects / changes the rate of reaction / (decomposition of hydrogen peroxide) //
	
	When catalyst / (manganese(IV) oxide) is present, the rate of reaction / (decomposition of hydrogen peroxide) changes / different
		2

	Able to state a u idea of hypotbesis. Sample answer Catalyst affects the decomposition.// Catalyst affects the reaction // Catalyst changes the reaction //	1
	No response or wrong response	0

Question	Mark Scheme	Marks
2(d)	**Able to list completely the materials and apparatus** Sample Answer Materials: 20-volume hydrogen peroxide, manganese(IV) oxide Apparatus: Test/boiling tube, spatula, wooden splinter	3
	Able to list incompletely materials and apparatus Sample answer Materials: Hydrogen peroxide, manganese(IV) oxide Apparatus: Test/boiling tube, wooden splinter	2
	Able to give an idea of materials and apparatus Sample answer Materials: Hydrogen peroxide Apparatus: Test / boiling tube / [any suitable container]	1
	No response or wrong response	0

Question	Mark Scheme	Marks
2(e)	**Able to state the steps correctly** Sample Answer 1. Pour [5-10 cm^3] hydrogen peroxide, H_2O_2 into a test tube / (test tube I) 2. Add [little/(0.-1.0) g] manganese(IV) oxide, MnO_2 into the test tube / (test tube I) 3. Bring/insert/place/put a glowing wooden splinter to **the mouth of the test tube** / (test tube I) 4. Record the observation. 5. Repeat (in test tube II) the experiment / (step 1, 3 and 4) without manganese(IV) oxide	3
	Able to state the steps partially correct Sample answer 1. Pour hydrogen peroxide, H_2O_2 into **a** test tube / (test tube I) 2. Add manganese(IV) oxide, MnO_2 into the test tube / (test tube I) 3. Bring/insert/place/put a glowing wooden splinter to the test tube / (test tube I) 4. Record the observation.	2
	Able to give an idea of the procedure Sample answer Add manganese(IV) oxide, MnO_2 into bydrogen peroxide, H_2O_2	1
	No response or wrong response	0

<table>
<tr><th>Questinn</th><th>Mark Scheme</th><th>Marks</th></tr>
<tr><td>2(f)</td><td>
Able tn exhihit the tahulation nf data that includes tbe fnllnwing infnrmatinn:

1 Heading for the manipulated variable

2 Heading for the responding variable

<u>Sample Answer</u>

<table>
<tr><td>Experiment / test tube</td><td>Rate of reaction / observation</td></tr>
<tr><td>Catalyst presence / Manganese(IV) oxide/ MnO_2/ I</td><td></td></tr>
<tr><td>No catalyst / II</td><td></td></tr>
</table>
//
<table>
<tr><td></td><td>Rate of reaction / observation</td></tr>
<tr><td>Hydrogen peroxide/H_2O_2 and manganese(IV) oxide/ MnO_2/catalyst</td><td></td></tr>
<tr><td>Hydrogen peroxide/H_2O_2</td><td></td></tr>
</table>
</td><td>2</td></tr>
<tr><td></td><td>
Able tn exhibit the incomplete tabulatinn nf data tbat includes:

1 Heading for the manipulated variable

2 Heading for the responding variable

<u>Sample answer</u>

<table>
<tr><td>Experiment / test tube /catalyst</td><td>Rate of reaction / observation</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
</table>
</td><td>1</td></tr>
<tr><td></td><td>Nn response nr wrong response</td><td>0</td></tr>
<tr><td></td><td>Tntal</td><td>17 marks</td></tr>
</table>

Notes : In question nn. 2, accept alternate answers if student use other suitable reactinn witb correct reactants and catalyst.

END OF MARKING SCHEME