SULIT
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CHEMISTRY
Paper 1
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MAJLIS PENGETUA SEKOLAH MALAYSIA
NEGERI PAHANG

PEPERIKSAAN PERCUBAAN SPM TAHUN 2010

CHEMISTRY

Tingkatan 5

Paper 1

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JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU
### DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO

1. Kertas soalan ini adalah dalam dwibahasa

2. Soalan di bahagian atas adalah dalam Bahasa Inggeris. Soalan di bawah dalam tulisan condong adalah dalam Bahasa Melayu yang sepadan.

3. Calon dikehendaki membaca maklumat di halaman 2 atau halaman 3.

Kertas soalan ini mengandungi 20 halaman bercetak

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For **Question 1** to **Question 50**, each question is followed by four options, A,B,C and D. Choose one correct answer for each question and blacken the corresponding space in your objective answer sheet.

*Bagi **soalan 1 hingga 50**, setiap soalan diikuti oleh empat pilihan jawapan iaitu **A,B,C dan D**. Pilih satu jawapan yang betul bagi setiap soalan dan hitamkan ruangan yang sepadan pada kertas jawapan objektif anda.*

1. Diagram 1 shows the particles arrangement for the change of state of matter.
    Rajah 1 menunjukkan susunan zarah untuk perubahan keadaan jirim.
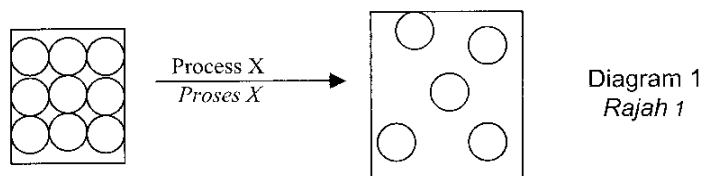
Diagram 1
Rajah 1

Which of the following is process X?
Antara berikut yang manakah proses X?

A. Evaporation
    Penyejatan

C. Condensation
    Kondensasi

B. Sublimation
    Pemejalwapan

D. Boiling
    Pendidihan

2   The Diagram 2 shows a model of an atom
    Rajah 2 menunjukkan satu model atom


Diagram 2
Rajah 2

Electron
Elektron

Nucleus
Nukleus
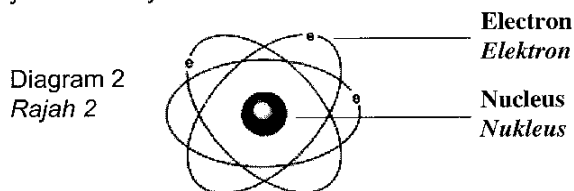
Who introduced this model?
Siapakah yang memperkenalkan model ini?

A. Neils Bohr
B. John Dalton

C. James Chadwick
D. Ernest Rutherford

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

A. Air
    Udara

C. Carbon
    Karbon

B. Steam
    Stim

D. Naphthalene
    Naftalena

4 Diagram 3 shows the set-up of apparatus to determine the empirical formula of magnesium oxide.
Rajah 3 menunjukkan radas untuk menentukan formula empirik bagi magnesium oksida.


Diagram 3
Rajah 3
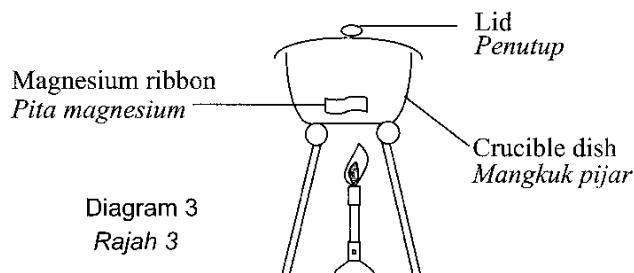
Which of the following statements is **true** for the lifting and closing of the lid quickly and occasionally during heating?

*Antara pernyataan berikut yang manakah **benar** bagi penutup diangkat dan ditutup dengan cepat sekali sekala semasa pemanasan?*

A. To avoid the pressure in the crucible dish
   Untuk mengelak tekanan dalam mangkuk pijar

B. To avoid the crucible dish from cracking
   Untuk mengelak mangkuk pijar dari retak

C. To avoid the white fumes from escaping
   Untuk mengelak wasap putih daripada terbebas keluar

D. To avoid water vapour from entering the crucible dish
   Untuk mengelak wap air daripada memasuki mangkuk pijar

5 Which of the following statements is true for one mole of a substance?
Antara pernyataan berikut, yang manakah benar bagi satu mol bahan?

A. 1 mol of copper contains 6.02×10^{23} molecules
   1 mol kuprum mengandungi 6.02×10^{23} molekul

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

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

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

6 Which of the following elements are in Group 18 in the Periodic Table of Elements?
Antara berikut, unsur yang manakah dalam Kumpulan 18 dalam Jadual Berkala Unsur?

A. Helium and krypton
Helium dan kripton

C. Oxygen and krypton
Oksigen dan kripton

B. Hydrogen and oxygen
Hidrogen dan oksigen

D. Helium, hydrogen and oxygen
Helium, hidrogen dan oksigen

7 Covalent bond between atoms M and Q is formed when
Ikatan kovalen antara atom M dan atom Q terbentuk apabila

A. atom M receives electron from atom Q
atom M menerima elektron dari atom Q

B. atom Q receives electron from atom M
atom Q menerima elektron dari atom M

C. atom M donates electron to atom Q
atom M menderma elektron kepada atom Q

D. atom M and atom Q mutually share valence electrons
atom M dan atom Q berkongsi bilangan elektron valens yang sama banyak

8 Which of the following is a property of ionic compound?
Antara berikut, yang manakah sifat bagi sebatian ionik?

A. Need a lot of energy to break the bonds in it.
Memerlukan tenaga yang banyak untuk memecahkan ikatan.

B. Able to conduct electricity in solid state.
Boleh mengkonduksikan elektrik dalam keadaan pepejal

C. Soluble in organic solvent.
Larut di dalam pelarut organik.

D. Solid ionic compound consists of scattered particles.
Sebatian ionik pepejal terdiri daripada zarah-zarah yang berselerak.

9 Diagram 4 shows the set-up of the apparatus for electrolysis.
Rajah 4 menunjukkan susunan radas bagi elektrolisis.

Diagram 4
Rajah 4
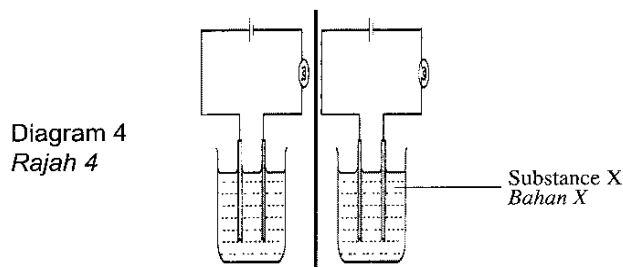
Substance X
Bahan X

Which of the following compounds could be used as substance X?
Antara berikut, yang manakah boleh digunakan sebagai bahan X?

A. Ethene, C_2H_4
  Etana, C_2H_4

B. Sodium chloride solution, NaCl
  Natrium klorida, NaCl

C. Chloromethane, CH_3Cl
  Klorometana, CH_3Cl

D. Ethyl ethanoate, $CH_3COOC_2H_5$
  Etil etanoat, $CH_3COOC_2H_5$

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Electrod Y
Elektrod Y

Iron electrode
Elektrod ferum

Diagram 5
Rajah 5

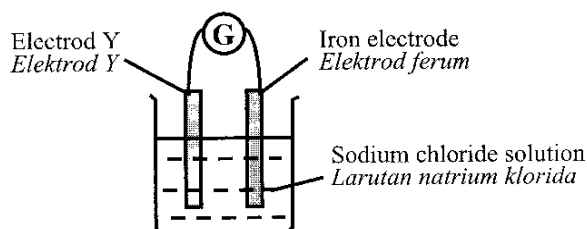Sodium chloride solution
Larutan natrium klorida

Diagram 5 shows a simple cell. Galvanometer will shows a reading when the switch is turned on. Which of the following metal will made iron the positive electrode when it is placed as electrode Y?

Rajah 5 menunjukkan sel ringkas. Galvanometer akan menunjukkan bacaan apabila suis dihidupkan. Antara logam berikut yang manakah akan menjadikan ferum elektrod positif apabila diletakkan sebagai elektrod Y?

A. Tin
  Stanum

B. Lead
  Plumbum

C. Silver
  Argentum

D. Magnesium
  Magnesium

11 Ascorbic acid is a weak acid because it
  Asid askorbik adalah asid lemah kerana asid ini

A. has a high melting point.
  Mempunyai takat lebur yang tinggi

B. is only partially ionized in water.
  Hanya mengion separa dalam air

C. contains few hydrogen atoms.
  Mengandungi sedikit atom-atom hydrogen

D. is only slightly soluble in water.
  Larut sedikit dalam air

12 Which of the following statements correctly describe a strong acid?
  Antara pernyataan berikut, yang manakah menerangkan tentang asid kuat dengan betul?

I. Has a high pH value
  Mempunyai nilai pH yang tinggi

II. Ionizes completely in water
  Mengion dengan lengkap dalam air

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

IV. Exists as molecules in water.
  Wujud sebagai molekul dalam air.

A. I and II
  I dan II

B. II and III
  II dan III

C. I and IV
  I dan IV

D. III and IV
  III dan IV

13 Which of the following is **true** about an alkali?
*Antara pernyataan berikut yang manakah **benar** tentang alkali?*

    A. An alkali is not corrosive
       Alkali tidak mengkakis

    B. An alkali is a base that is soluble in water
       Alkali adalah bes yang larut dalam air

    C. A strong alkali has a lower pH value
       Alkali kuat mempunyai pH yang rendah

    D. A weak alkali has a high degree of ionization
       Alkali lemah ialah alkali yang mempunyai kadar pengionan yang tinggi

14 Which of the following shows the arrangement of the atoms in brass?
Antara berikut yang manakah menunjukkan susunan atom dalam loyang?
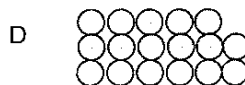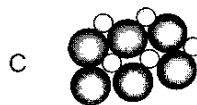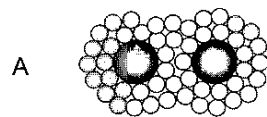
15 The body of an aeroplane is made of duralumin. What is the main metal in duralumin?
Badan kapal terbang dibuat daripada duralumin. Apakah logam utama dalam duralumin?

    A. Iron   B. Copper   C. Aluminium   D. Magnesium
        Ferum   *Kuprum*   *Aluminium*   *Magnesium*

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Diagram 6
Rajah 6
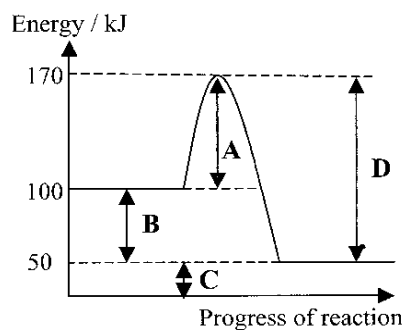
Diagram 6 shows the energy profile diagram for an exothermic reaction. Among
A, B, C and **D** , which represents the activation energy of the reaction?

Rajah 6 menunjukkan rajah profil tenaga untuk tindakbalas eksotermik. Di antara
A, B, C *dan* ***D****, yang manakah menunjukkan tenaga pengaktifan tindakbalas?*

17   The following equation shows the reaction between calcium carbonate , $CaCO_3$ and hydrochloric acid, HCl :
Persamaan berikut menunjukkan tindak balas antara kalsium karbonat, CaCO₃ dan asid hidroklorik, HCl :

$$CaCO_{3(aq)} + 2HCl_{(aq)} \rightarrow CaCl_{2(aq)} + CO_{2\,(g)} + H_2O_{(l)}$$

Which of the following is the suitable method to determine the rate of reaction?
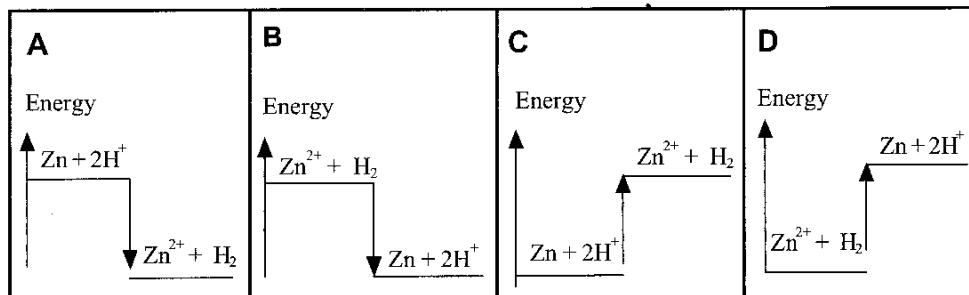*Antara berikut yang manakah kaedah yang sesuai untuk menentukan kadar tindak balas itu?*

    A.   Change in the temperature of the solution with time
          Perubahan dalam suhu bagi larutan dengan masa

    B.   Change in the volume of carbon dioxide gas with time
          Perubahan isi padu gas karbon dioksida dengan masa

    C.   Change in the mass of water with time
          Perubahan jisim air dengan masa

    D.   Change in the concentration of hydrochloric acid with time
          Perubahan kepekatan asid hidroklorik dengan masa

18   Which of the following is an endothermic process ?
Antara berikut yang manakah adalah proses endotermik?

    A.   The combustion of ethanol
          Pembakaran etanol

    B.   Reaction between sodium hydroxide solution and hydrochloric acid
          Tindak balas antara larutan natrium hidroxida dan asid hidroklorik

    C.   Displacement reaction between magnesium and copper(II) sulphate solution
          Tindak balas penyesaran antara magnesium dengan larutan kuprum(II) sulfat.

    D.   Dissolving solid ammonium sulphate in water
          Melarutkan pepejal ammonium sulfat dalam air

19   The reaction between zinc and hydrochloric acid is an exothermic reaction.Which of the following energy level diagrams represents the reaction?
Tindak balas di antara zink dan asid hidroklorik adalah tindak balas eksotermik. Gambar rajah aras tenaga yang manakah mewakili tindak balas tersebut?

A	B	C	D
Energy	Energy	Energy	Energy
$\uparrow$ $Zn + 2H^+$ $\downarrow$ $Zn^{2+} + H_2$	$\uparrow$ $Zn^{2+} + H_2$ $\downarrow$ $Zn + 2H^+$	$\uparrow$ $Zn^{2+} + H_2$ ... $Zn + 2H^+$	$\uparrow$ $Zn + 2H^+$ ... $Zn^{2+} + H_2$

20 Paracetamol is used for the following purposes **except**
   *Parasetamol digunakan untuk semua tujuan di bawah **kecuali***

    A. To reduce fever
   Untuk mengurangkan demam

    C. To reduce inflammation
   Untuk mengurangkan radang/ bengkak

    B. To relieve headaches
   Untuk melegakan sakit kepala

    D. To relieve flu symptoms
   Untuk melegakan simptom selsema

21 Diagram 7 shows the atomic symbol of element X.
   Rajah 7 menunjukkan simbol bagi atom unsur X.

$$^{9}_{4}X$$
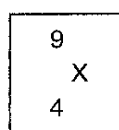
Diagram 7
Rajah 7

Which of the following is true about the sub-atomic particles of element X?
Antara berikut yang manakah benar mengenai zarah-zarah sub-atom bagi unsur X?

	Proton number **Nombor proton**	Nucleon number **Nombor nukleon**	Electron arrangement **Susunan elektron**
A	4	9	2.2
B	4	9	2.7
C	9	4	2.2
D	9	4	2.7

22 Table 1 shows the relative atomic mass of elements W and X.
   Jadual 1 menunjukkan jisim atom relatif bagi unsur W dan unsur X.

Element *Unsur*	Relative atomic mass *Jisim atom relatif*
W	48
X	16

Table 1
Jadual 1

Which of the following is **true** about the atoms of elements W and X?
*Antara berikut, yang manakah **benar** tentang atom bagi unsur W dan unsur X?*

    A The mass of one atom of X is 16 g
   Jisim satu atom X ialah 16g

    B The number of protons in atom W is 48
   Bilangan proton dalam atom W ialah 48

    C 3 moles of X have the same mass as 1 mole of W
   3 mol X mempunyai jisim yang sama dengan 1 mol W

    D The density of one atom of W is 3 times that of an atom of X
   Ketumpatan satu atom W adalah 3 kali ganda ketumpatan satu atom X

23   Metal X forms an oxide that has a formula of X_2O_3. If the formula of chloride ion is Cl^-, then the formula of the chloride compound of X is

Logam X membentuk oksida yang berformula X_2O_3. Jika formula ion klorida adalah Cl^-, formula bagi sebatian klorida X ialah

    A. XCl   B. XCl_2 C. XCl_3 D. X_2Cl_3

24   Table 24 shows the number of electrons of ion M^{3-}
Jadual 24 menunjukkan bilangan elektron bagi ion M^{3-}.

Particle *Zarah*	Number of electron *Bilangan elektron*
Ion M^{3-}	18

Table 2
Jadual 2

What is the position of the element M in the Periodic Table?
Apakah kedudukan unsur M dalam jadual berkala?

	Period *Kala*	Group *Kumpulan*
A	2	3
B	3	15
C	3	17
D	4	2

25   Diagram 8 shows the symbol of elements V, W, X, Y and Z. Which of the following elements belong to the same Group in the Periodic Table?

Rajah 8 menunjukkan simbol bagi elemen V, W, X Y dan Z. Yang manakah antara unsur berikut terletak di dalam Kumpulan yang sama di dalam Jadual Berkala?

$^{19}_{9}$V $^{2}_{3}$W $^{24}_{12}$X $^{27}_{13}$Y $^{40}_{20}$Z   Diagram 8
Rajah 8

    A. V and W   B. W and Y   C. X and Z   D. V and Y
        V dan W   *W dan Y*   *X dan Z*   *Vdan Y*

	Element *Unsur*	Electron arrangement *Susunan elektron*
	R	2.4
	S	2.8.2
	T	2.8.6
	U	2.8.8.1

Table 3
Jadual 3

26   The table 3 shows the electron arrangement of four elements R, S, T and U.
*Jadual 3 menunjukkan susunan elektron bagi empat unsur R, S, T dan U.*

Which of the elements will form a covalent bond with the chlorine atom?
Unsur yang manakah akan menghasilkan ikatan kovalen dengan atom klorin?

    A. R and T   B. R and S   C. T and U   D. S and U
        R dan T   *R dan S*   *T dan U*   *S dan U*

27   Diagram 9 shows the set-up of apparatus for electrolysis of iron (II) sulphate.
Rajah 9 menunjukkan radas bagi elektrolisis ferum (II) sulfat.

Diagram 9
Rajah 9

Carbon electrode X   Y carbon electrode

copper (II) sulphate
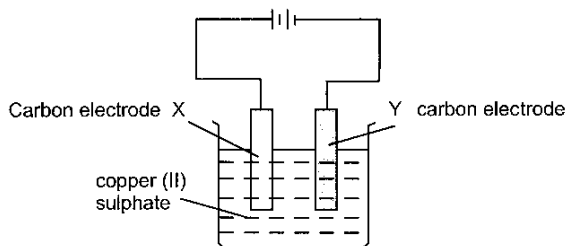
What is formed at carbon electrode Y ?
Apakah yang terbentuk elektrod karbon Y?

A. Oxygen
   Oksigen

C. hydrogen gas
   gas hidrogen

B. Sulphur dioxide
   Sulfur dioksida

D. Copper
   Kuprum

28   Which of the following solutions have the same number of hydrogen ions, H^+, as in 50 cm^3 of 0.1 mol dm^{-3} sulphuric acid, H2SO4?

Antara larutan berikut, yang manakah mempunyai bilangan ion hidrogen, H^+, sama seperti dalam 50 cm^3 0.1 mol dm^{-3} asid sulfurik, H2SO4?

I   100 cm^3 of 0.1 mol dm^{-3} hydrochloric acid, HCl
   100 cm^3 0.1 mol dm^{-3} asid hidroklorik, HCl

II   50 cm^3 of 0.2 mol dm^{-3} nitric acid, HNO_3
   50 cm^3 0.2 mol dm^{-3} asid nitrik, HNO_3

III 100 cm^3 of 0.1 mol dm^{-3} ethanoic acid, CH_3COOH
   100 cm^3 0.1 mol dm^{-3} asid etanoik, CH_3COOH

IV 50 cm^3 of 0.1 mol dm^{-3} phosphoric acid, H_3PO_4
   50 cm^3 0.1 mol dm^{-3} asid fosforic, H_3PO_4

A. I and II only
   I dan II sahaja

C. III and IV only
   III dan IV sahaja

B. I and III only
   I dan III sahaja

D. I, II and III only
   I, II dan III sahaja

29   Reaction between a soluble salt A and sodium iodide solution will produce an insoluble salt, lead(II) iodide

Tindak balas antara garam terlarutkan A dan larutan natrium iodida akan menghasilkan garam tak larut, plumbum (II) iodida.

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| A | + | Sodium iodide solution
Larutan natrium iodida | → | Lead(II) iodide
Plumbum(II) iodida |
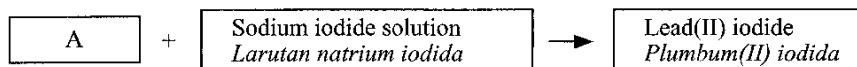
Which of the following substance is A?
Yang manakah antara berikut adalah A?

A Lead(II) nitrate
   Plumbum(II) nitrat

C Lead(II) carbonate
   Plumbum(II) karbonat

B Lead(II) chloride
   Plumbum(II) klorida

D Lead(II) sulphate
   Plumbum(II) sulfat

30 The equation represents the decomposition of hydrogen peroxide solution.
Persamaan di bawah mewakili penguraian larutan hidrogen peroksida

$$2H_2O_{2\ (aq)} \rightarrow 2H_2O_{(l)} + O_{2(g)}$$
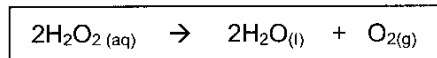
Which of the following can be used to determine the rate of this reaction?
Antara berikut yang manakah boleh digunakan untuk menentukan kadar tindak balas

I Release of gas per unit time
  Pembebasan gas per unit masa

II Change of colour intensity per unit time
  Perubahan keamatan warna per unit masa

III Formation of precipitate per unit time
   Pembentukan mendakan per unit masa

IV Increase in the mass of reactant per unit time
   Penambahan jisim bahan tindak balas per unit masa

A. I only
   I sahaja

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

B. III and IV only
   III dan IV sahaja

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

31. The following equation represents a reaction for industrial preparation of propanol.
Persamaan berikut mewakili tindak balas penyediaan etanol secara industri.

$$P + H_2O \xrightarrow{\text{Catalyst } X,\ 300^\circ C/60atm} CH_3\,CH_2\,CH_2\,OH$$
[*mangkin X, 300°C / 60 atm*]
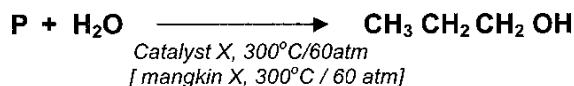
What is P and catalyst X?
Apakah P dan mangkin X?

	P	Catalyst X / *Mangkin X*
A	C_2H_4	Platinum / *platinum*
B	C_3H_6	Nickel / *nikel*
C	C_2H_4	Sulphuric acid / *Asid sulfurik*
D	C_3H_6	Phosphoric acid / *Asid fosforik*

32 Which of the following contain an element with oxidation number +6?
Antara sebatian berikut yang manakah mengandungi unsur dengan nombor pengoksidaan +6?

A. SO_2 B. $KMnO_4$ C. NO_2 D. $K_2Cr_2O_7$

33 Diagram 10 shows the energy level diagram for the reaction between silver ions and chloride ions.
Rajah 10 menunjukkan gambar rajah aras tenaga bagi tindak balas antara ion argentum dengan ion klorida.

Energy
Tenaga $Ag^+(aq) + Cl^-(aq)$

Diagram 10
Rajah 10

$\Delta H = -65.5 \text{ kJmol}^{-1}$

$AgCl(s)$
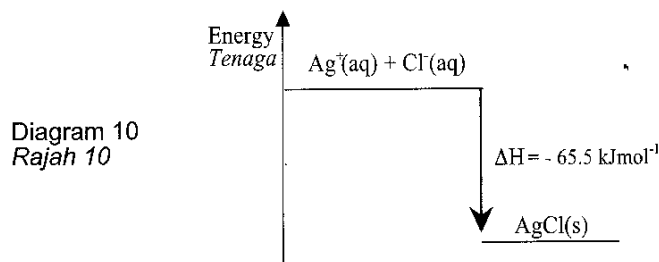
Which of the following statements is true about this reaction?
Yang manakah antara pernyataan berikut adalah benar mengenai tindak balas ini?

A. Endothermic reaction occurs
   Tidak balas endotermik berlaku

B. The energy content of the product is higher than the reactants
   Kandungan tenaga hasil tindak balas adalah lebih tinggi daripada bahan tindak balas

C. 65 kJ of heat is absorbed when 1 mol of silver chloride is formed
   65 kJ tenaga diserap apabila 1 mol argentum klorida terbentuk

D. The final temperature at the end of the reaction is higher than the initial temperature
   Suhu akhir tindak balas adalah lebih tinggi daripada suhu awal tindak balas

34 Diagram 11 shows the setup of apparatus for the determination of heat of reaction.
Rajah 11 menunjukkan susunan radas untuk menentukan haba tindak balas.

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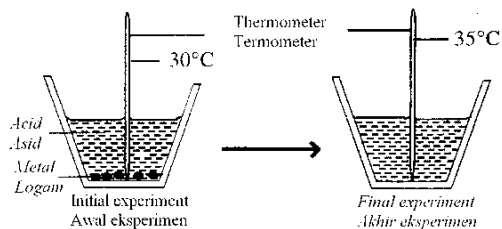
Diagram 11
Rajah 11

Based on diagram 11, which of the following statement is true?
Berdasarkan Rajah 11 pernyataan berikut yang manakah benar?

I Process of bond formation occurs.
Proses pembentukan ikatan berlaku

II The temperature increases during the reaction.
Suhu meningkat semasa tindak balas berlaku

III The value of ΔH for the reaction is positive.
Nilai ΔH dalam tindak balas ini adalah positif

IV The energy content of the products is lower than the energy content of the reactants.
Kandungan tenaga hasil tindak balas lebih rendah daripada kandungan tenaga bahan tindak balas

A I and II only
I dan II sahaja

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

B III and IV only
III dan IV sahaja

D I, II, III dan IV
I, II, III dan IV

35 Which of the following pairs of food additives and uses is **correct**?
*Antara pasangan bahan tambah makanan dan kegunaan berikut yang manakah **betul**?*

	Food Additive *Bahan Tambah Makanan*	Uses *Kegunaan*
A	Ascorbic acid *Asid askorbik*	Antioxidant *Antioksida*
B	Sodium benzoate *Natrium benzoate*	Flavour *Perisa*
C	Triphenyl compound *Sebatian trifenil*	Stabilizer *Penstabil*
D	Monosodium glutamate *Monosodium glutamat*	Preservative *Bahan pengawet*

36 Atom of oxygen-18 has 8 electrons. How many neutrons does an atom of oxygen 18 contains?
Atom oksigen-18 mempunyai 8 elektron. Berapakah bilangan neutron bagi atom oksigen-18?

A. 6　　　　B. 8　　　　C. 10　　　　D. 18

[Lihat halaman sebelah
SULIT

37   Copper (II) carbonate decomposed when heated strongly according to the chemical equation.
[Relative atomic mass: Cu, 64; O, 16; C, 12]

Kuprum(II)carbonat terurai apabila dipanaskan mengikut persamaan kimia berikut.
[Jisim atom relatif: Cu, 64; O, 16; C, 12]

$$CuCO_3 \longrightarrow CuO + CO_2$$
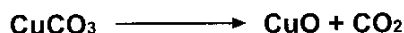
What is the mass of copper(II)oxide formed when 24.8g of copper(II) carbonate is burnt completely?
Apakah jisim kuprum(II)oksida yang terbentuk apabila 24.8 kuprum(II)karbonat terbakar selengkapnya?

A.   8.0 g   B.   16.0 g   C.   24.8 g   D.   160 g

38   1.3 g of zinc reacts with excess sulphuric acid. Calculate the volume of hydrogen gas formed at s.t.p. (RAM : Zn, 65, 1 mole of gas occupies a volume of 22.4 dm^3 at s.t.p.)

1.3g zink bertindakbalas dengan asid sulfurik berlebihan. Hitungkan isipadu gas hydrogen yang terbentuk pada s.t.p (JAR : Zn, 65, 1 mol gas menempati isipadu 22.4 dm^3 at s.t.p.)

A.   112 cm^3 C.   336 cm^3
B.   224 cm^3 D.   448 cm^3

39   An element Y has proton number 12. It has the tendency of forming cation Y^{2+}.
What is the electron arrangement of Y^{2+} ?

Elemen Y mempunyai nombor proton 12. Ia cenderung membentuk kation Y^{2+}.
Apakah susunan electron Y^{2+} ?

A.   2.8   C.   2.8.2
B.   2.2   D.   2.8.8.2

40   The following statements are about atom G and J.
Pernyataan berikut adalah mengenai atom G dan J.

- Electron arrangement of atom G is 1
  Susunan elektron atom G ialah 1
- Proton number of atom J is 6
  Nombor proton atom J ialah 6

What is the formula of the compound formed between G and J?
Apakah formula bagi sebatian yang terbentuk antara G dan J?

A   JG   B JG_2 C JG_3 D JG_4

41 Table 4 shows the electron arrangement of atoms of elements V, W, X, Y and Z.
Jadual 4 menunjukkan susunan elektron atom-atom unsur V, W, X, Y dan Z.

Element	Electron Arrangement
V	2.8
W	2.8.2
X	2.8.4
Y	2.8.7
Z	2.8.8.1

Table 4
Jadual 4

Which of the following pair of elements when combined will form a compound that conducts electricity in the molten state?

Manakah pasangan unsur berikut apabila berpadu akan membentuk satu sebatian yang boleh mengkonduksikan arus elektrik dalam keadaan lebur?

A   V and X
   V dan X

C   X and Y
   X dan Y

B   W and Z
   W dan Z

D   Y and Z
   Y dan Z

42 Diagram 7 shows the set up of the apparatus to study the electroplating of an iron spoon using electrolysis method.
Rajah 7 menunjukkan satu set radas untuk mengkaji penyaduran sudu besi menggunakan kaedah elektrolisis.

Diagram 12
Rajah 12

Iron spoon
Sudu besi

Silver
Argentum

Silver nitrat solution
Larutan Argentum nitrate
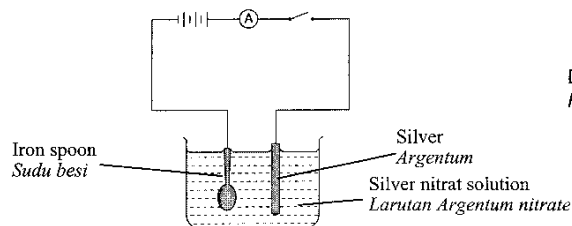
Which of the following half equations represent the reactions that occur at the anode and cathode?
Yang manakah antara berikut setengah persamaan yang mewakili tindak balas yang berlaku di katod dan di anod.

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

43 Table 5 shows the voltages and negative terminals of three cells.
Jadual 5 menunjukkan bacaan nilai voltan dan terminal negative bagi tiga sel.

Electrodes used	Voltage (V)	Negative terminal	
P and Q	2.5	Q	Table 5
Q and R	3.0	Q	*Jadual 5*
R and S	0.2	R	

Which of the following is the correct arrangement of the metals in the electrochemical series starting with the most electropositive electrode?

Yang manakah di antara berikut susunan logam yang betul mengikut siri elektrokimia bermula dengan elektrod yang lebih elektropositif.

A. P,Q,R,S
B. Q,P,R,S

C. R,S,Q,P
D. S,R,P,Q

44 Diagram 13 shows two volumetric flasks containing 2.0 $moldm^{-3}$ of hydrochloric acid and 0.2 mol dm^{-3} hydrochloric acid.

Rajah 13 menunjukkan dua kelalang isipadu yang mengandungi asid hidroklorik 2.0 mol dm^{-3} dan asid hidroklorik 0.2 mol dm^{-3}.

50 cm^3 hydrochloric acid
2.0 mol dm^{-3}
50 cm^3 asid hidroklorik 2.0 mol dm^{-3}

100 cm^3 hydrochloric acid
0.2 mol dm^{-3}
100 cm^3 asid hidroklorik 0.2 mol dm^{-3}
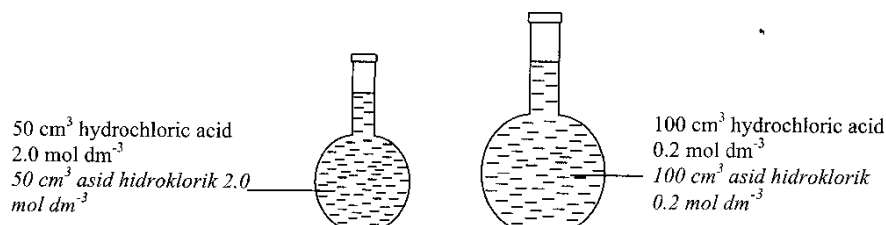
Diagram 13
Rajah 13

What is the volume of 2.0 mol dm^{-3} hydrochloric acid needed to prepare 100 cm^3 of 0.2 mol dm^{-3} hydrochloric acid?

Apakah isipadu asid hidroklorik 2.0 mol dm^{-3} yang diperlukan untuk menyediakan 100 cm^3 asid hidroklorik 0.2 mol dm^{-3}?

A   20.0 cm^3
B   10.0 cm^3

C   5.0 cm^3
D   1.0 cm^3

45 A series of test is carried out on solution Y and the results are shown in the Table 5 below:

Satu siri ujian dijalankan ke atas larutan Y dan keputusannya ditunjukkan dalam Jadual 5 di bawah:

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Test 1 Ujian 1	Addition of NaOH until excess. Penambahan NaOH sehingga berlebihan	White precipitate formed. Precipitate dissolve in excess NaOH Mendakan putih terbentuk. Mendakan larut dalam NaOH berlebihan
Test 2 Ujian 2	Addition of ammonia solution until excess. Penambahan larutan ammonia sehingga berlebihan	White precipitate formed. Precipitate dissolve in excess ammonia Mendakan putih terbentuk. Mendakan larut dalam ammonia berlebihan.
Test 3 Ujian 3	Addition of dilute nitric acid followed by barium nitrate solution. Penambahan larutan asid nitric diikuti dengan larutan barium nitrat.	White precipitate formed. Mendakan putih terbentuk.

Table 5
Jadual 5

The substance present in solution Y is
Bahan yang hadir dalam larutan Y adalah

A   Zinc sulphate
    Zink sulfat

C   Aluminium chloride
    Aluminium klorida

B   Lead(II)nitrate
    Plumbum(II)nitrat

D   Aluminium sulphate
    Aluminium sulfat

46   Diagram 14 shows curve W obtained from the decomposition of 20 cm^3 of 0.40 mol dm^{-3} hydrogen peroxide solution, H_2O_2, using 0.2 g of manganese (IV) oxide as catalyst at a temperature of 30 ^{0}C.

Rajah 14 menunjukkan lengkung W terbentuk daripada penguraian 20 cm^3 larutan hidrogen peroksida 0.40 mol dm^{-3}, di mangkinkan oleh mangan(IV) oksida pada suhu 30^{0}C.

Diagram 14
Rajah 14
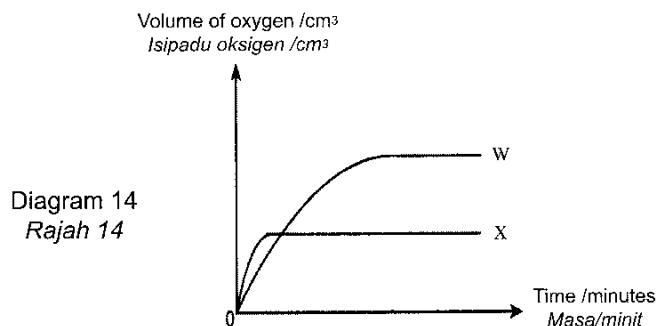
Which of the following experiments will produce curve X?
Antara eksperimen berikut yang manakah akan menghasilkan lengkung X?

	Volume of H_2O_2 /cm^3 Isipadu H_2O_2 /cm^3	Concentration of H_2O_2/ mol dm^{-3} Kepekatan H_2O_2 /mol dm^{-3}	Temperature /^{0}C Suhu / ^{0}C
A	10	0.60	30
B	15	0.20	30
C	20	0.60	40
D	30	0.30	40

47 Diagram 15 shows the process to produce compound J.
Rajah 15 menunjukkan proses menghasilkan sebatian J.

Propanol *Propanol* C_3H_7OH	+	Ethanoic acid *Asid etanoik* CH_3COOH

Compound J
Sebatian J
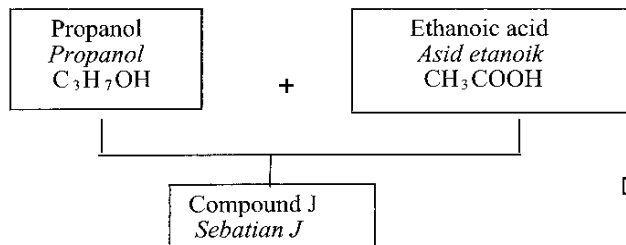
Diagram 15
Rajah 15

Which of the following structural formulas is of compound J?
Antara formula struktur yang manakah bagi sebatian J?

A
$$CH_3—\overset{\overset{O}{\|}}{C}—O—CH_2—CH_3$$

C
$$CH_3—CH_2—\overset{\overset{O}{\|}}{C}—O—CH_2—CH_3$$

B
$$CH_3—\overset{\overset{O}{\|}}{C}—O—CH_2—CH_2—CH_3$$

D
$$CH_3—CH_2—\overset{\overset{O}{\|}}{C}—O—CH_2—CH_2—CH_3$$
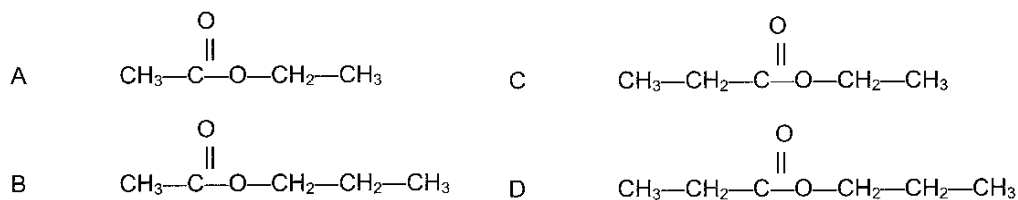
48 Table 6 below shows the percentage by mass of the elements in compound P.
Jadual 6 di bawah menunjukkan peratus mengikut jisim unsur - unsur dalam sebatian P.

Element *Unsur*	Mass(%) *Jisim(%)*
Carbon *Karbon*	521
Hydrogen *Hidrogen*	130
Oxygen *Oksigen*	349

Table 6
Jadual 6

The relative molecular mass of compound P is 46.
Compound P can be produced from the hydration of a named alkene.

Jisim molekul relatif bagi sebatian P ialah 46.
Sebatian P boleh diperoleh daripada penghidratan suatu alkena.

Which of the following may be the structural formula of compound P?
Di antara formula struktur berikut, yang manakah paling mungkin bagi sebatian P?

A
H H
H - C - C - H
O H
H

C
H H H
H - C - C - C - H
O H H
H

B
H H H
H - C - C - C - H
H H H

D
$$CH_3, - CH_2 - \overset{\overset{O}{\|}}{C} - O - CH,$$
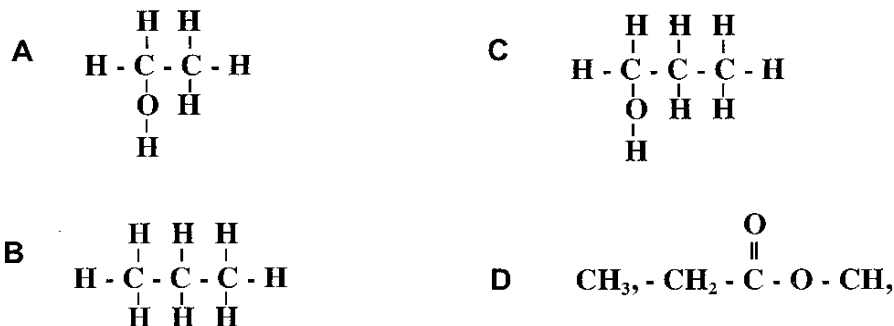
49 Diagram 16 shows a set up of the apparatus to study the transfer of electrons at a distance. Which of the following half equations show the correct reactions at rod P and rod Q?

Rajah 16 menunjukkan susunan radas untuk mengkaji pemindahan elektron pada satu jarak. Antara setengah persamaan berikut, yang manakah menunjukkan tindak balas yang betul di rod P dan rod Q?

Carbon electrode
Elektrod karbon
Bromine water
Air bromin
Potassium iodide solution
Larutan kalium iodida
Dilute sulphuric acid
Asid sulfurik cair
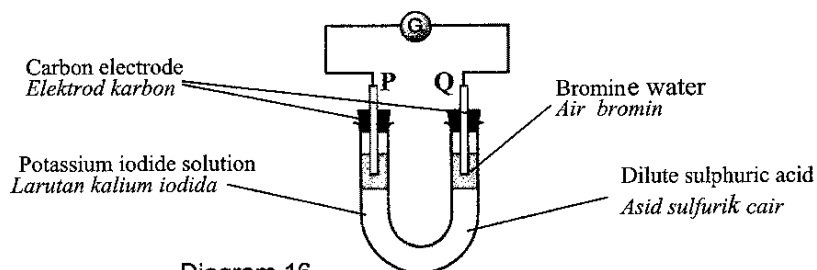
Diagram 16
Rajah 16

	P	Q
A	$2I^- \rightarrow I_2 + 2e$	$Br_2 + 2e \rightarrow 2Br^-$
B	$2I^- \rightarrow I_2 + 2e$	$2Br^- \rightarrow Br_2 + 2e$
C	$2Br^- \rightarrow Br_2 + 2e$	$2I^- \rightarrow I_2 + 2e$
D	$2Br^- \rightarrow Br_2 + 2e$	$I_2 + 2e \rightarrow 2I^-$

50 The equation below shows the heat of reaction between zinc and copper(II) sulphate solution.
Persamaan di bawah menunjukkan haba tindak balas antara zink dengan larutan kuprum(II) sulfat.

$Zn(s) + CuSO_4(aq) \longrightarrow ZnSO_4(aq) + Cu(s)$ $\triangle H = -210kJ\ mol^{-1}$

The initial temperature of the copper(II) sulphate solution is 30.0 ° C, what is the final temperature of the solution if excess powdered zinc is added into 50.0cm³ of copper(II) sulphate solution 0.5 mol dm⁻³?
[specific heat capacity of solution = 4.2 Jg⁻¹ °C⁻¹]

Suhu awal larutan kuprum(II) sulfat ialah 30.0°C, berapakah suhu akhir larutan jika serbuk zink berlebihan ditambahkan kepada 50.0cm³ larutan kuprum(II) sulfat 0.5 mol dm⁻³?
[haba muatan larutan =4.2 Jg⁻¹°C⁻¹]

A   12.5 °C   C   55.0 °C
B   25.0 °C   D   80.0 °C •

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

NAMA :	
KELAS :	

MAJLIS PENGETUA SEKOLAH MALAYSIA
NEGERI PAHANG

PEPERIKSAAN PERCUBAAN SPM TAHUN 2010

CHEMISTRY

Tingkatan 5

Paper 2

Dua Jam Tiga Puluh Minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU
DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO

1. Tuliskan **nama dan kelas** anda pada ruangan yang disediakan.

2. Kertas soalan ini adalah dalam dwibahasa.

3. Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.

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

5. Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.

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

Kertas soalan ini mengandungi 19 halaman bercetak dan 1 halaman tidak bercetak

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Section A
Bahagian A

[60 marks]
[60 markah]

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

1.   Diagram 1.1 shows the atomic model proposed by Neils Bohr
      Rajah 1.1 menunjukkan model atom yang dicadangkan oleh Neils Bohr.

Diagram 1.1
Rajah 1.1

i) Name X and Y
   Namakan X dan Y

   X :………………………………   Y : ………………………….   [1mark]
                                                                    [1 markah]

ii) Which subatomic particles are involved in a chemical reaction ?
   Zarah-zarah sub-atom yang manakah terlibat dalam tindak balas kimia?

   ……………………………………………………………………………………   [1 mark]
                                                                    [1 markah]

b) Table 1.1 shows the proton number and nucleon number for atom P, Q and R.
   Jadual 1.1 menunjukkan nombor proton bagi atom P, Q dan R.

Atom	Proton number	Nucleon number
P	16	32
Q	17	35
R	17	37

Table 1.1
Jadual 1.1

(i) What is meant by proton number?
   Apakah yang dimaksudkan dengan nombor proton?

   ……………………………………………………………………………………
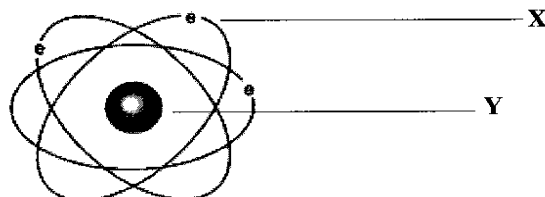
                                                                    [1 mark]
                                                                    [1 markah]

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(ii) What is the number of neutrons in atom Q ?
      Berapakah bilangan neutron dalam atom Q?

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

(iii) Write the electron arrangement for atom R
      Tuliskan susunan elektron bagi atom R.

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

(iv) Draw the electron arrangement of atom R.
      Lukiskan susunan electron bagi atom R.

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

(v)   State the number of valence electrons for atom R.
      Nyatakan bilangan electron valens bagi atom R

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

(c)   Table 1.2 shows the number of protons and neutrons of four different atoms.
      Jadual 1.2 menunjukkan bilangan proton dan neutron bagi empat atom yang berlainan

Atom	Number of protons *Bilangan proton*	Number of neutrons *Bilangan neutron*
A	16	17
B	16	16
C	3	4
D	19	20

(i)   Which atoms are isotopes?
      Atom-atom yang manakah adalah isotop?

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

(ii) Give a reason for your answer in (c) (i).
      Berikan satu sebab bagi jawapan anda di (c) (i).

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

Diagram 2.1
Rajah 2.1

Labels: Zinc carbonate / *Zink karbonat*; Heat / *Panaskan*; Limewater / *Air kapur*
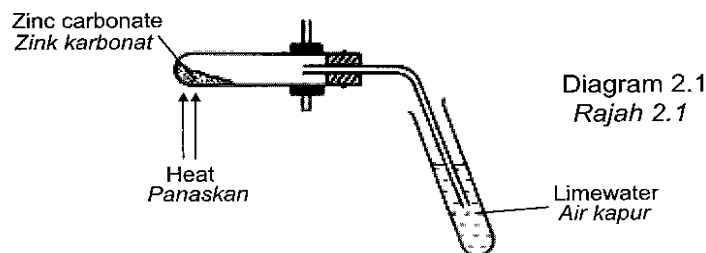
Diagram 2 shows set-up of the apparatus for an experiment when 4 g of zinc carbonate powder is heated strongly. Solid P which is yellow in colour when hot and white in colour when cooled and the colourless gas Q are produced.

Rajah 2.1menunjukkan susunan radas bagi suatu eksperimen apabila 4 g serbuk zink karbonat dipanaskan dengan kuat . Pepejal P yang berwarna kuning semasa panas dan putih semasa sejuk serta gas tanpa warna Q terhasil.

(a) (i) Name gas Q
Namakan gas Q

....

[1 mark]
[1 markah]

(ii) State the observation when gas Q passed through the limewater.
Nyatakan permerhatian apabila gas Q dilalukan ke atas air kapur.

....

[1 mark]
[1 markah]

(b) (i) Name solid P
Namakan pepejal P.

....

[1 mark]
[1 markah]

(c) Write the chemical equation for the reaction in the experiment above.
Tuliskan persamaan kimia bagi tindakbalas yang berlaku dalam eksperimen di atas.

....

[1 mark]
[1 markah]

(d) Calculate :
Kirakan:

(i) the number of moles of zinc carbonates used.
[Relative formula mass of zinc carbonate = 125]
Bilangan mol zink karbonat yang digunakan.
[Jisim formula relative bagi zink karbonat = 125]

[1 mark]
[1 markah]

(ii) the volume of carbon dioxide gas obtained at room condition.
[1 mole of gas occupied 24 dm³ at room condition]

Isipadu gas karbon dioksida yang terhasil pada keadaan bilik
[1 mol gas menempati ruang 24 dm³ pada keadaan bilik.

[2 marks]
[2 markah]

(iii) the number of molecules in carbon dioxide gas.
[Avogadro's Constant = 6.02 x 10²³ mol⁻¹]

Bilangan molekul di dalam gas karbon dioksida
[Pemalar Avogadro = 6 .02 x 10²³ mol⁻¹]

[1 mark]
[1 markah]

3

		P											T				
Q														U		V	
R						S											W

Diagram 3.1
Rajah 3.1

Using the symbols P,Q, R, S, T, U, V and W , answer the following questions.
Dengan menggunakan simbol P, Q, R, S, T, U, V dan W, jawab soalan-soalan berikut.

(a) State the element which is classify under Group 2.
Nyatakan unsur yang dikelaskan di bawah kumpulan 2

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

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(b) Which of the elements has the biggest atomic radius?
Unsur yang manakah mempunyai jejari atom yang paling besar?

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

(c) (i) Compare the electronegativity of elements Q, U and V ?
Bandingkan keelektronegatifan bagi unsur Q, U dan V ?

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

(ii) Explain your answer in (c) (i).

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

(c) Compare the reactivity of Q and R towards oxygen .
Bandingkan kereaktifan di antara Q dan R terhadap oksigen.

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

(d) Why is W chemically unreactive?
Kenapa W tidak reaktif secara kimia ?

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

(e) Element T reacted with U to form a compound.
Unsur T bertindak balas dengan Q menghasilkan satu sebatian

(i) Write the formula of compound formed
Tuliskan formula sebatian yang terbentuk

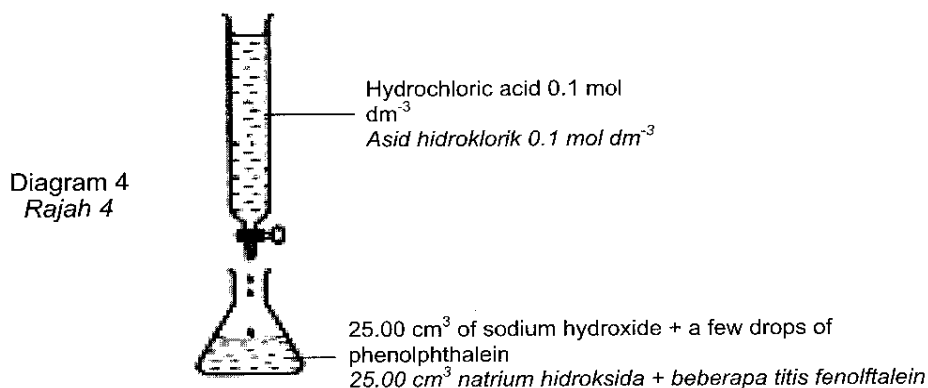.. [1 mark]
[1 markah]

(ii) Draw the electron arrangement for the compound formed.
Lukiskan susunan electron bagi sebatian yang terbentuk.

[2 marks]
[2 markah]

4   Diagram 4 shows the set-up of the apparatus for the neutralization reaction between a strong acid, hydrochloric acid and a strong alkali, sodium hydroxide. Phenolphthalein is used as an indicator. In a titration, 20.00 cm^3 of 0.1 mol dm^{-3} hydrochloric acid is required to neutralise 25.00 cm^3 of sodium hydroxide solution.

Rajah 4 menunjukkan susunan radas yang digunakan bagi tindak balas peneutralan antara asid kuat, asid hidroklorik dan alkali kuat, natrium hidroksida. Fenolftalein digunakan sebagai penunjuk. Dalam satu pentitratan, 20.00 cm^3 asid hidroklorik 0.1 mol dm^{-3} diperlukan untuk meneutralkan 25.00 cm^3 larutan natrium hidroksida.

Diagram 4
Rajah 4

Hydrochloric acid 0.1 mol dm^{-3}
Asid hidroklorik 0.1 mol dm^{-3}

25.00 cm^3 of sodium hydroxide + a few drops of phenolphthalein
25.00 cm^3 natrium hidroksida + beberapa titis fenolftalein

(a) Hydrochloric acid is a strong acid. What is meant by strong acid?
     Asid hidroklorik adalah asid kuat. Apakah yang dimaksudkan dengan asid kuat?

     ....

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

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

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

     (ii) Calculate the number of mole of hydrochloric acid used in this experiment.
           Hitung bilangan mol asid hidroklorik yang digunakan dalam eksperimen ini.

   [2 marks]
                                                                                                    [2 markah]

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(iii) Calculate the molarity of sodium hydroxide solution.
Hitung kemolaran larutan natrium hidroksida.

[3 marks]
[3 markah]

c) State the colour changes of sodium hydroxide solution when the end point is reached.
Nyatakan perubahan warna natrium hidroksida apabila takat akhir dicapai.

....

[1 mark]
[1 markah]

5. Diagram 5 shows a series of reactions of a carbon compound.
Rajah 5 menunjukkan beberapa siri tindak balas sebatian karbon.
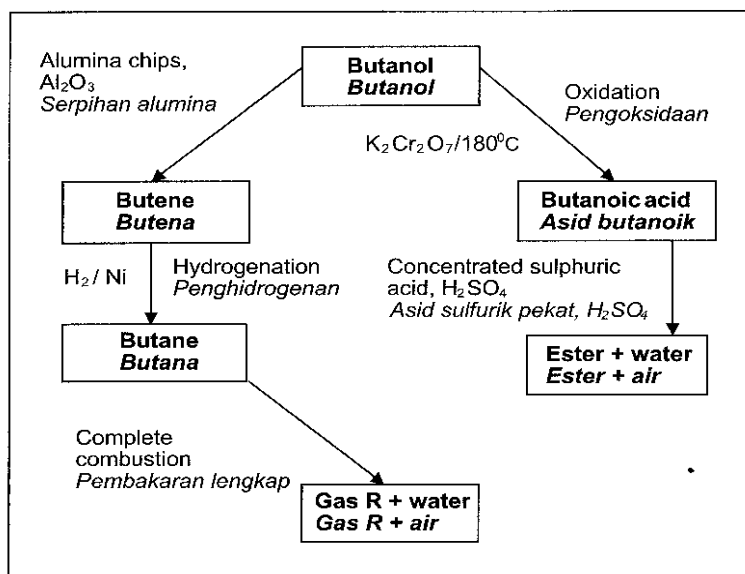
Diagram 5
Rajah 5

(a) (i) Write the molecular formula of butanol.
Tuliskan formula molekul bagi butanol.

....

[1 mark]
[1 markah]

(ii) Draw the structural formulae of **two** isomers of butanol.
*Lukiskan formula struktur bagi **dua** isomer butanol.*

[2 marks]
[2 markah]

(iii) Name the ester that produced when ethanol is reacted with butanoic acid.
Namakan ester yang terhasil apabila etanol ditindak balaskan dengan asid butanoik.

....

[1 mark]
[1 markah]

(b) Butane undergoes a complete combustion in the presence of oxygen to produce gas R and water.
Butana menjalani pembakaran lengkap dengan kehadiran oksigen untuk menghasilkan gas R dan air.

(i) Name the gas R produced.
Namakan gas R yang terhasil.

....

[1 mark]
[1 markah]

(ii) Write a balanced chemical equation for the combustion of butane.
Tuliskan persamaan kimia yang seimbang bagi pembakaran butana.

....

[2 marks]
[2 markah]

(c) Butene can be obtained from the reaction of butanol through dehydration process.
Draw a labeled diagram of the set up of the apparatus for the experiment.
Butena boleh didapati daripada tindak balas butanol melalui proses pendehidratan.
Lukis gambar rajah berlabel susunan radas untuk eksperimen ini.

[2 marks]
[2 markah]

Table 5 shows the results of a test to differentiate between butane and butene.
Jadual 5 menunjukkan keputusan ujian untuk membandingkan antara butana dan butena.

Procedure *Prosedur*	Observation *Pemerhatian*
Bromine water is added to butene. *Air bromin ditambahkan kepada butena.*	Brown colour of bromine water is decolourised. *Warna perang air bromin dinyahwarnakan.*
Bromine water is added to butane. *Air bromin ditambahkan kepada butana.*	Brown colour of bromine water remains. *Warna perang air bromine kekal.*

Table 5
Jadual 5

(d) Based on Table 5 above, explain why there is a difference in these observations.
Berdasarkan Jadual 5, terangkan mengapa terdapat perbezaan dalam pemerhatian ini.

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

[2 marks]
[2 markah]

6. Figure 6 shows the set-up of the apparatus to study the transfer of electrons at a distance. Electrode X is dipped in bromine water and electrode Y in iron(II) sulphate solution.

Rajah 6 menunjukkan susunan radas untuk mengkaji pemindahan elektron pada suatu jarak. Elektrod X direndamkan ke dalam air bromin dan elektrod Y ke dalam larutan ferum(II) sulfat.

Electrode X
Elektrod X

Bromine water
Air bromin

Electrode Y
Elektrod Y

Iron(II) sulphate solution

Sulphuric acid

Figure 6
Rajah 6
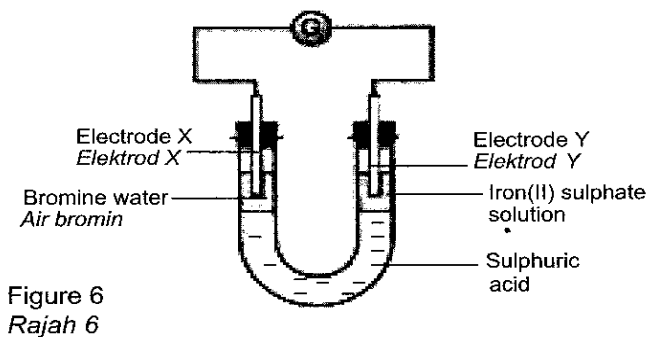
(a) What is the function of sulphuric acid?
Apakah fungsi asid sulfurik?

....

[1 mark]
[1 markah]

[Lihat halaman sebelah

(b) Describe the observation at
Nyatakan pemerhatian yang berlaku di

    (i) Electrode X
        Elektrod X

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

    (ii) Electrode Y
        Elektrod Y

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

(c) (i) Write down the half equation at for the reaction at electrode X.
       Tuliskan persamaan setengah bagi tindak balas di elektrod X.

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

    (ii) State the change of oxidation number for bromine in this reaction.
       Nyatakan perubahan nombor pengoksidaan bagi bromin dalam tindak balas ini.

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

    (iii) Determine the type of reaction that occur at electrode X.
       Nyatakan jenis tindak balas yang berlaku di elektrod X.

       ....
                                  [1 mark]

(d) (i) Write down the half equation at for the reaction at electrode Y.
       Tuliskan persamaan setengah bagi tindak balas di elektrod Y.

       ....
                                  [1 mark]

    (ii) Name **one** chemical that can be used to substitute iron(II) sulphate solution for the above experiment.

       *Namakan **satu** bahan kimia yang boleh digunakan untuk menggantikan larutan ferum(II) sulfat dalam eksperimen di atas.*

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

(e) Write the overall equation for the reaction.
Tuliskan persamaan keseluruhan bagi tindak balas.

....

[1 mark]
[1 markah]

(f) Indicate the direction of electron flow using arrow at Figure 6.
Tentukan arah pergerakan elektron dengan menggunakan anak panah pada Rajah 6.

[1 mark]
[1 markah]

(g) Name the oxidizing agent in this experiment.
Namakan agen pengoksidaan dalam eksperimen.

....

[1 mark]
[1 markah]

Section B
Bahagian B

[20 marks]
[20 markah]

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

7   (a) Diagram 7 shows the set –up of the apparatus used to compare the electrical
conductivity of solutions A and B.
*Rajah 7 menunjukkan susunan radas yang digunakan untuk membandingkan
kekonduksian elektrik larutan A dan B.*

Diagram 7.1
Rajah 7.1
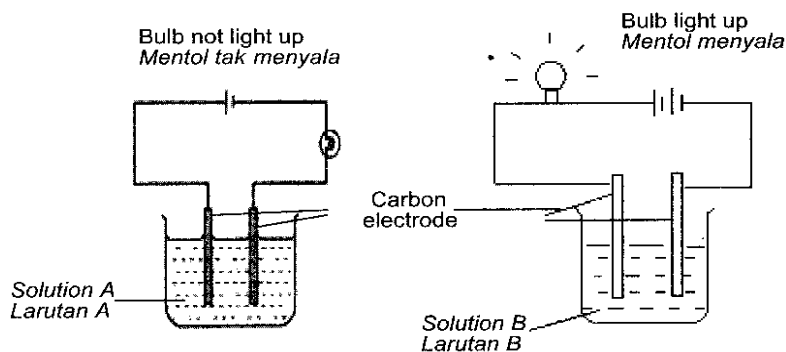
Based on the observations in Diagram 7,
Berdasarkan pemerhatian dalam Rajah 7,

(i) Identify the type of compound of solution A and B.
Kenal pasti jenis sebatian bagi larutan A dan B.

[2 marks]
[2 markah]

(ii) Explain why there is a difference in the observations.
Terangkan mengapa terdapat perbezaan dalam pemerhatian itu.

[4 marks]
[4 markah]

b) Diagram 7.2 shows the set-up of apparatus for two types of cell.
Rajah 7.2 menunjukkan susunan radas untuk dua jenis sel.

Cell J
Sel J

Cell K
Sel K
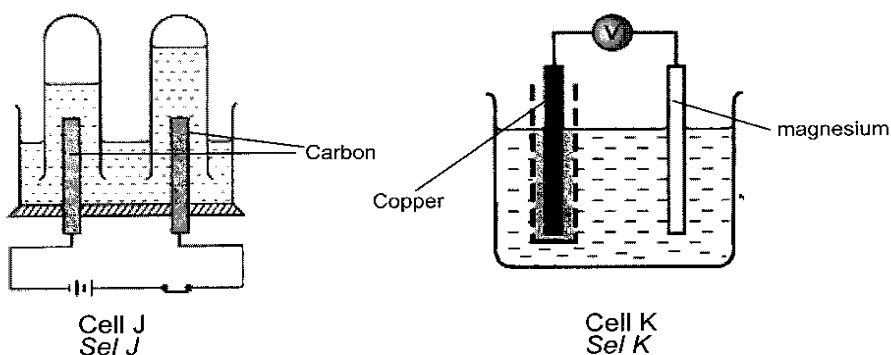
(i) Compare the observation and product formed at the anode for both cells.
Bandingkan pemerhatian dan hasil yang terbentuk di anod bagi ke dua-dua sel.

[4 marks]
[4 markah]

(ii) Write the half equation at the anode for both cells.
Tuliskan persamaan setengah di anod bagi ke dua-dua sel.

[2 marks]
[2 markah]

c) In other experiment, you are given carbon electrodes, potassium iodide solution, acidified potassium manganat (VII) solution and dilute sulphuric acid.
Draw a labelled diagram to show the set up of apparatus.

Dalam eksperimen lain, anda dibekalkan dengan dua karbon elektrod, larutan kalium iodida, larutan kalium manganat (VII) berasid dan asid sulfurik cair.
Lukiskan satu gambarajah berlabel untuk menunjukkan susunan radas tersebut.

[2 marks]
[2 markah]

d) Referring to the diagram in (c),
Merujuk kepada rajah di (c),

    (i)   state the observations that takes place at both electrodes.
         Nyatakan pemerhatian yang berlaku pada kedua-dua elektrod.

    (ii)   write the half equation for the reaction at anode and cathode.
         Tuliskan persamaan setengah bagi tindakbalas yang berlaku di anod dan katod.

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

    (iv) Name a substance that can replace dilute sulphuric acid.
         Namakan satu bahan yang boleh menggantikan asid sulfurik cair.

                                                                [6 marks]
                                                               [6 markah]

8.   Diagram 8 shows the label of soft drink.
     Rajah 8 menunjukkan label satu minuman ringan.

Diagram 8
Rajah 8

INGREDIENT:
Ramuan:

Carbonated water, ascorbic acid, aspartame, octyl ethanoate, and tartazine

Air berkarbonat, asid askorbik, aspartame, oktil etanoat dan tartazin

Expiry date : 20 Jan 2011
Tarikh luput : 20 Jan 2011
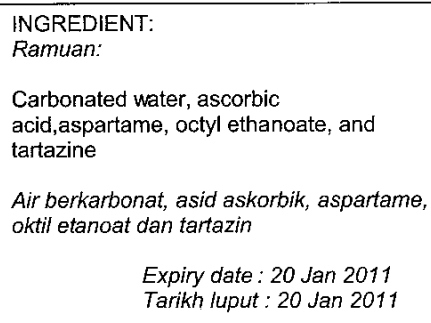
    (a)   Based on the ingredient used, classify the type of food additives that contained in this soft drink.
         Berdasarkan ramuan yang digunakan , kelaskan jenis bahan tambah yang terkandung dalam minuman ringan ini.

                                                                    [4 marks]
                                                                [4 markah]

    (b) (i)   Patients B suffered from tuberculosis that caused by certain bacteria. What types of medicine that can be used to treat patient B?
              Pesakit B menghidao batuk kering yang disebabkabn oleh bakteria tertentu. Apakah jenis ubat yang boleh digunakan untuk merawat pesakit B?

        (ii)   Explain why patient that takes penicilin must complete the whole course of the medicine prescribes to him even if he feels better.
              Jelaskan mengapa pesakit yang mengambil penicillin mesti menghabiskan kesemua ubat yang disyorkan walaupun beliau telah sihat.

                                                                     [5 marks]

$$CH_3 \quad CH_2 \quad CH_2 \quad CH_2 \quad CH_2 \quad CH_2 \quad CH_2 \quad CH_2$$

$$CH_2 \quad CH_2 \quad CH_2 \quad CH_2 \quad CH_2 \quad CH_2 \quad CH_2 \qquad COO^-Na^+$$

Part X
Bahagian X

Part Y
Bahagian Y
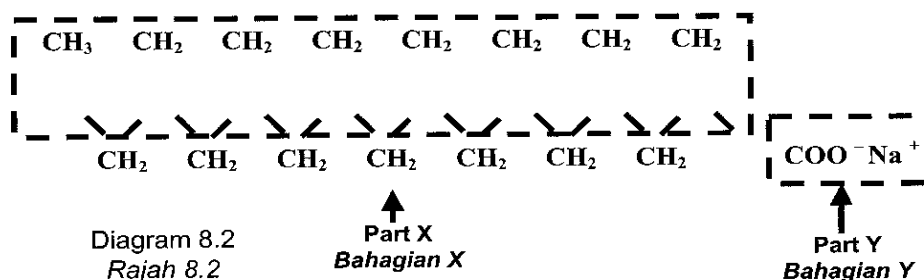
Diagram 8.2
Rajah 8.2

(c) Name part X and part Y. State the solubility of each parts in water and grease.
Namakan bahagian X dan bahagian Y. Nyatakan keterlarutan setiap bahagian di dalam air dan gris.

[4 marks]
[4 markah]

(d) Diagram 8.3 shows a set-up of apparatus when a student carried out two experiments to investigate the cleansing effect of soap and detergent on oily stained cloth in hard water.
Rajah 8.3 menunjukkan susunan radas apabila seorang pelajar menjalankan dua eksperimen untuk mengkaji kesan pembersihan bahan pencuci oleh sabun dan detergen ke atas kotoran berminyak dalam air liat.
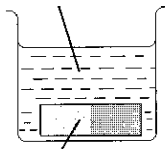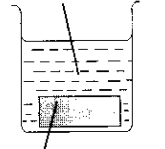
	Experiment *Eksperimen*	
	Experiment I: *Eksperimen I:*	Experiment II: *Eksperimen II:*
Arrangement of apparatus *Susunan radas*	Soap + hard water *Sabun + air liat* Cloth with oily stain *Kain kotor yang berminyak*	Detergent + hard water *Sabun + air liat* Cloth with oily stain *Kain kotor yang berminyak*
Observation *Pemerhatian*	Oily stain remained *Kotoran berminyak kekal*	Oily stain disappeared *Kotoran berminyak hilang*

Diagram 8.3
Rajah 8.3

Compare the cleansing effect between Experiment I and Experiment II.
Explain why there are differences in the observations. State the substance which is more suitable as a cleansing agent to remove stain in hard water.
Bandingkan kesan pembersihan antara Eksperimen I dan Eksperimen II.
Terangkan mengapa terdapat perbezaan dalam pemerhatian tersebut.
Nyatakan bahan yang lebih sesuai sebagai bahan pencuci kotoran berminyak dalam air liat.

[7 marks]
[7 markah]

[Lihat halaman sebelah
SULIT

9. A student carried out three experiments to investigate the effects of the factors influencing the rate of reaction. Table 9 shows the results of the experiment.

Seorang pelajar telah menjalankan tiga eksperimen untuk menyiasat kesan faktor-faktor yang mempengaruhi kadar tindak balas. Jadual 9 menunjukkan keputusan-keputusan eksperimen tersebut.

Experiment *Eksperimen*	Reactants *Bahan Tindak Balas*	Total volume of gas collected in two minutes, cm^3. *Jumlah isipadu gas yang terkumpul dalam dua minit, cm^3.*
I	0.2 g of marble chips, calcium carbonate, $CaCO_3$ and $25cm^3$ of sulphuric acid, H_2SO_4, 0.3 mol dm^{-3} in 60°C	30.00
II	0.2 g of marble chips, calcium carbonate, $CaCO_3$ and $25cm^3$ of sulphuric acid, H_2SO_4, 1 mol dm^{-3} in 60°C	45.00
III	0.2 g of marble chips, calcium carbonate, $CaCO_3$ and $25cm^3$ of sulphuric acid, H_2SO_4, 0.3 mol dm^{-3} in 40°C	`15.00

Table 9
Jadual 9

a) State the meaning of the rate of reaction.
Nyatakan maksud kadar tindak balas.

[1 mark]
[1 markah]

b) Calculate the average rate of reaction for :

(i) Experiment I
(ii) Experiment II
(iii) Experiment III
(In cm^3s^{-1})

Hitungkan kadar tindak balas purata bagi:

(i) Eksperimen I
(ii) Eksperimen II
(iii) Eksperimen III
(dalam cm^3s^{-1})

[3 marks]
[3 markah]

c) (i) Write a balance chemical equation for the reaction of calcium carbonate with sulphuric acid.
Tuliskan persamaan kimia yang seimbang bagi tindakbalas antara kalsium karbonat dengan asid sulfurik.

[2 marks]
[2 markah]

(ii) Calculate the maximum volume of gas produced at S.T.P
Hitungkan isipadu gas maksimum yang terhasil pada S.T.P.

[Relative atomic mass : Ca, 40 ; C, 12 ; O,16 ;
Molar volume : 22.4 dm^3 mol^{-1} at S.T.P]

*[Jisim atom relative : Ca, 40 ; C, 12 ; O,16 ;
Isipadu Molar : 22.4 dm^3 mol^{-1} pada S.T.P]*

[4 marks]
[4 markah]

c) With the reference to the collision theory, compare the rates of reaction between:
Dengan merujuk kepada teori perlanggaran, bandingkan kadar tindakbalas di antara:

(i) Experiment I and Experiment II
Eksperimen I and Eksperimen II

[5 marks]
[5 markah]

(ii) Experiment I and Experiment III
Eksperimen I and Eksperimen III

[5 marks]
[5 markah]

10. Two solutions are used to prepare carbonate salt. Diagram 10 shows the reaction scheme in preparing Copper (II) Carbonate.
Dua larutan digunakan untuk menyediakan garam karbonat. Rajah 10 menunjukkan skema tindakbalas dalam penyediaan Kuprum (II) Karbonat.
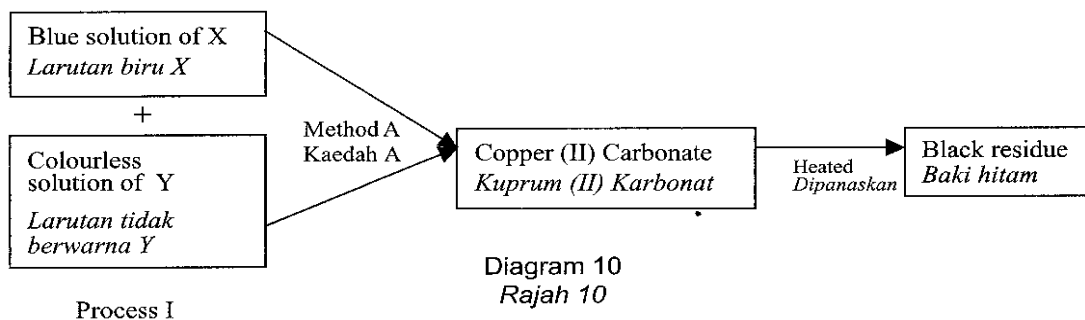
Diagram 10
Rajah 10

In process I, solution of X and Y are mixed and green precipitate is formed.
Dalam proses I, larutan X dan Y dicampurkan dan mendakan hijau terbentuk.

[Lihat halaman sebelah

a) (i) Name the blue solution X and colourless solution Y in diagram 10.
Namakan larutan biru X dan larutan tidak berwarna Y dalam rajah 10.

[2 marks]
[2 markah]

(ii) Name the Method A.
Namakan Kaedah A.

[1 mark]
[1 markah]

(iii) Write the balanced chemical equation for the reaction in process I.
Tuliskan persamaan kimia seimbang bagi tindakbalas dalam proses I.

[2 marks]
[2 markah]

(iv) State a confirmatory test to verify the cathion present in the solution of X.
Nyatakan ujian pengesahan untuk mengenalpasti kation yang hadir di dalam larutan X.

[2 marks]
[2 markah]

b) (i) Name the black residue.
Namakan baki hitam itu.

[1 mark]
[1 markah]

(ii) Describe how you would prepare Copper (II) Carbonate through Method A by using a suitable salt solution.
Your answer should consist of the following:

Huraikan bagaimana anda menyediakan Kuprum (II) Karbonat melalui kaedah A dengan menggunakan larutan garam yang sesuai.
Jawapan anda hendaklah mengandungi perkara berikut:

- List of material and apparatus
  Senarai bahan dan alat radas

- Procedures of the experiment
  Prosedur eksperimen

[10 marks]
[10 markah]

c) Calculate the mass of the silver salt precipitated if 50 cm^3 of 1.0 mol dm^{-3} silver nitrate, $AgNO_3$ solution react completely with magnesium chloride, $MgCl_2$ solution.
[Relative atomic mass: Ag, 108; Cl, 35.5]

Hitungkan jisim mendakan garam argentum yang terbentuk jika 50 cm^3 of 1.0 moldm^{-3} larutan argentum nitrat, $AgNO_3$ bertindakbalas lengkap dengan larutan magnesium klorida, $MgCl_2$.
[Jisim atom relatif: Ag, 108; Cl, 35.5]

[2 marks]
[2 markah]

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SULIT

SULIT	NAMA :	
4541/3		
CHEMISTRY	KELAS :	
Paper 3		

September 2010

1 ¹/₂ JAM

NO KAD PENGENALAN
							.				

MAJLIS PENGETUA SEKOLAH MALAYSIA
NEGERI PAHANG

PEPERIKSAAN PERCUBAAN SPM TAHUN 2010

CHEMISTRY

Tingkatan 5

Paper 3

Satu Jam Tiga Puluh Minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU
DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO

1. Tuliskan **nombor kad pengenalan, angka giliran, nama dan kelas** anda pada ruangan yang disediakan.

2. Kertas soalan ini adalah dalam dwibahasa.

3. Soalan di bahagian atas adalah dalam Bahasa Inggeris. Soalan di dalam tulisan condong adalah dalam Bahasa Melayu yang sepadan.

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

5. Calon dikehendaki membaca maklumat di halaman 2.

Kod Pemeriksa		
Soalan	Markah Penuh	Markah Diperoleh
1	33	
2	17	
JUMLAH		

Kertas soalan ini mengandungi 8 halaman bercetak

[Lihat halaman sebelah
SULIT

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MAKLUMAT UNTUK CALON

1. Jawab **semua** soalan.
2. Jawapan kepada **Soalan 1** hendaklah ditulis dalam ruangan yang disediakan dalam kertas soalan.
3. Jawapan kepada **Soalan 2** hendaklah ditulis pada helaian tambahan. Anda boleh menggunakan persamaan, gambar rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda.
4. Tunjukkan kerja mengira, ini membantu anda mendapatkan markah.
5. Sekiranya anda hendak membatalkan sesuatu jawapan, buat garisan di atas jawapan itu.
6. Rajah yang mengiringi tidak dilukiskan mengikut skala kecuali dinyatakan.
7. Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan di dalam kurungan.
8. Masa yang dicadangkan menjawab Soalan 1 ialah 45 minit dan Soalan 2 ialah 45 minit.
9. Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.
10. Kertas soalan ini hendaklah diserahkan di akhir peperiksaan.

Pemberian markah:

Markah	Penerangan
3	**Cemerlang** : Respons yang paling baik
2	**Memuaskan**: Respons yang sederhana
1	**Lemah**: Respons yang kurang tepat
0	Tiada respons <u>atau</u> respons salah

INFORMATION FOR CANDIDATES

1. Answer **all** questions.
2. Write your answer for **Question 1** in the spaces provided in the question paper.
3. Write your answers for **Question 2** on the extra sheet. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answer.
4. Show your working, it may help you to get marks.
5. If you wish to cancel any answer, neatly cross out the answer.
6. The diagrams in the questions provided are not drawn to scale unless stated.
7. Marks allocated for each question or part question are shown in brackets.
8. The time suggested to answer Question 1 is 45 minutes and Question 2 is 45 minutes.
9. You may use a non-programmable scientific calculator.
10. This question paper must be handed in at the end of the examination.

Marks awarded:

Mark	Description
3	**Excellent:** The best response provided
2	**Satisfactory:** An average response provided
1	**Weak:** An inaccurate response provided
0	No response <u>or</u> wrong response provided

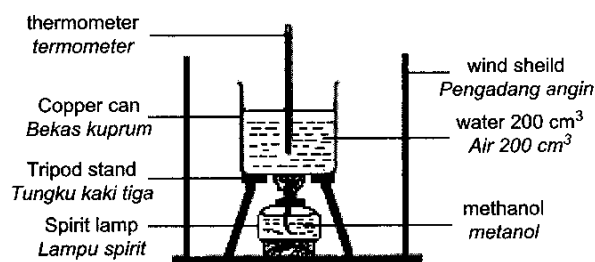| 1 | Diagram 1.1 shows the apparatus set-up for experiment to determine the heat of combustion of alcohol. *Rajah 1.1 menunjukkan susunan radas eksperimen menentukan haba pembakaran alkohol.* | For Examiner's use |

Diagram 1.1
Rajah 1.1

Diagram 1.2 shows the reading of the mass of methanol and spirit lamp before combustion. When the temperature of water increase by 30°C, the flame of the lamp is put off. Diagram 1.3 shows the mass of methanol and spirit lamp after the combustion.
Rajah 1.2 meninjukkan jisim pelita dan methanol sebelum pembakaran. Apabila suhu air meningkat sehingga 30°C, pelita dipadamkan. Rajah 1.3 menunjukkan jisim pelita dan metanol selepas pembakaran.

Lamp + methanol
Pelita + metanol

196.0023   194.3901
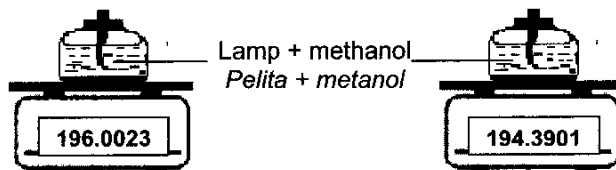
Diagram 1.2   Diagram 1.3
Rajah 1.2   *Rajah 1.3*

Initial reading before combustion   Final reading after combustion
Bacaan awal sebelum   *Bacaan akhir selepas*
pembakaran.   *pembakaran.*

(a)   Based on the reading shown in Diagram 1.2 and Diagram 1.3, record the reading to two decimal places for :
Berdasarkan kepada bacaan pada Rajah 1.2 dan Rajah 1.3, catatkan bacaan kepada dua tempat perpuluhan.

http://chngtuition.blogspot.com

Mass of lamp + methanol before combustion : _____ g
Jisim pelita + metanol sebelum pembakaran

Mass of lamp + methanol after combustion : _____ g
Jisim pelita + metanol selepas pembakaran

Mass of methanol : _____ g
Jisim metanol

[3 marks]

1(a)

(b) State the hypothesis for the above experiment .
Nyatakan hipotesis bagi eksperimen di atas.

_____

_____

[3 marks]

1(b)

(c) State all the variables for this experiment.
Berikan semua pembolehubah bagi eksperimen ini

(i) Manipulated variables :
Pembolehubah dimanipulasikan

_____

(ii) Responding variables :
Pembolehubah bergerak balas

_____

(iii) Constant variables:
Pembolehubah dimalarkan

_____

[3 marks]

1(c)

(d) (i) Calculate the heat change of heat in the experiment.
Hitungkan perubahan haba dalam eksperimen itu.

[Relative atomic mass : H,1 ; C,12 ; O, 16: Density of solution = 1.0 gcm^{-3}, specific heat capacity of solution = 4.2 $J\ g^{-1}\ °C^{-1}$]
[Jisim atom relatif : H,1 ; C,12 ; O, 16: Ketumpatan larutan = 1.0 gcm^{-3}, muatan haba pendam = 4.2 $J\ g^{-1}\ °C^{-1}$]

Mass of lamp + methanol before combustion : _____ g
Jisim pelita + metanol sebelum pembakaran

Mass of lamp + methanol after combustion : _____ g
Jisim pelita + metanol selepas pembakaran

Mass of methanol : _____ g
Jisim metanol

[3 marks]

1(a)

(b)   State the hypothesis for the above experiment .
Nyatakan hipotesis bagi eksperimen di atas.

_____

_____

[3 marks]

1(b)

(c)   State all the variables for this experiment.
Berikan semua pembolehubah bagi eksperimen ini

(i)   Manipulated variables :
Pembolehubah dimanipulasikan

_____

(ii) Responding variables :
Pembolehubah bergerak balas

_____

(iii) Constant variables:
Pembolehubah dimalarkan

_____

[3 marks]

1(c)

(d)   (i) Calculate the heat change of heat in the experiment.
Hitungkan perubahan haba dalam eksperimen itu.

[Relative atomic mass : H,1 ; C,12 ; O, 16: Density of solution = 1.0 gcm^{-3}, specific heat capacity of solution = 4.2 J g^{-1} $^{\circ}$C^{-1}]
[Jisim atom relatif : H,1 ; C,12 ; O, 16: Ketumpatan larutan = 1.0 gcm^{-3}, muatan haba pendam = 4.2 J g^{-1} $^{\circ}$C^{-1}]

(ii)	Calculate the the number of mole.	For Examiner's use
	Hitungkan bilangan mol.	

(iii)	Calculate the heat of combustion ΔH, for methanol in this experiment.	
	Hitungkan haba pembakaran ΔH, untuk metanol dalam eksperimen ini.	

1(d)

[3 marks]

(e)	State three observation on this experiment.
	Nyatakan tiga pemerhatian dalam eksperimen ini.

1(e)

[3 marks]

(f)	Write a balanced chemical equation for combustion of methanol.
	Tuliskan persamaan kimia bagi pembakaran metanol.

1(f)

[3 marks]

(g)	Give the operational defination for the heat of combustion.
	Beri definisi secara operasi bagi haba pembakaran.

1(g)

[3 marks]

http://chngtuition.blogspot.com

(h)		An experiment above was repeated by using ethanol and buthanol. The value of heat of combustion of ethanol is 969 kJ mol^{-1} and buthanol is 1969 kJ mol^{-1} *Eksperimen di atas diulangi dengan menggunakan etanol dan butanol. Nilai bagi haba pembakaran etanol ialah 969 kJ mol^{-1} dan butanol ialah 1969 kJ mol^{-1}.*	*For Examiner's use*
	(i)	Construct a table to show the name of three alcohol, number of carbon atoms per molecule and the heat of combustion for each of the alcohol. *Bina satu jadual yang menunjukkan nama tiga alkohol, bilangan atom karbon per molekul dan haba pembakaran bagi setiap alkohol.*	
			1(h)i
		[3 marks]	
	(ii)	Plot a graph to show the heat of combustion produced against number of atom carbon per molecule for the three alcohols. *Plotkan graf haba pembakaran melawan bilangan atom karbon per molekul bagi tiga alkohol.*	

For Examiner's use

[3 marks]

1(h)ii

(iii) Based on the graph (f)(ii), state the relationship between the number of carbon atom per molecule and heat of combustion.
Berdasarkan graf di (f)(ii), nyatakan hubungan antara bilangan atom karbon per molekul dengan haba pembakaran.

_____

_____

[3 marks]

1(h)iii

(iv) Based on the graph (e)(ii), predict the heat of combustion of propanal C_3H_7OH.
Berdasarkan graf (e)(ii), ramalkan haba pembakaran untuk propanol, C_3H_7OH.

_____

[3 marks]

1(h)iv

2

Hydrogen peroxide solution
Larutan hidrogen peroksida

manganese(IV) oxide powder
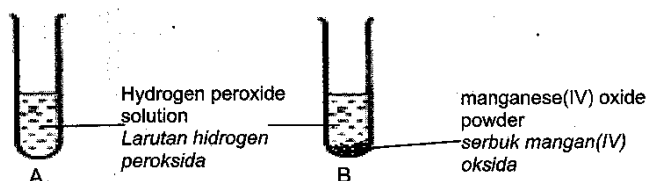serbuk mangan(IV) oksida

A
B

Diagram 2.1
Rajah 2.1

Diagram 2.1 shows the reaction of decomposition of hydrogen peroxide. Decomposition of hydrogen peroxide produced water and oxygen gas. The rate of decomposition of hydrogen peroxide can be increased by adding manganese(IV) oxide powder which acts as a catalyst.

Rajah 2.1 menunjukkan tindak balas penguraian hidrogen peroksida. Penguraion hidrogen peroksida menghasilkan air dan gas oksigen. Kadar penguraian hidrogen peroksida boleh ditingkatkan dengan menambahkan serbuk mangan(IV) oksida yang bertindak sebagai mangkin.

Plan a laboratory experiment to investigate the effect of catalyst on the decomposition of hydrogen peroxide.
Rancang satu eksperimen dalam makmal untuk mengkaji kesan mangkin ke atas kadar penguraian hidrogen peroksida.

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

a. Problem statement
   Pernyataan masalah

b. All variables involved
   Semua pembolehubah terlibat

c. Hypothesis
   Hipotesis

d. List of materials and apparatus
   Senarai bahan dan alat radas

e. Procedure
   Prosedur

f. Tabulation of data
   Penjadualan data   [17 marks]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

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

4541/2
CHEMISTRY
Kertas 2
Peraturan Pemarkahan
Sept 2010

PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA
SEKOLAH MENENGAH MALAYSIA (PKPSM)
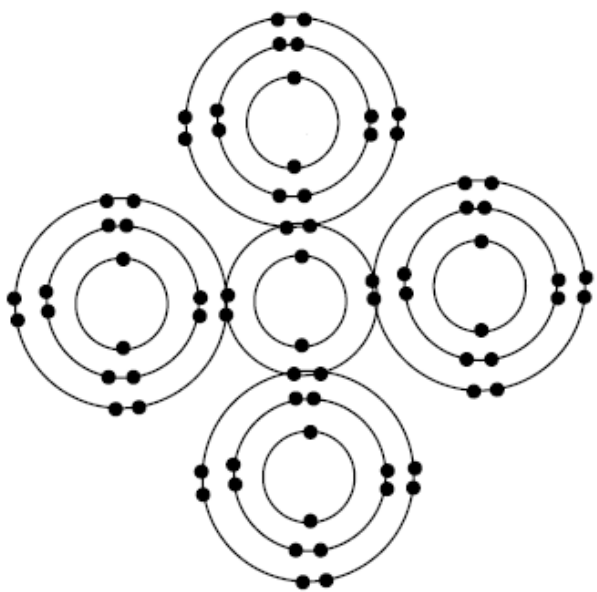**CAWANGAN PAHANG**

PEPERIKSAAN PERCUBAAN TAHUN 2010

TINGKATAN 5

PERATURAN PEMARKAHAN
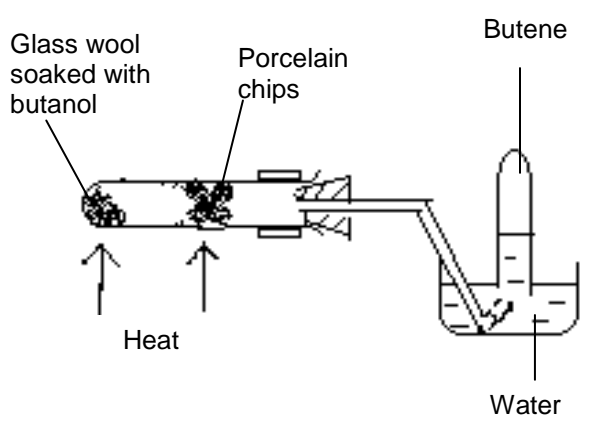
_____
Kertas ini mengandungi 11 halaman bercetak

No.		Mark Scheme	Sub Mark	Total Mark
1	(a)(i)	X : electron Y : nucleus	 1	
	(ii)	Electron // X	1	2
	(b)(i)	The number of protons in the nucleus of an atom	1	
	(ii)	18	1	
	(iii)	2.8.7	1	
	(iv)	 Number of shells , 3 Number of electrons	 1 1	6
	(v)	7	1	
	(c) (i) (ii)	A and B Because A and B has different number of neutrons but same number of protons // has different nucleon number but same proton number	1 1	2
			TOTAL	**9**

No.		Mark Scheme	Sub Mark	Total Mark
2	(a) (i)	Carbon dioxide	1	
	(ii)	Limewater turns cloudy/milkychalky//white precipitate formed	 1	2
	(b)	Zinc oxide	1	1

	(c)	$ZnCO_3 \longrightarrow ZnO + CO_2$
		  1. correct formula for reactant
		  2. correct formula for products
			
			1
			1
				2

	(d) (i)	$\dfrac{4}{125}$ mol // 0.032 mol	1	

		Mark Scheme	Sub Mark	Total Mark
	(ii)	1. Correct ratio 1 mole of $ZnCO_3$: 1 mole of CO_2 // 0.032 mole : 0.032 mole	1	
		2. Correct volume of gas with unit 0.032 x 24 dm^3 // 0.768 dm^3 // 768 cm^3.	1	4
	(iii)	0.032 x 6.02 x 10^{23} molecules // 1.926 x 10^{22} molecules.	1	
			TOTAL	**9**
No.		**Mark Scheme**	**Sub Mark**	**Total Mark**
3	(a)	P	1	1
	(b)	R	1	1
	(c) (i)	The electronegativity is increase from Q to V	1	
	(ii)	Across the period from Q to V , the atomic size decreases,	1	3
		The attraction force between nucleus and valens electrons increases	1	
	(d)	R is more reactive than Q	1	1
	(e)	Because the element has octet electron arrangement/ Because the outermost shell has occupied 8 electrons.	1	1
	(f) (i)	TU_4	1	
	(ii)			3

		Corect diagram, label T and U, correct no. of electron	1	
		Correct valens electron each of the atom	1	
		TOTAL		**10 M**

No.		Mark Scheme	Sub Mark	Total Mark
4	(a)	1. Strong acid is the acid that is <u>completely dissociated in water</u> 2. produce higher <u>concentration of hydrogen ions</u>	1 1	2
	(b)(i)	$HCl + NaOH \rightarrow NaCl + H_2O$ - Correct formula of reactants - Correct formula of products	 1 1	2
	(b)(ii)	No. of mol of HCl = (20.00 x 0.1)/1000 = 0.002 mol	1 1	2
	(b)(iii)	1. From the eq., 1 mol HCl : 1 mol NaOH 2. Molarity of NaOH = 0.002 x 1000 /		3
	(c)	Colourless to pink	1	1
		TOTAL		**10**
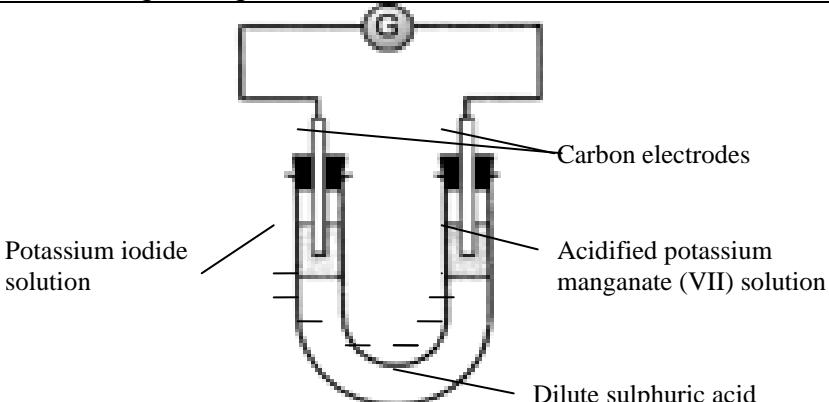
No.		Mark Scheme	Sub Mark	Total Mark
5	(a)(i)	C_4H_9OH	1	1
	(a)(ii)	1. 2. 	 1 1	 2

	(a)(iii)	Ethyl butanoate	1	1
	(b)(i)	Carbon dioxide	1	1
	(b)(ii)	$C_4H_{10} + 13/2O_2 \rightarrow 4CO_2 + 5H_2O$ // $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$ - Correct formula of reactants and products - Balanced equation	1 1	2
	(c)	 1. Functional diagram 2. Labeled diagram	1 1	2

	(d)	1. Butene is unsaturated hydrocarbon //
		     has double bond
		 2. Butane is saturated hydrocarbon //
		     Has single bond
			1
			
			 1
				2

			TOTAL	**11**

No.		Mark Scheme	Sub Mark	Total Mark
6	(a)	To allow the movement of ions	1	1
	(b)(i)	Brown colour of bromine water turns colourless	1	
	(b)(ii)	Green colour of iron(II) sulphate solution turns brown	1	2
	(c)(i)	$Br_2 + 2e \rightarrow 2Br^-$	1	
	(c)(ii)	0 to -1	1	
	(c)(iii)	Reduction reaction	1	3
	(d)(i)	$Fe^{2+} \rightarrow Fe^{3+} + e$	1	
	(d)(ii)	Potassium iodide solution, KI // Reactive metals, e.g Zinc, Zn	1	2
	(e)	$Br_2 + 2Fe^{2+} \rightarrow 2Br^- + 2Fe^{3+}$ - Correct formula of reactants and products	1	1
	(f)	$Y \rightarrow X$	1	1
	(g)	Bromine water	1	1
			[TOTAL	11

SECTION C

No.		Mark Scheme	Sub Mark	Total Mark
7	(a) (i)	Solution A: covalent Solution B: ionic	1 1	2
	(ii)	- In solution A, A exist as molecule // no free moving ions - Molecule does not carry the charge and the bulb does not light up - In solution B, ions can move freely Ions carry the charge and the bulb is lighted up	1 1 1 1	4

(b)(i)	Cell J	Cell K	1 + 1 1 + 1	4
	Gas bubbles are released	Anode becomes thinner		
	Gas oxygen	Copper (II) ion		

(b)(ii)	Cell J : $4OH^- \rightarrow O_2 + 2H_2O + 4e$ Cell K : $Mg \rightarrow Mg^{2+} + 2e$	1 1	2

(c)			
	- correct functional diagram - label	1 1	2

Carbon electrodes

Potassium iodide solution

Acidified potassium manganate (VII) solution

Dilute sulphuric acid

(d)(i)	- potassium iodide solution : colourless solution turns brown - acidified potassium manganate (VII) solution : purple solution decolourised	1 1	
(ii)	potassium iodide solution : $2I^- \rightarrow I_2 + 2e$ acidified potassium manganate (VII) solution : $MnO_4^- + 8H^+ + 5e \rightarrow Mn^{2+} + 4H_2O$	1 1	6
(iii)	To allow the flow of ions from both electrolytes // to separate the reducing agent from the oxidising agent.	1	
(iv)	Potassium nitrate solution // sodium chloride chloride solution // potassium sulphate solution [any suitable answer]	1	

		TOTAL	**20**

No.		Mark Scheme	Sub Mark	Total Mark
8	(a)	[Able to classify the type of food additives in given situation correctly] Table: 	Food additive	Substance
Colouring	Tartazine
Flavouring	Octyl ethanoate
Anti oxidant	Citric acid
Sweetener// preservative	aspartame		1 1 1 1	4
	(b)	Antibiotic 1.To make sure all the bacteria are killed Otherwise the patient may becomes ill again Bacteria become more resistant to the antibiotic. As a result, the antibiotic is no longer effective.// Patients need stronger antibiotic to fight the same infection	1 1 1 1 1	5
	(c)	Part X – hydrophobic/hydrocarbon Part Y – hydrophilic/ionic Parx X – dissolves in grease Part Y – dissolves in water	4	4

	(c)	1.The cloth in experiment II is clean
		    whereas the cloth in Experiment I is still dirty.
		2.In hard water,soap react with magnesium ion
		3.to form scum
		4.Detergent are more effective in hard water
		5.Detergent does not form scum
		6.Detergent are better cleansing agen then soap
		   to remove oily stain.
			1
			1
			1
			1
			1
			1
			
			1
				7

			TOTAL	**20 M**

No.		Mark Scheme	Sub Mark	Total Mark
9	(a)	Rate of reaction is the speed at which reactants are converted into products in a chemical reaction.	1	1
	(b) (i)	$\dfrac{30}{2 \times 60} = 0.25 \text{ cm}^3\text{s}^{-1}$	1	
	(ii)	$\dfrac{45}{2 \times 60} = 0.375 / 0.38 \text{ cm}^3\text{s}^{-1}$	1	3
	(iii)	$\dfrac{15}{2 \times 60} = 0.125 / 0.13 \text{ cm}^3\text{s}^{-1}$	1	
	(c) (i)	$CaCO_3 + H_2SO_4 \rightarrow CaSO_4 + CO_2 + H_2O$ Reactant and product correct Balance equation	1 1	2

	(ii)	The number of moles $CaCO_3$ = 0.2/40 + 12 + (16x3)
		
		                           = 0.002 mol
		
		 1 mole of $CaCO_3$ releases 1 mole of CO_2. (ratio of $CaCO_3$ to CO_2)
		 0.002 mole of $CaCO_3$ releases 0.002 mole of CO_2
		 The maximum volume of CO_2 = 0.002 x 22.4
		                               = 0.0448 dm^3
		                               = 44.8 cm^3
			1
			
			 1
			
			 1
			
			 1
				4

	(d) (i)	- Experiment II has a higher rate of reaction compared to experiment I - The concentration of sulphuric acid, H_2SO_4 in experiment II is higher than experiment I - When the concentration of the solution is increase/higher, the number of reactant particles also increase/higher. - The frequency of collision between carbonate ions and hydrogen ions increases - The frequency of effective collision also increases	1 1 1 1 1	5

No.		Mark Scheme	Sub Mark	Total Mark
	(d) (ii)	- Experiment I has a higher rate of reaction compared to experiment III	1	
		- The temperature used in experiment I is higher than in experiment III	1	
		- Higher temperature causes particles move faster/higher//kinetic energy is increase	1	
		- Frequency of collision between carbonate ions and hydrogen ions increase	1	5
		- The frequency of effective collision also increases	1	
		TOTAL		**20**

No.		Mark Scheme	Sub Mark	Total Mark
10	(a) (i)	Blue solution X = Copper (II) sulphate	1	
		Colurless solution Y = potassium carbonate // sodium carbonate // ammonium carbonate	1	2
	(ii)	Double decomposition method	1	1
	(iii)	$CuSO_4 + K_2CO_3 \rightarrow CuCO_3 + K_2SO_4$ //		
		$CuSO_4 + Na_2CO_3 \rightarrow CuCO_3 + Na_2SO_4$ //		
		$CuSO_4 + (NH_4)_2CO_3 \rightarrow CuCO_3 + (NH_4)_2SO_4$		
		Correct rectants and products	1	
		Balanced equations	1	2
	(iv)	- Add sodium hydroxide solution (until excess)	1	
		- Blue precipitate formed //	1	2
		- Add ammonia aqueous / ammonium hydroxide solution (until excess)		
		Blue precipitate soluble in excess		
	(b) (i)	Copper (II) oxide	1	1
	(ii)	Materials : [25 – 100] cm^3 of [0.5 – 2.0] moldm^{-3} copper (II)sulphate solution(any suitable answer) [25 – 100] cm^3 of [0.5 – 2.0] moldm^{-3} sodium carbonate solution	1	
		(any suitable answer) Filter paper	1	
		Apparatus : Filter funnel, beakers, retort stand	1	
			1	

		and clamp, glass rod and 100cm^3 measuring cylinder. Procedures : - About [25 – 100] cm^3 of [0.5 – 2.0] moldm$^-$^{3} copper (II) sulphate solution is measured into a beaker. - About [25 – 100] cm^3 of [0.5 – 2.0] moldm$^-$^{3} sodium carbonate solution is measured and mixed with the solution in the beaker. - The mixture is stirred with a glass rod. - The precipitate formed is removed by filtration. - The precipitate is rinsed with distilled water. - The precipitate is dried between the filter paper	 1 1 1 1 1 1	 10
	(iii)	$2AgNO_3 + MgCl_2 \rightarrow 2AgCl + Mg(NO_3)_2$ No of moles AgNO$_3$ = 50 x 1.0 / 1000 = 0.05 mol 2 mol AgNO$_3$ $\rightarrow$ 2 mol AgCl from the reaction 0.05 mol AgNO$_3$ $\rightarrow$ 0.05 mol AgCl Mass of AgCl = 0.05 x 143.5 = 7.175 g	 1 1	 2
			TOTAL	**20**

SULIT
4541/3
CHEMISTRY
Kertas 3
Peraturan Pemarkahan
September 2010

PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA
SEKOLAH MENENGAH NEGERI PAHANG DARUL MAKMUR

PEPERIKSAAN PERCUBAAN SPM 2010

KIMIA

Kertas 3
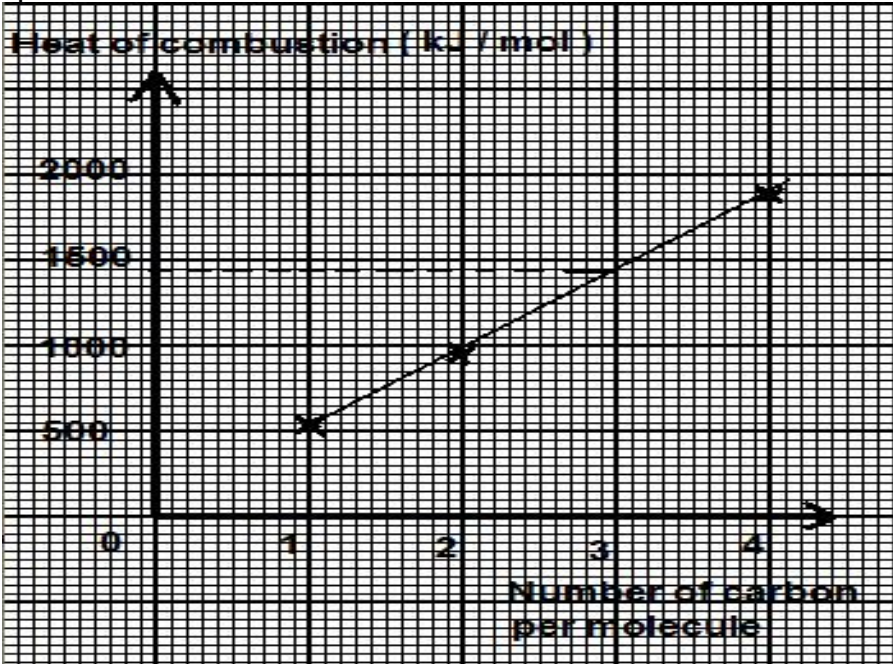

PERATURAN PEMARKAHAN

[Lihat sebelah]

Question		Rubric / Details	Score
1	(a)	*[Able to answer all questions to **two decimal point** accurately]* Sample answer : Mass of methanol lamp before combustion : 196.00g Mass of methanol lamp after combustion : 194.40g Mass of methanol : 1.60g	3
		[Able to answer all questions to one decimal point] Sample answer : Mass of methanol lamp before combustion : 196.0g Mass of methanol lamp after combustion : 194.4g Mass of methanol : 1.6g	2
		[Able to answer] Sample answer : Mass of methanol lamp before combustion : 196 g / Mass of methanol lamp after combustion : 194.4g / Mass of methanol : 1.6g *Correct any one answer*	1
		[No response given or wrong response]	0
1	(b)	*[Able to state relationship between the manipulated variables with the responding variables accurately]* Sample answer: When the number of <u>carbon atom per molecule increase</u>, the heat of combustion increase // When the number of atom carbon per molecule decrease, the heat of combustion decrease.	3
		[Able to state relationship between the manipulated variables with the responding variables correctly] Sample answer: When the number of carbon atom increase, the heat of combustion increase // Heat of combustion increase, the number of atom carbon increase.	2

		[Able to give some ideas on hypothesis] Sample answer: Alcohol change, heat of combustion changes	1
		[No response given or wrong response]	0

1	(c)	[Able to state all the variables accurately]
		 Sample answer:
		     i. Number of atom carbon per molecule / type of alcohol/
		         methanol, ethanol, butanol
		     ii. Heat of combustion
		     iii. Copper can // volume of water
			3

		[Able to answer less accurately // incomplete]	2
		[Able to give some ideas on variables }	1
		[No response given or wrong response]	0

1	(d)	[Student able to calculate and write the answer with unit correctly (S1, S2, S3 and S4)]
		 Sample answer:
		     i. Heat energy release = 200 x 4.2 x 30 = 25200J/ 25.2kJ
		     ii. No. of moles methanol = 1.6/32 = 0.05mol
		     iii. ΔH = 25.2/0.05 = 504 kJmol^{-1}
		 All three response are correct
			3

		[Any **two** response are correct]	2
		[Any **one** response are correct]	1
		[No response given or wrong response]	0

1	(e)	[Able to state all the observation correctly]
		 Sample answer :
		     (i) Temperature of water increase/ temperature increase
		     (ii) Mass of methanol decrease
		     (iii) Copper can become hot
			3

		*[Any **two** responses are correct]*	2
		*[Any **one** responses are correct]*	1
		[No response or wrong answer]	0

1	(f)	*[Able to write the balance equations]*
		
		Sample answer :
		$2CH_3OH + 3O_2 \rightarrow 2CO_2 + 4H_2O$
		
		   i. Correct reactant
		   ii. Correct product
		   iii. Balance equations
			3

		[Any two response are correct]	2
		[Any one response are correct]	1
		[No response or wrong answer]	0
1	(g)	*[Able to state the operational definition accurately]* Sample answer: Heat of combustion is heat energy released when 1 mole of alcohol is burn completely in excess oxygen.	3
		[Able to state the operational definition] Sample answer: Heat of combustion is heat energy released when alcohol is burn completely in excess oxygen.	2
		[Able to give some ideas to give operational definition] Sample answer: Heat of combustion is heat energy released when its burn completely in excess oxygen.	1
		[No response or wrong answer]	0
1	(h) (i)	*[Able to draw a table containing the following items]* Sample answer:	

				3

Alcohol	Number of carbon atom per molecule	Heat of combustion / kJmol⁻¹
Methanol	1	504
Ethanol	2	969
Butanol	4	1969

All three responses are correct

[Able to draw a table containing the following items without unit] Sample answer: | Alcohol	Number of carbon atom per molecule	Heat of combustion / kJmol⁻¹ | |---|---|---| | Methanol | 1 | 504 | | Ethanol | 2 | 969 | | Butanol | 4 | 1969 |	2
[Able to give some ideas to record the result of the experiment]	1
[No response or wrong answer]	0

(h) (ii)	[Able to draw a graph containing the following items] Sample answer: 	3

		i. Axes are correctly labeled with units ii. All points shown on the graph iii. Smooth curve covering half of page		
		[Able to state all above but axes are without units]		2
		[Axes labeled correctly]		1
		[No response or wrong answer]		0
	(h) (iii)	*[Able to state the relationship between the number atom carbon and heat of combustion]* Sample answer: When the number of carbon atom per molecule increase, the heat of combustion will increase // when the number of carbon atom per molecule decrease, the heat of combustion will decrease		3
		Heat of combustion is directly proportional to the number of carbon atom per molecule.		2
		Heat of combustion is refer to the number of carbon atom per molecule/ alcohol/ number of carbon		1
		[No response or wrong answer]		0
	(h) (iv)	*[Able to predict the heat of combustion correctly by refer the graph]* Sample answer: $1470 \leq \Delta H \leq 1480$ kJ/mol		3
		[Able to predict the heat of combustion correctly] Sample answer: $1460 \leq \Delta H \leq 1470$ kJ/mol or $1480 \leq \Delta H \leq 1490$ kJ/mol		2
		[Any one response is correct]		1
		[No response or wrong answer]		0

2	(a)	[Able to write the problem statement of the experiment accurately] Sample answer: How does the catalyst affect the rate of reaction?	3
		[able to write the problem statement of the experiment correctly] Sample answer: Does a catalyst affect the rate of reaction?	2
		[Able to write a relevant idea about the problem statement of the experiment] Sample answer: Catalyst affects the rate of reactions. // Manganese (IV) oxide affects the rate of decomposition of hydrogen peroxide.	1
		[No response given or wrong response]	0
2	(b)	[Able to state the **three** variables accurately] Sample answer: Manipulated variable : Presence of manganese (IV) oxide Responding variable : Rate of reactions Constant variable: Concentration and volume of hydrogen peroxide solution // temperature of hydrogen peroxide solution.	3
		[Able to state any two variables correctly]	2
		[Able to state only one variables correctly]	1
		[No response given or wrong response]	0
2	(c)	[Able to state the relationship accurately between the manipulated variable and the responding variable with direction] Sample answer: Catalyst / manganese (IV) oxide increases the rate of reaction.	3

		[Able to state the relationship between the manipulated variable and the responding variable] Sample answer: Catalyst / manganese (IV) oxide changes the decomposition of hydrogen peroxide.	2
		[Able to state the idea of hypothesis] Sample answer: Catalyst / manganese (IV) oxide affects the rate of reaction.	1
		[No response given or wrong response]	0

2	(d)	[Able to state complete list of substances and apparatus]
		
		Sample answer:
		Substances : 20-volume hydrogen peroxide solution, manganese
		           (IV) Oxide powder
		Apparatus : test tube, wooden splinter, test tube rack, spatula,
		           $10cm^3$ measuring cylinder
			3

		[Able to state all substances, test tube, wooden splinter and measuring cylinder correctly]	2
		[Able to state all substances, test tube, wooden splinter correctly]	1
		[No response given or wrong response]	0

2	(e)	[Able to list all the steps in the procedure correctly]
		
		Sample answer:
		  1. Label two test tube as A and B
		  2. Measure 5cm3 of 20-volume hydrogen peroxide and pour it into test tube A. Repeat for test tube B.
		  3. Add one spatula of manganese (IV) oxide powder into test tube B.
		  4. Shake the two test tube and place them into a test tube rack.
		  5. Immediately hold a glowing wooden splinter separately at the open edge of each test tubes.
		  6. Observe and record the changes.
			3

		[Able to list down Steps 2,3 and 5]	2
		[Able to list down Steps 2 and 5]	1
		[No response given or wrong response]	0

2	(f)	[Able to tabulate the data with the following aspects] 1. Correct titles 2. Label of test tube Sample answer: <table><tr><td>Test tube</td><td>Observation</td></tr><tr><td>A</td><td></td></tr><tr><td>B</td><td></td></tr></table>	2
		[Able to construct a table with at least the title] Sample answer: <table><tr><td>Test tube</td><td>Observation</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table>	1
		[No response given or wrong response]	0