**JABATAN PELAJARAN NEGERI MELAKA
DENGAN KERJASAMA
MAJLIS PENGETUA SEKOLAH MALAYSIA
CAWANGAN MELAKA**

PEPERIKSAAN PERCUBAAN SPM 2016
NEGERI MELAKA

4541/1

KIMIA
Kertas 1
Ogos/Sept
1 ¼ jam

Satu jam lima belas minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of 50 questions.
   Kertas soalan ini mengandungi 50 soalan.
2. Answer all questions.
   Jawab semua soalan.
3. Answer each question by blackening the correct space on the answer sheet.
   Jawab dengan menghitamkan ruangan yang betul pada kertas jawapan.
4. Blacken only one space for each question.
   Hitamkan satu ruangan sahaja bagi setiap soalan.
5. If you wish to change your answer, erase the blackened mark that you have made.Then blacken the space for the new answer.
   Sekiranya anda hendak menukar jawapan, padamkan tanda yang telah dibuat.
   Kemudian hitamkan jawapan yang baru.
6. The diagrams in the questions provided are not drawn to scale unless stated.
   Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
7. You may use a non-programmable scientific calculator.
   Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.

Kertas soalan ini mengandungi **27** halaman bercetak

Question 1 to Question 50 are followed by four options **A, B, C** or **D.**
Choose the best option for each question and blackened the corresponding space on
the objective answer sheet.
*Bagi **Soalan 1** hingga **Soalan 50**, tiap-tiap soalan diikuti oleh empat pilihan jawapan **A, B, C** dan **D**. Pilih satu jawapan yang terbaik bagi tiap-tiap soalan dan hitamkan ruangan yang sepadan pada kertas jawapan objektif anda*

1   Which of the following processes occurs when iodine is heated?

       Antara proses berikut, yang manakah berlaku apabila iodin dipanaskan?

       A   Evaporation
               Peruapan
       B   Sublimation
               Pemejalwapan
       C   Condensation
               Kondensasi
       D   Boiling
               Pendidihan

2   Which of the following statements is true for **one** mole of a substance?
       *Antara pernyataan berikut yang manakah benar tentang **satu** mol suatu bahan?*

       A   1 mol of hydrogen gas contains 6.02×10^{23} atoms
               1 *mol gas hidrogen mengandungi 6.02 x 10^{23} atom*
       B   1mol of magnesium contains 6.02×10^{23} molecules
               1*mol magnesium mengandungi 6.02×10^{23} molekul*
       C   1 mol sodium chloride solution accupies 22.4 dm^3 at s.t.p
               1 *mol larutan natrium klorida mengandungi isipadu 22.4 dm^3 pada s.t.p*
       D   1 mol of water contains the same number of molecules as the number of atoms in 12 g
               Karbon-12.
               1 *mol air mengandungi bilangan molekul yang sama dengan bilangan atom dalam* 12 *g Karbon-*12.

3   Which of the following chemist arranged the elements in the Periodic Table of Elements in order
   of increasing proton number
       Antara ahli kimia berikut, siapakah yang menyusun unsur-unsur di dalam Jadual Berkala Unsur mengikut susunan bilangan proton yang menaik

       A   Moseley
       B   Mendeleev
       C   Dobereiner
       D   Lothar Meyer

4541/1   **SULIT**

4   Which of the following statements best explain the stability of inert gases?
Antara pernyataan berikut yang manakah terbaik menerangkan kestabilan gas adi?

    A   Have octet electron arrangement except helium
          Mempunyai susunan elektron oktet kecuali helium
    B   Can accept, lose or share electron
          Boleh terima, hilang atau kongsi elektron
    C   Have 8 valence electrons
          Mempunyai 8 elektron valens
    D   Exists as polyatomic gases
          Wujud sebagai gas poliatom

5   Diagram 1 shows the symbols of element Y and element Z.
The letters used are not the actual symbol of the elements.
Rajah 1 menunjukkan simbol bagi unsur Y dan Z.
Huruf yang digunakan bukan simbol sebenar unsur itu.

$$^{7}_{3}Y \qquad ^{14}_{7}Z$$
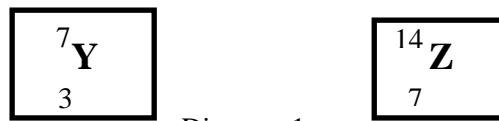
Diagram 1
Rajah 1

Which of the following is true about the atoms of element Y and Z?
Antara berikut yang manakah benar tentang atom bagi unsur- unsur tersebut?

    A   The number of mole in 7 g atom Y is equal to the number of mole in 14 g atom Z
          Bilangan mol dalam 7 g atom Y adalah sama dengan bilangan mol dalam 14 g atom Z
          The mass of an atom of Y is 7 g and the mass of an atom of Z is 14 g
    B   *Jisim satu atom Y ialah 7 g dan jisim satu atom Z ialah 14 g*
          The mass of 1 mol of Y is 3 g and the mass of 1mol of Z is 7 g
    C   *Jisim 1 mol Y ialah 3 g dan jisim 1 mol Z ialah 7 g*
          The mass of 1 mol of Y is twice the mass of 1 mol of Z
    D   *Jisim 1 mol Y adalah dua kali jisim 1 mol Z*

6   Z is an element that reacts with water to produce hydrogen gas.
Which of the following is likely to be the electron arrangement of Z?
Z adalah satu unsur yang boleh bertindakbalas dengan air untuk menghasilkan gas hidrogen.
Yang manakah antara berikut adalah susunan elektron Z?

    A   2.4
    B   2.8.7
    C   2.8.8.1
    D   2.8.18.8

7 Diagram 2 shows the set-up of apparatus for an experiment to determine the empirical formula of magnesium oxide.
Rajah 2 menunjukkan susunan radas bagi eksperimen untuk menentukan formula empirik magnesium oksida.
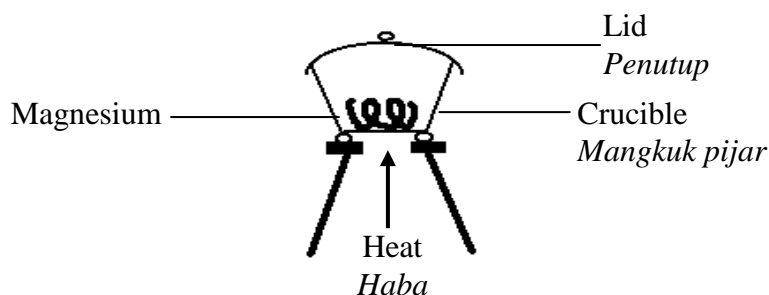
Rajah 2

Why is the crucible lid opened once in a while during the experiment?
Mengapakah penutup mangkuk pijar dibuka secara berkala semasa eksperimen?

A To avoid explosion
   Untuk mencegah letupan
B To cool the magnesium
   Untuk menyejukkan magnesium
C To allow oxygen gas to enter the crucible
   Untuk membenarkan oksigen memasuki mangkuk pijar
D To see what happen inside the crucible
   Untuk melihat apakah yang berlaku di dalam mangkuk pijar

8

The information of substance X is:
 - Empirical formulae is CH_2
 - Relative Molecular Mass is 42

Maklumat bagi Bahan X adalah :
 - *Formula empirik* CH_2
 - *Jisim Molekul Relatif* 42

What is the molecular formula of substance X?
Apakah formula molekul bagi Bahan X?

A C_2H_4
B C_2H_6
C C_3H_6
D C_3H_8

9   Table 1 shows the proton number of elements P and Q
Jadual 1 menunjukkan nombor proton bagi unsur P dan Q

Element	Proton number
Unsur	*Nombor proton*
P	11
Q	17

Table 1
Jadual 1

Which of the following statements are true for the elements in Table?
Antara pernyataan berikut, yang manakah adalah betul bagi unsur-unsur didalam Jadual1?

I   Q is more electronegative than P
        Q adalah lebih elektronegatif dari P
II   The atomic size of P is bigger than Q
        Saiz atom P adalah lebih besar dari Q
III   Elements P and Q can conduct electricity
        Unsur-unsur P dan Q boleh mengalirkan elektrik
IV   P and Q are in the same period in the Periodic Table of Elements
        P dan Q berada dalam kala yang sama dalam Jadual Berkala Unsur

A   I and III only
        I *dan* III *sahaja*
B   II and IV only
        II *dan* IV *sahaja*
C   I, II and IV only
        I, II *dan* IV *sahaja*
D   II, III and IV only
        II, III *dan* IV *sahaja*

10   Diagram 3 shows the electron arrangement of ion J.
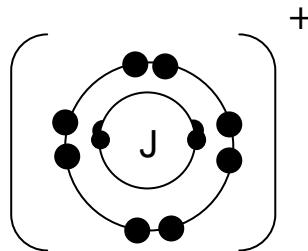*Rajah 3 menunjukkan susunan elektron ion J*

Diagram 3
Rajah 3

Where does the element J is placed in the Periodic Table of Elements?
Dimanakah unsur J diletakkan di dalam Jadual Berkala Unsur?

	Group *Kumpulan*	Period *Kala*
A	1	3
B	3	1
C	8	2
D	18	2

11 The diagram 4 shows the representation of Calcium element in the Periodic Table of Elements.
Rajah 4 menunjukkan perwakilan bagi unsur Kalsium dalam Jadual Berkala Unsur


Diagram 4
Rajah 4

Choose the correct standard representation of calcium atom.
Pilih perwakilan piawai yang betul bagi atom kalsium

A $\quad Ca_{19}^{39}$

B $\quad {}_{39}^{19}Ca$

C $\quad {}_{19}^{39}Ca$

D $\quad Ca_{39}^{19}$

12 Which of the following diagram shows atom of element that exist as monoatomic gas at room condition?
Antara rajah atom unsur yang berikut, yang manakah wujud sebagai gas monoatom pada keadaan bilik?

A

C

B

D
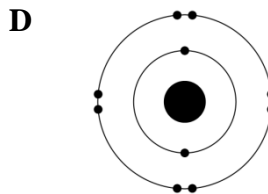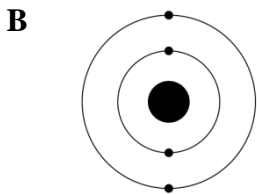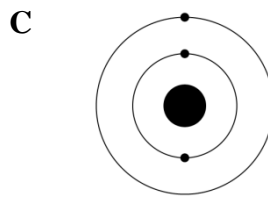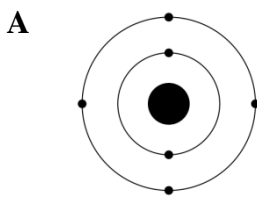
13 Which of the followings is the correct electron arrangement of atom of element that exist in form of diatomic molecule ?

Manakah di antara berikut adalah susunan elektron yang benar bagi atom unsur yang wujud sebagai molekul dwiatom?

    A 2

    B 2.6

    C 2.8

    D 2.8.3

14 Halogen is the common name for members of group 17 in the periodic table of element. All member of halogen react with heated iron wool to produce brown solid of iron(III) halide.
Halogen adalah nama lain bagi ahli kumpulan 17 dalam Jadual Berkala unsur.
Semua unsur halogen bertindak balas dengan kapas besi yang panas menghasilkan pepejal berwarna perang ,besi (III) halida.

Choose the **best statement** to describe the above property of halogen.
*Pilih kenyataan yang **paling tepat** untuk menerangkan sifat halogen tersebut*

    A The electronegativity of halogen increase down the group
       Keelektronegatifan halogen bertambah menuruni kumpulan
    B The electronegativity of halogen decrease down the group
       Keelektronegatifan halogen berkurang menuruni kumpulan
    C The number of valence electron in an atom of halogen increase down the group
       Bilangan electron valens di dalam suatu atom halogen bertambah menuruni kumpulan
    D The number of valence electron in an atom of halogen is 7
       Bilangan electron valens di dalam suatu atom halogen ialah 7

15 Atom of element Q formed a positive charged ion. The oxide of Q react with both acids and alkalis to form salt. Choose the best statement for the oxide of Q.

Atom unsur Q membentuk ion bercas positif. Oksida unsur Q bertindak balas dengan asid dan alkali untuk menghasilkan garam. Pilih kenyataan yang tepat mengenai oksida unsur Q

    A Q ion has +3 charge.
       Ion Q mempunyai cas +3
    B Chemical formulae of Q oxide is Q_2O
       Formula kimia bagi oksida Q adalah Q_2O
    C Oxide of Q is amphoteric
       Oksida Q adalah amfoterik
    D Oxide of Q is ionic compound
       Oksida Q adalah sebatian ion

16 Table 2 shows the results of an experiment to determine the reactivity of three metals R, S and T in the electrochemical series by using the displacement reaction.
Jadual 2 menujukkan keputusan satu eksperimen untuk menentukan kereaktifan tiga logam R, S dan T di dalam siri elektrokimia menggunakan tindakbalas penukargantian

Reactants *Bahan tindak balas*	Observations *Pemerhatian*
R + solution of S	No visible change
R + solution of T	T deposited
S + solution of T	T deposited

Table 2
Jadual 2

Arrange the three metals in ascending order in the electrochemical series.
Susunkan tiga logam ini dalam tertib menaik siri elektrokimia.

A S, R, T
B T, R, S
C R, S, T
D T, S, R

17 Diagram 5 shows the experiment setup by a student to find out his favorite iron spoon got rusty. He cleaned the surface with sand paper but still not improve the appearance. He searched the internet and found the way to make it attractive.
Rajah 5 menunjukkan susunan eksperimen oleh seorang pelajar untuk mengenalpasti mengapa sudu besi kegemarannya telah berkarat. Dia membersihkan permukaannya dengan kertas pasir tetapi masih lagi tidak menarik. Dia melayari internet dan mendapat jawapan bagaimana untuk menjadikan sudu itu menarik.
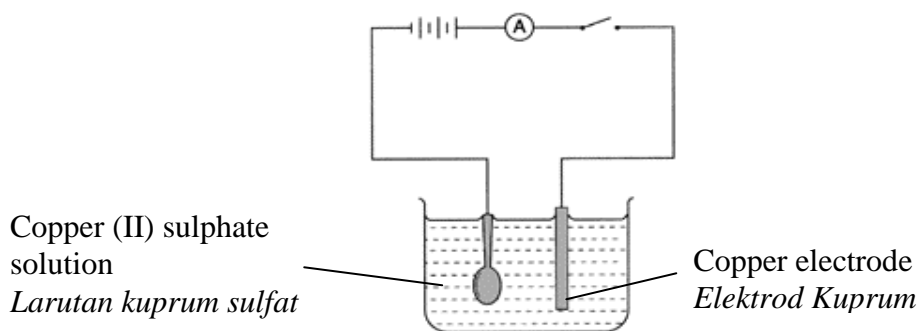
Copper (II) sulphate solution
Larutan kuprum sulfat

Copper electrode
Elektrod Kuprum

Diagram 5
Rajah 5

Why the brown solid deposited on the spoon
Mengapa pepejal perang terenap pada sudu besi?
A Hyroxide ions are discharged at anode
Ion hidroksida dinyahcaskan di anod
B Hydrogen ions are discharged at anode
Ion hidrogen dinyahcaskan di anod
C Copper ions are discharged at cathode
Ion copper dinyahcaskan di katod
D Sulphate ions are discharged at cathode
Ion sulfat dinyahcaskan di katod

18   Diagram 6 below shows a chemical cell.
      Rajah 6 di bawah menunjukkan satu sel kimia.

Magnesium
Glacial ethanoic acid
Asid etanoik glasial
Zinc

Diagram 6
Rajah 6
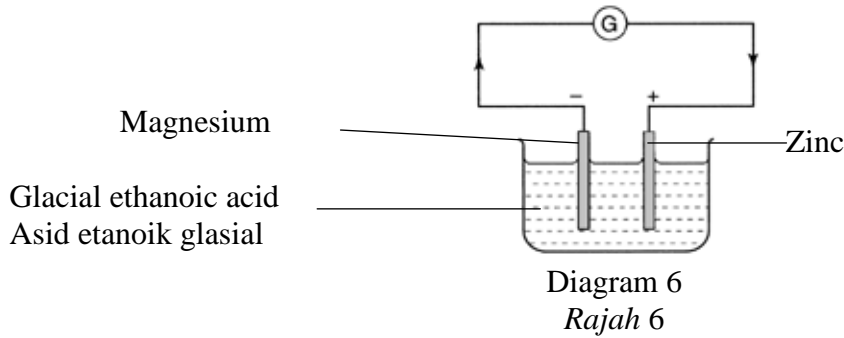
It is found that the needle of the galvanometer does not deflect.
What should be done to make the needle deflect?
Didapati bahawa jarum galvanometer tidak terpesong.
Apakah yang patut dilakukan untuk memesongkan jarum galvanometer?

A   Add dry cells in series in the circuit
     Tambahkan sel kering seciri bersiri di dalam litar
B   Add water to the glacial ethanoic acid
     Tambah air kepada asid etanoik tulen
C   Substitute the zinc electrode with carbon electrode
     Gantikan elektrod zink dengan elektrod karbon
D   Interchange the magnesium electrode and the zinc electrode
     Tukarkan kedudukan elektrod magnesium dan elektrod zink

19   Diagram 7 shows the electrolysis of concentrated sodium chloride solution using carbon electrode.
      Rajah 7 menunjukkan elektrolisis larutan natrium klorida pekat menggunakan elektrod karbon.

Carbon electrode : X
Elektrod karbon : X

Carbon electrode : Y
Elektrod karbon : Y

Concentrated sodium chloride
Natrium klorida pekat

Diagram 7
Rajah 7
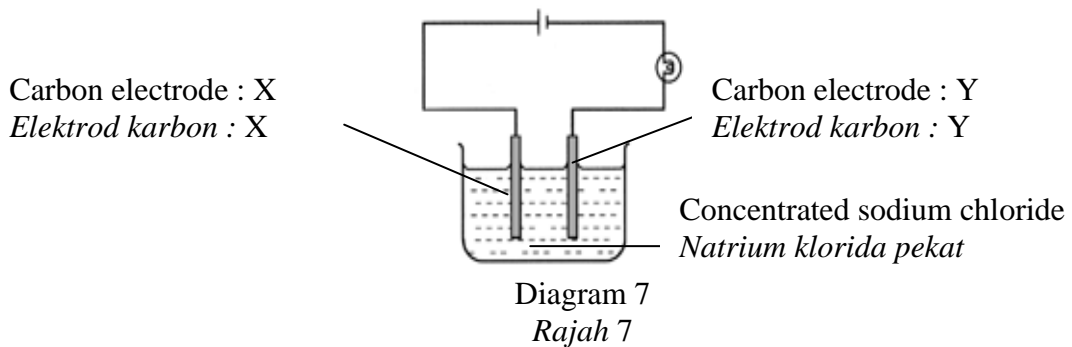
Which of the half equation represent the reactions at the electrode X and electrode Y?
Setengah persamaan manakah yang mewakili tindak balas pada elektrod X dan elektrod Y?

	X	Y
A	$2\,Cl^- \rightarrow Cl_2 + 2e$	$2H^+ + 2e \rightarrow H_2$
B	$2\,Cl^- \rightarrow Cl_2 + 2e$	$Na^+ + e \rightarrow Na$
C	$4\,OH^- \rightarrow 2\,H_2O + O_2 + 4e$	$Na^+ + e \rightarrow Na$
D	$4\,OH^- \rightarrow 2\,H_2O + O_2 + 4e$	$2H^+ + 2e \rightarrow H_2$

20 Diagram 8 shows the set-up of apparatus of an electrolytic cell.
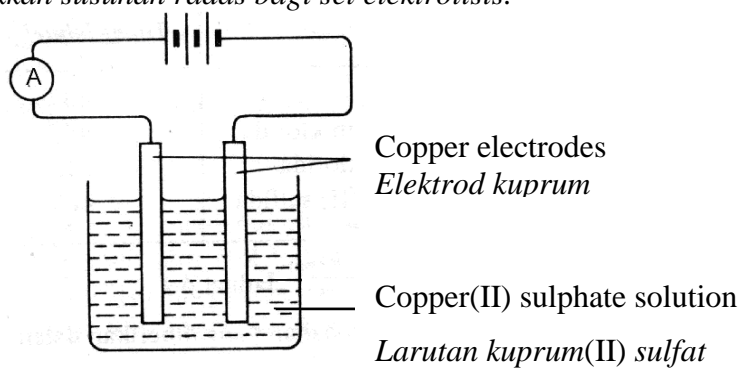*Rajah* 8 *menunjukkan susunan radas bagi sel elektrolisis.*

Copper electrodes
Elektrod kuprum
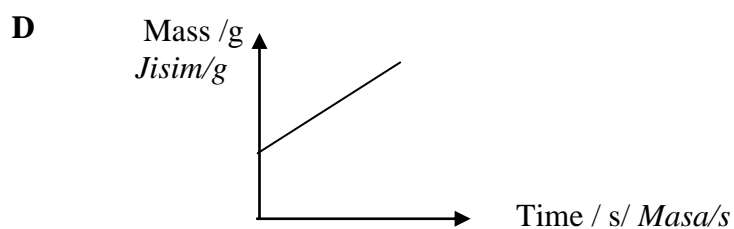
Copper(II) sulphate solution

Larutan kuprum(II) *sulfat*
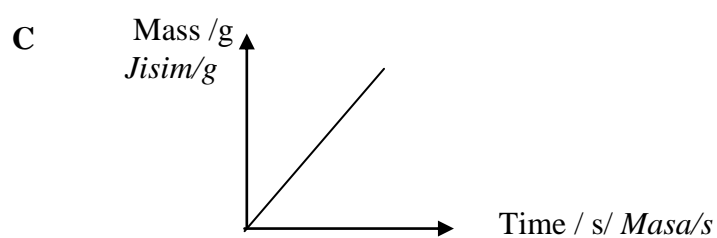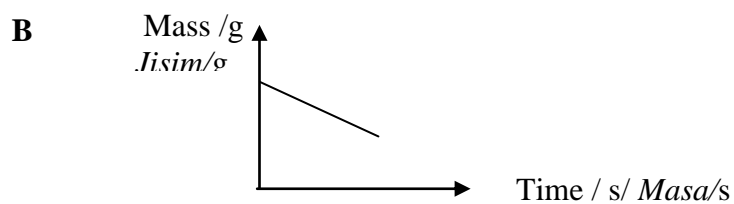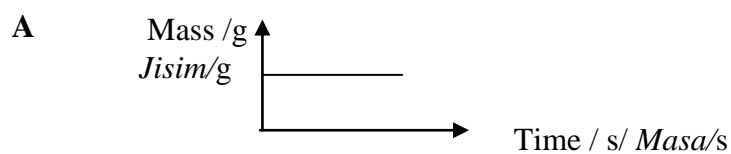
Diagram 8
Rajah 8

Which of the following graphs show the changes in mass of the cathode during electrolysis ?
Antara graf berikut manakah menunjukkan perubahan jisim katod semasa elektrolisis?

A   Mass /g
Jisim/g
Time / s/ *Masa/*s

B   Mass /g
Jisim/g
Time / s/ *Masa/*s

C   Mass /g
Jisim/g
Time / s/ *Masa/s*

D   Mass /g
Jisim/g
Time / s/ *Masa/s*

21 Diagram 9 shows the set up of the apparatus for the reaction between calcium carbonate and ethanoic acid in two different solvents.
Rajah 9 menunjukkan susunan radas bagi tindak balas antara kalsium karbonat dengan asid etanoik dalam dua pelarut yang berlainan.
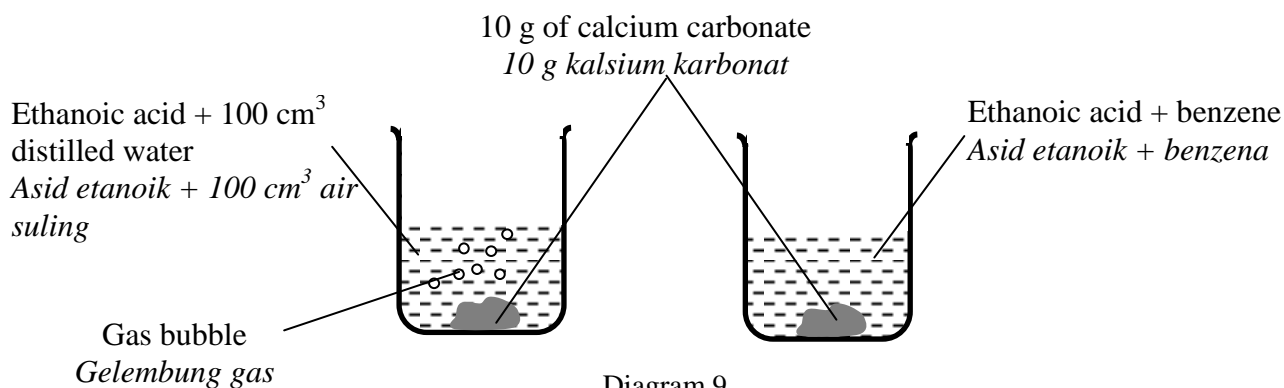
10 g of calcium carbonate
10 g kalsium karbonat

Ethanoic acid + 100 cm^3 distilled water
Asid etanoik + 100 cm^3 air suling

Ethanoic acid + benzene
Asid etanoik + benzena

Gas bubble
Gelembung gas

Diagram 9
Rajah 9

Which of the following statements are true about the observation in beaker X and Y?
Antara pernyataan berikut, yang manakah benar tentang pemerhatian dalam bikar X dan Y?

I   Water ionizes ethanoic acid in beaker X
    Air mengionkan asid etanoik dalam bikar X
II Benzene ionizes ethanoic acid in beaker Y
    Benzena mengionkan asid etanoik dalam bikar Y
III Water reacts with calcium carbonate in beakerX
    Air bertindak balas dengan kalsium karbonat dalam bikar X
IV Ethanoic acid remains as molecules in beaker Y
    Asid etanoik kekal sebagai molekul-molekul dalam bikar Y

A I and II only
    I dan II sahaja
B I and IV only
    I dan IV sahaja
C II and III only
    II dan III sahaja
D III and IV only
    III dan IV sahaja

22   Table 3 shows the degree of dissociation of four solutions of alkali which have the same concentration.
Jadual 3 menunjukkan darjah penceraian empat larutan alkali yang mempunyai sama kepekatan.

Solution *Larutan*	Degree of dissociation *Darjah penceraian*
W	High/*Tinggi*
X	Medium / *Sederhana*
Y	Very high/*Sangat tinggi*
Z	Low /*Rendah*

Table 3
Jadual 3

Which solution has the highest pH value?
Larutan manakah yang mempunyai nilai pH yang paling tinggi?

  A   W
  B   X
  C   Y
  D   Z

23   A farmer found that his soil is too acidic for some plants to grow well.
Which substance is suitable to reduce the acidity of the soil?
Seorang petani mendapati tanahnya terlalu berasid untuk tanamannya tumbuh dengan baik. Bahan manakah yang sesuai digunakan untuk mengurangkan keasidan tanah itu?

  A   Barium chloride
        Barium klorida
  B   Calcium oxide
        Kalsium oksida
  C   Sodium nitrite
        Natrium nitrit
  D   Potassium iodide
        Kalium iodida

24. Which of the following is the cause of plastic products pollute the environment?
Antara yang berikut, yang manakah merupakan sebab barangan plastik mencemarkan persekitaran?

  A   Non biodegradable
        Tidak terbiodegradasi
  B   Extremely toxic
        Sangat toksik
  C   Flammable
        Mudah terbakar
  D   Radioactive
        Radioaktif

25 Diagram 10 shows the apparatus set-up for the neutralisation reaction between a strong acid and a strong alkali.
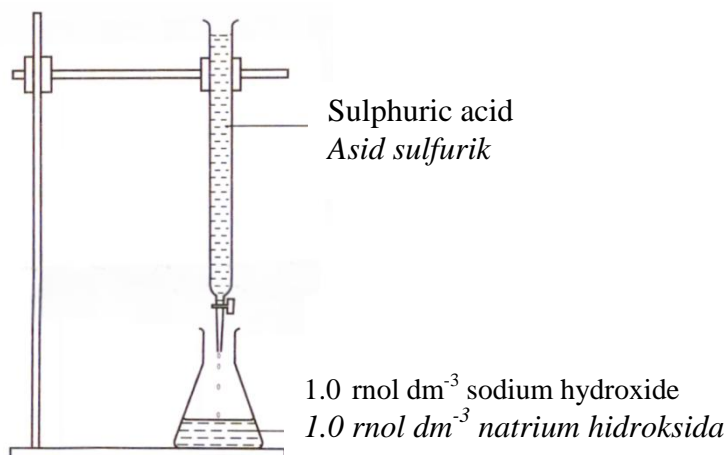*Rajah 10 menunjukkan susunan radas bagi tindak balas peneutralan antara asid kuat dan alkali kuat.*

Sulphuric acid
Asid sulfurik

1.0 rnol dm^{-3} sodium hydroxide
1.0 rnol dm^{-3} natrium hidroksida

Diagram 10
Rajah 10

25.0 cm^3 of sulphuric acid neutralises 50.0 cm^3 of 1.0 rnol dm^{-3} sodium hydroxide solution. What is the molarity of the sulphuric acid?
25.0 cm^3 as id sulfurik meneutralkan 50.0 cm^3 larutan natrium hidroksida 1.0 mol dm^{-3}. Apakah kemolaran asid sulfurik?

A 1.0 mol dm^{-3}
B 1.5 mol dm^{-3}
C 2.0 mol dm^{-3}
D 4.0 mol dm^{-3}

26 Which characteristic of hydrogen chloride enables to show acidic properties in water?
Ciri hidrogen klorida yang manakah membolehkannya menunjukkan sifat keasidan dalam air?

A Dissolves in water
Larut dalam air
B Contains hydrogen in its molecule
Mengandungi hidrogen dalam molekulnya
C Contains chlorine in its molecule
Mengandungi klorin dalam molekulnya
D Ionises in water to form hydrogen ions
Mengion dalam air untuk membentuk ion-ion hidrogen

27. Equation bellow shows the formation of fibre glass:
Plastic + Glass Fibers → Fiber glass
Persamaan di bawah menunjukkan penghasilan gentian kaca:
Plastik + Gentian → Kaca Kaca Gentian

Why is fiberglass better than common plastic?
Mengapakah gentian kaca lebih baik daripada plastik biasa?
A High tensile strength
Kekuatan regangan yang tinggi
B Resistent to corrosion
Tahan kakisan
C Able to withstand heat
Berupaya menahan haba
D Good conductor of electricity
Konduktor elektrik yang baik

28. The chemical equation below shows the reaction of manufacturing of sulphuric acid in stage II.
Persamaan kimia di bawah menunjukkan tindak balas untuk penghasilan asid sulfurik dalam peringkat II.

$$2SO_2 + O_2 \rightleftharpoons 2SO_3$$
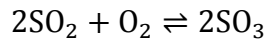
What are the optimum conditions for the reaction in stage II.
Apakah keadaan optimum untuk tindak balas dalam peringkat II ini.

	Temperature/ ºC *Suhu/ ºC*	Catalyst *Mangkin*	Pressure/ atm *Tekanan/ atm*
A	450	Iron *Besi*	1
B	250	Iron *Besi*	10
C	250	Vanadium(V) oxide *Vanadium(V) oksida*	10
D	450	Vanadium(V) oxide *Vanadium(V) oksida*	1

29. Diagram 11 above shows the arrangement of atoms in brass. Which of the following could be atoms X and Y?

Rajah 11 di atas menunjukkan susunan atom bagi loyang. Yang manakah berikut mungkin atom X dan Y?
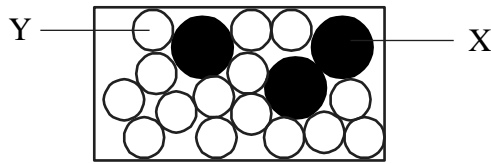
Y ——— ◯◯●●◯◯ ◯● ——— X

Diagram 11
Rajah 11

	X	**Y**
A	Copper	Tin
	Kuprum	*Stanum*
B	Zinc	Copper
	Zink	*Kuprum*
C	Iron	Carbon
	Ferum	*Karbon*
D	Copper	Zinc
	Kuprum	*Zink*

30. Diagram 12 shows a decorative glass which is used in the house. The glass has the following properties.

Rajah 12 menunjukkan satu kaca perhiasan yang digunakan dirumah. Kaca itu mempunyai ciri-ciri berikut.

High density
Ketumpatan yang tinggi

Optically transparent
Lutsinar secara optik

High refractive index
Index biasan yang tinggi

Diagram 12
Rajah 12

Which of the following glass has the above properties?
Kaca manakah mempunyai ciri-ciri seperti di atas

A Fused glass
Kaca silica terlakur
B Soda-lime glass
Kaca soda kapur
C Borosilicate glass
Kaca borosilikat
D Lead crystal glass
Kaca plumbum Kristal

31. Diagram 13 represents the interaction of the hydrogen dan chlorine particles in two syringes , Syringe A and Syringe B in the reaction to produce hydrogen chloride gas.
Rajah 13 mewakili interaksi di antara zarah –zarah hidrogen dan zarah –zarah klorin dalam dua picagari A dan Picagari B di dalam tindak balas menghasilkan gas hidrogen klorida.
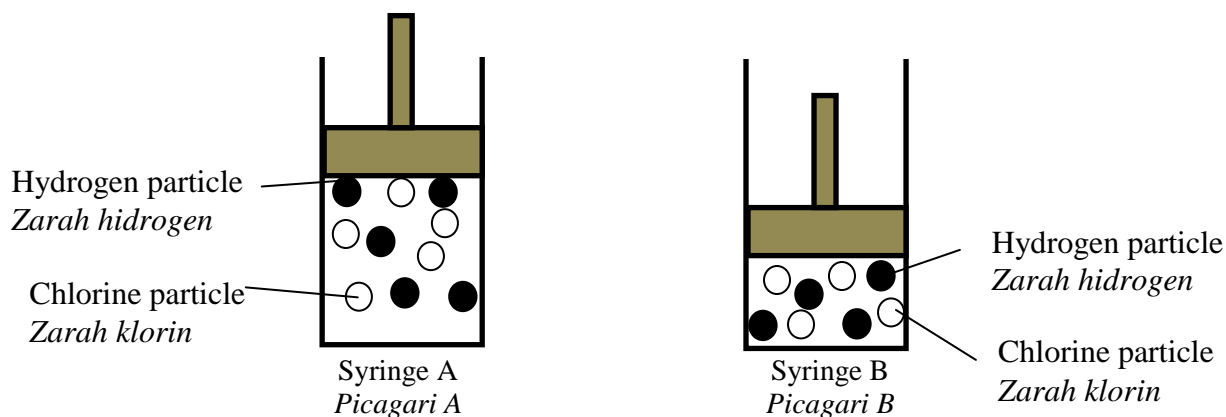

Hydrogen particle
Zarah hidrogen

Chlorine particle
Zarah klorin

Syringe A
Picagari A

Hydrogen particle
Zarah hidrogen

Chlorine particle
Zarah klorin

Syringe B
Picagari B

Diagram 13
Rajah 13

The following statements are true about the reaction that takes place except
Pernyataan-pernyataan yang berikut adalah benar mengenai tindak balas yang berlaku kecuali

A. The collisions between the hydrogen and chlorine particles increases in syringe B
   Perlanggaran antara zarah zarah hidrogen dan klorin meningkat dalam picagari B
B The kinetic energy of the hydrogen and chlorine particles in Syringe B is higher compared to the particles in syringe A
   Tenaga kinetik zarah-zarah hidrogen dan klorin dalam picagari B adalah lebih tinggi berbanding dalam picagari A
C The rate of reaction to produce hydrogen chloride is higher in syringe B compared to syringe A
   Kadar tindak balas menghasilkan gas hidrogen klorida lebih tinggi dalam picagari B berbanding A
D There are more collision of the hydrogen and chlorine particles that achieved the activation energy in syringe B compared to syringe A.
   Lebih banyak perlangggaran antara zarah-zarah hidrogen dan klorin dalam picagari B mencapai tenaga pengaktifan berbanding dalam picagari A

32 Diagram 14 , shows the chemical equation between hydrochloric acid and calcium carbonate that produces calcium chloride , water and carbon dioxide gas :
Rajah 14 menunjukkan tindak balas antara asid hidroklorik dan kalsium karbonat menghasilkan kalsium klorida, air dan gas karbon dioksida :

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

Diagram 14
Rajah 14

The rate of reaction for this reaction can be increased if
Kadar tindak balas bagi tindak balas yang ini boleh ditingkatkan jika

A. the volume of the hydrochloric acid is increased two-fold
isipadu asid hidroklorik yang digunakan ditambah dua kali ganda
B. Water is added to the acid to increase the volume the acid used
air ditambahkan kepada asid untuk meningkatkan isipadu asid yang digunakan
C. Increase the mass of the calsium carbonate used in the reaction
tambahkan jisim kalsium karbonat yang bertindak balas
D. the asid used in the reaction is heated
asid yang digunakan dalam tindak balas ini dipanaskan

33 Diagram 15 shows a structure formula which represents a food flavouring substance.
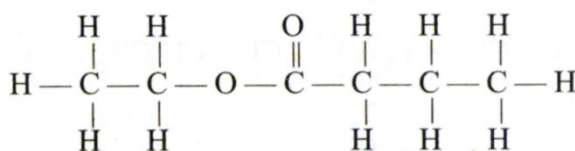*Rajah 15 menunjukkan formula struktur yang mewakili satu bahan perisa makanan.*

Diagram 15
Rajah 15

Which of the following can be used to make the flavouring?
Antara yang berikut, yang manakah boleh digunakan untuk membuat perisa itu?

A Ethanol and butanoic acid
Etanol dan asid butanoik
B Propanol and propanoic acid
Propanol dan asid propanoik
C Butanol and ethanoic acid
Butanol dan asid etanoik
D Propyl propanoate and ethanol
Propil propanoat dan etanol

34.   Diagram 16 shows the results of experiment 1 and experiment 2 for the reaction of excess magnesium with hydrochloric acid
Rajah 16 menunjukkan keputusan eksperimen 1 dan eksperimen 2 bagi tindak balas antara magnesium berlebihan dengan asid hidroklorik .
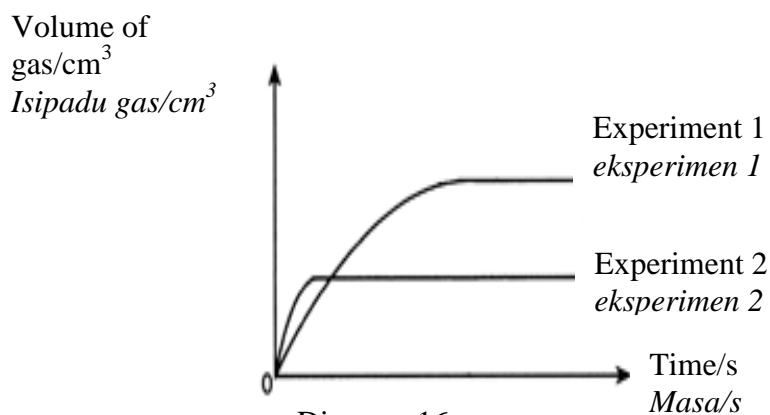
Volume of
gas/cm^3
Isipadu gas/cm^3

Diagram 16
Rajah 16

If in experiment 1, the volume of 1.0 moldm^{-3} hydrochloric acid used is 100 cm^3, state the volume and concentration acid used in experiment 2.
Jika dalam eksperimen 1 , isipadu 1.0 moldm^{-3} asid hidroklorik yang digunakan ialah sebanyak 100 cm^3 , nyatakan isipadu dan kepekatan yang telah digunakan dalam eksperimen 2.

	Volume of hydrochloric acid /cm^3 *Isipadu asid hidroklorik/cm^3*	Concentration of hydrochloric acid/moldm^{-3} *Kepekatan Asid hidroklorik/ moldm^{-3}*
A	25	2.0
B	50	1.0
C	25	0.5
D	35	2.0

35   A bottle of wine left open develops a sour taste after some time. Which statement best explains this observation?
Bau masam terhasil apabila sebotol wain dibiarkan terdedah ke udara selama satu jangka masa. Pernyataan manakah yang paling tepat menerangkan pemerhatian ini?

A   The ethanol evaporates from the wine
   Etanol yang terdapat dalam wain tersejat
B   The ethanol is oxidized by air to an acid
   Etanol dioksidakan oleh udara kepada asid
C   The ethanol reacts to become an ester
   Etanol bertindak balas menjadi ester
D   The ethanol is slowly oxidized to carbon dioxide and water
   Etanol teroksida perlahan-lahan kepada karbon dioksida dan air

36. A student found out that the time taken to collect the hydrogen gas that was produced

in the reaction between zinc and sulphuric acid was shortened when copper (II) sulphate solution was added. What was the role of the copper (II) sulphate solution in the reaction?
Seorang pelajar mendapati masa untuk mengumpul gas hidrogen terhasil melalui tindak balas zink dengan larutan asid sulfurik asid menjadi singkat bila larutan kuprum (II)sulfat ditambahkan. Apakah peranan larutan kuprum (II) sulfat itu dalam balas itu?

I.   It lowered the activation energy for the reaction
Ia merendahkan tenaga pengaktifan tindak balas yang berlaku
II. It provided the energy for the zinc atoms and hydrogen ions collisions
Ia membekalkan tenaga kepada atom zink dan ion hidrogen yang berlanggaran antara satu sama lain
III. It caused the frequency of effective collisions between zinc atoms and hydrogen ions to increase.
Ia menyebabkan frekuensi perlanggaran berkesan antara atom zink dan ion hidrogen meningkat
IV. It caused the frequency of collisions between zinc atoms and hydrogen ions to increase
Ia menyebabkan frekuensi perlanggaran antara atom zink dan ion hidrogen meningkat.

A.   I dan III   **B**.   II dan IV   **C**. I,III dan IV   **D**.   I,II,III dan IV

37. Food that is kept in the refrigerator last longer than the food exposed to room temperature because
Makanan yang disimpan dalam peti sejuk lebih tahan lama berbanding makanan yang terdedah kepada suhu bilik kerana

A.   there is no bacteria in the refrigerator
dalam peti sejuk tiada bakteria
B.   the rate of metabolism of bacteria is low when the temperature is low
kadar metabolisme bakteria adalah rendah pada suhu yang rendah
C.   the low temperature of the refrigerator slows down the evaporation of water from the food
suhu rendah dalam peti sejuk melambatkan penyejatan air daripada makanan
D. the collisions of bacteria and the food particles do not take place in the refrigerator
perlanggaran antara bakteria dengan zarah-zarah makanan tidak berlaku dalam peti sejuk

38 The fourth member of a homologous series has the formula, C_5H_{10}. What is the formula of the first member of this series?
Ahli keempat bagi satu siri homolog mempunyai formula, C_5H_{10}. Apakah formula bagi ahli pertama dalam siri ini?

A CH_4
B $HCOOH$
C C_2H_4
D CH_2

39 Diagram 17 shows a process of preparing margarine from palm oil through process X.
Rajah 17 menunjukkan proses menyediakan marjerin daripada minyak kelapa sawit melalui proses X.
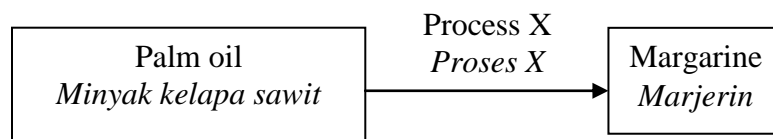
Palm oil *Minyak kelapa sawit*	Process X *Proses X* →	Margarine *Marjerin*

Diagram 17
Rajah 17

What is process X?
Apakah proses X?

A Oxidation
Pengoksidaan
B Saponification
Saponifikasi
C Halogenation
Penghalogenan
D Hydrogenation
Penghidrogenan

40 Which of the following statements are true about vulcanized rubber?
Antara pernyataan berikut, yang manakah benar tentang getah tervulkan?

I Easily oxidized
Mudah dioksidakan
II Cannot withstand heat
Tiada ketahanan terhadap haba
III Stronger than unvulcanised rubber
Lebih kuat daripada getah tak tervulkan
IV More elastic than unvulcanised rubber
Lebih kenyal daripada getah tak tervulkan

A I and II
I dan II
B I and III
I dan III
C II and IV
II dan IV
D III and IV
III dan IV

41 Diagram 18 shows a set-up of apparatus of a redox reaction.
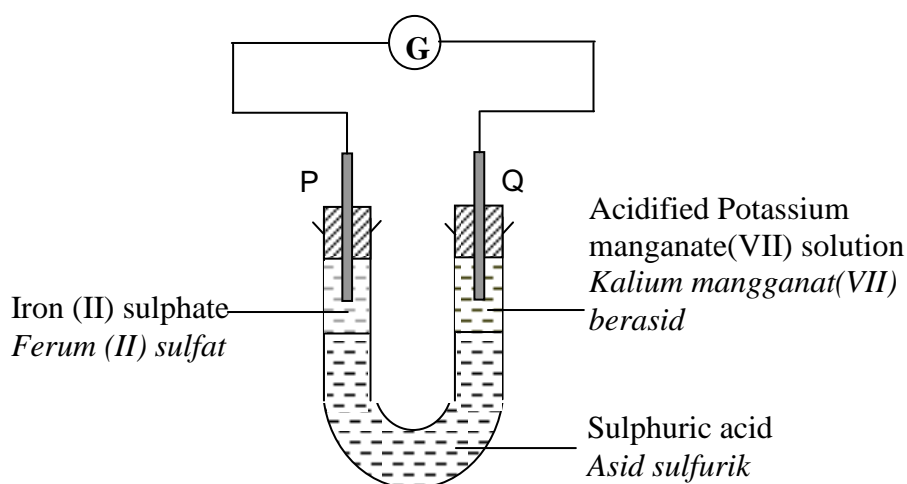*Rajah 18 menunjukkan set radas untuk tindakbalas redoks*

P   Q

Acidified Potassium manganate(VII) solution
Kalium mangganat(VII) berasid

Iron (II) sulphate
Ferum (II) sulfat

Sulphuric acid
Asid sulfurik

Diagram 18
Rajah 18

Which of the following observation is correct?
Manakah antara pemerhatian berikut adalah benar?

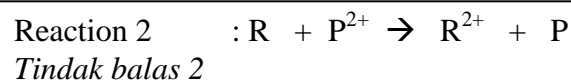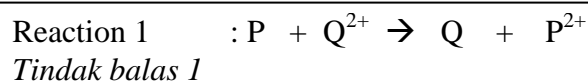|	Iron (II) sulphate solution *Larutan Ferum(II) sulfat*	Acidified potassium manganate(VII) *Larutan kalium manganat(VII) berasid*
A	Brown to green *Perang kepada hijau*	Orange to green *Jingga kepada hijau*
B	Brown to green *Perang kepada hijau*	Purple to colourless *Ungu kepada tidak berwarna*
C	Green to brown *Hijau kepada perang*	Purple to colourless *Ungu kepada tidak berwarna*
D	Green to brown *Hijau kepada perang*	Orange to green *Jingga kepada hijau*

42 Which of following is redox reaction?
Antara tindak balas berikut, yang manakah merupakan tindak balas redoks?

A $Cu + O_2 \rightarrow CuO$

B $Zn \rightarrow Zn^{2+} + 2e$

C $2H^+ + 2e \rightarrow H_2$

D $NaOH + HCl \rightarrow NaCl + H_2O$

43 P, Q and R are metals. Based on the ionic equations below, which of the following statement is true?

P, Q dan R merupakan logam. Berdasarkan persamaan ion di bawah, penyataan yang manakah benar ?

Reaction 1   : $P + Q^{2+} \rightarrow Q + P^{2+}$
Tindak balas 1

Reaction 2   : $R + P^{2+} \rightarrow R^{2+} + P$
Tindak balas 2

A   P and R are oxidising agents
  P dan R merupakan agen pengoksidaan
B   P is more electropositive than R.
  P lebih elektropositif daripada R
C   The descending sequence of metals' reactivity is Q, P, R
  Susunan menurun kereaktifan logam ialah Q,P,R
D   Q is lower than P in the electrochemical series.
  Q adalah di bawah P dalam siri elektrokimia.

44 Which metals can displace lead from lead(II)nitrate solution?
Logam manakah yang boleh menyesarkan plumbum daripada larutan plumbum(II)nitrat?

I   *Zinc*
  Zink
II   Silver
  Argentum
III Copper
  Kuprum
IV   Aluminium
  Aluminium

A   I and II
  I dan II
B   I and IV
  I dan IV
C   II and III
  II dan III
D   III and IV
  III dan IV

45 Diagram 19 shows a traffic jam caused by flash flood. This situation corrodes the metal part of the car.

Rajah 19 menunjukkan kesesakan trafik disebabkan oleh banjir kilat. Kejadian ini mengakibatkan bahagian logam kereta terkakis

If you are a materials engineer of an automotive company, suggest the best way to solve this problem.

Jika anda merupakan seorang jurutera bahan bagi sebuah syarikat automatif, cadangkan cara terbaik untuk mengatasi masalah ini.

Diagram 19
Rajah 19

A   Electroplate the metal with silver
   Penyaduran logam dengan argentum

B   Galvanizing the metal with zinc
   Penggalvanian logam kepada zink

C   Connecting the metal to magnesium
   Penyambungan logam kepada magnesium

D   Paint the surface of the metal car with a thick layer of paint
   Mengecat permukaan logam kereta dengan lapisan cat yang tebal

46 The following ionic equation shows the formation of lead(II) sulphate .
Persamaan ion berikut menunjukkan tindak balas pembentukan plumbum(II)sulfat.

$$Pb^{2+}(aq) + SO_4^{2-}(aq) \longrightarrow PbSO_4(s) \quad \Delta H = -42 \text{ kJ mol}^{-1}$$
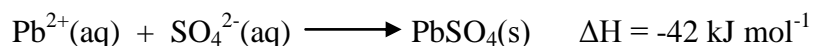
Which of the following answer is related to the above reaction ?
Antara jawapan yang berikut, yang mana adalah berkaitan dengan tindak balas di atas?

	Initial temperature, ^oC *Suhu awal, ^oC*	Highest/Lowest temperature, ^oC *Suhu tertinggi / suhu terendah, ^oC*	Type of reaction *Jenis tindak balas*
A	29.0	32.0	Endothermic *Endotermik*
B	29.0	32.0	Exothermic *Eksotermik*
C	29.0	27.5	Exothermic *Eksotermik*
D	29.0	27.5	Endothermic *Endothermic*

47 Preservatives are one of the food additives that are commonly used to prevent the proliferation of microorganisms to ensure that food from spoiling quickly . Which of the following substance is a preservative ?
Pengawet merupakan salah satu bahan tambah makanan yang biasa digunakan untuk menghalang pembiakan mikroorganisma bagi memastikan makanan tahan lebih lama. Antara berikut, yang manakah bahan yang digunakan sebagai bahan pengawet?

A   Lecithin
    Lesitin
B   Azo compound
    Sebation azo
C   Sodium nitrite
    Natrium nitrat
D   Monosodium glutamate
    Mononatrium glutamat

48   Diagram 20 shows the inner part of a cold pack
Rajah 20 menunjukkan bahagian dalam sebuah pek sejuk.

Diagram 20
Rajah 20

Water and salt contained in cold packs are separated by a thin membrane that breaks down when force is applied . Water will be mixed with salt and will cause an endothermic reaction that gives a cool effect . Among the salts below , which can be used in the cold pack ?

Air dan pepejal garam yang terkandung dalam pek sejuk dipisahkan oleh lapisan membran nipis yang mudah pecah apabila dikenakan daya. Air akan bercampur dengan pepejal garam dan akan menyebabkan tindak balas endotermik yang memberikan kesan sejuk. Antara garam di bawah ini, yang manakah boleh digunakan di dalam pek sejuk tersebut?

A   Ammonium nitrate
        Ammonium nitrat

B   Calcium oxide
        Kalsium oksida

C   Anhydrous calcium chloride
        Kalsium klorida kontang

D   Potassium chloride
        Kalium klorida

49 Chart 1 shows the classification of psychotherapeutic medicines.
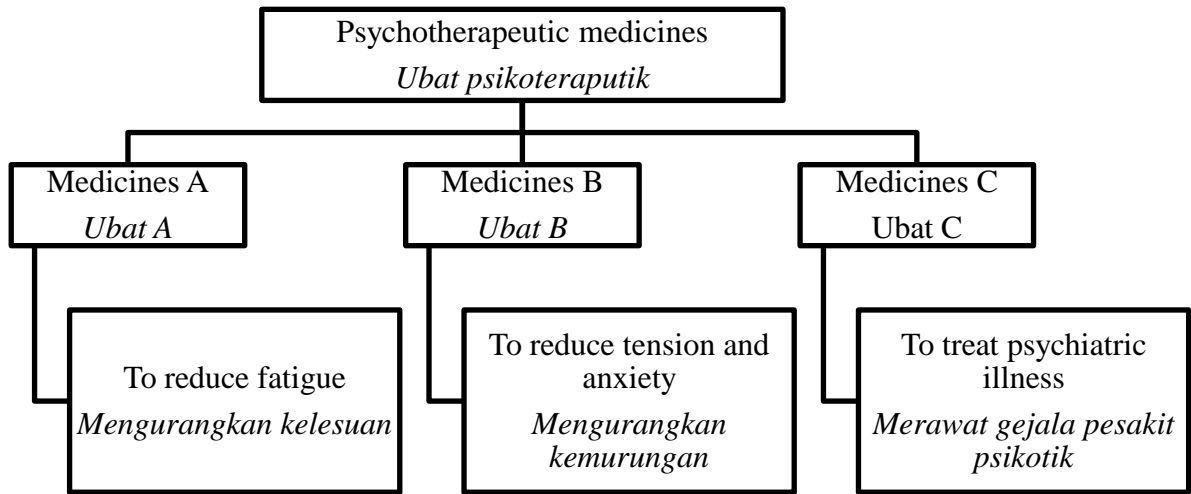*Carta 1 menunjukkan pengelasan ubat-ubatan psikoteraputik.*

```
            ┌─────────────────────────────┐
            │  Psychotherapeutic medicines │
            │      Ubat psikoteraputik     │
            └─────────────────────────────┘
        ┌───────────────┼───────────────┐
┌───────────────┐ ┌───────────────┐ ┌───────────────┐
│  Medicines A  │ │  Medicines B  │ │  Medicines C  │
│     Ubat A    │ │     Ubat B    │ │     Ubat C    │
└───────────────┘ └───────────────┘ └───────────────┘
```

Medicines A — *Ubat A*	Medicines B — *Ubat B*	Medicines C — *Ubat C*
To reduce fatigue *Mengurangkan kelesuan*	To reduce tension and anxiety *Mengurangkan kemurungan*	To treat psychiatric illness *Merawat gejala pesakit psikotik*

Chart 1
Carta 1

Which of the following answer is true?
Antara jawapan berikut yang mana adalah benar?

	Medicines A *Ubat A*	Medicines B *Ubat B*	Medicines C *Ubat C*
A	Stimulant *Stimulan*	Antidepresent *Antidepresen*	Barbiturate *Barbiturat*
B	Stimulant *Stimulan*	Antidepresent *Antidepresen*	Antipsychotic *Antipsikotik*
C	Antidepresent *Antidepresen*	Barbiturate *Barbiturat*	Stimulant *Stimulant*
D	Antipsychotic *Antipsikotik*	Stimulant *Stimulant*	Antidepresent *Antidepresen*

50 Diagram 21 shows a simulation of the cleansing action of soap and detergent using match sticks.
Rajah 21 menunjukkan simulasi tentang tindakan pencucian sabun dan detergen dengan menggunakan batang mancis.
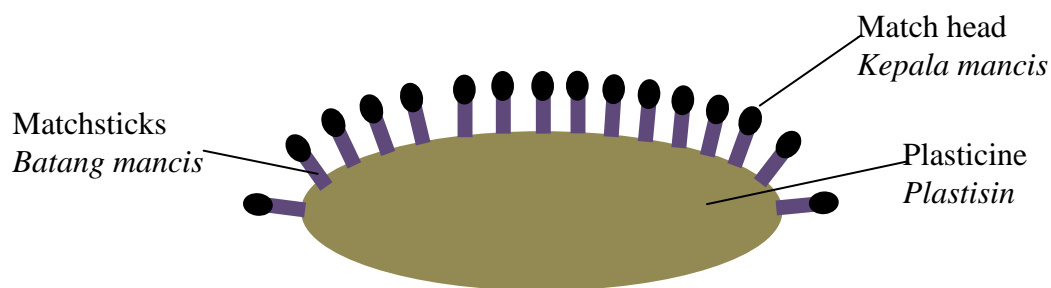

Diagram 21
Rajah 21

The matchstick is representing soap ions and plasticine as grease. Based on the structure of soap below , which of the following pairs are correctly matched to represent the head of a match and matchsticks .

Batang mancis mewakili ion sabun dan plastisin sebagai gris. Berdasarkan kepada struktur sabun di bawah ini, yang manakah menunjukkan padanan yang tepat mewakili kepala mancis dan batang mancis.
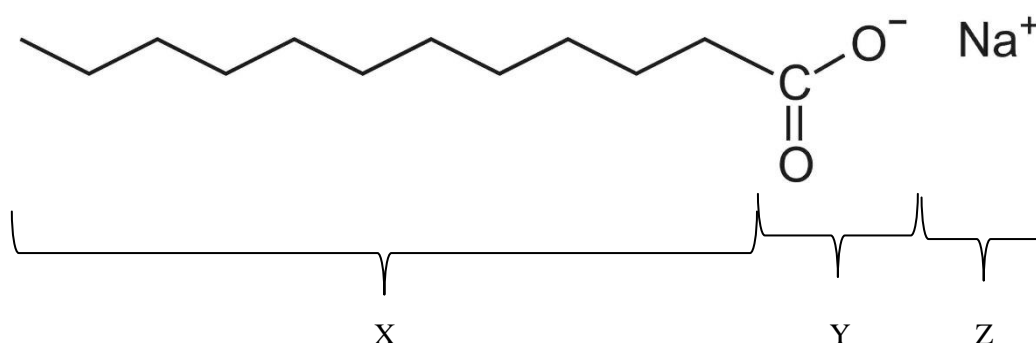
	Match head *Kepala mancis*	Matchsticks *Batang mancis*
A	X	Y
B	Y	Z
C	Y	X
D	Z	X

NAMA   : ……………………………………..

TINGKATAN : …………………………….

JABATAN PELAJARAN NEGERI MELAKA
DENGAN KERJASAMA
MAJLIS PENGETUA SEKOLAH MALAYSIA
CAWANGAN MELAKA

MPSM

PEPERIKSAAN PERCUBAAN SPM 2016
NEGERI MELAKA

4541/2

KIMIA
Kertas 2
Ogos/Sept
2 ½ jam

Dua jam tiga puluh minit
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JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tulis **nama** dan **tingkatan** anda pada ruangan yang disedikan di atas.*

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 sebelah kertas soalan ini*

.

Untuk Kegunaan 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		100	

Kertas soalan ini mengandungi **25** halaman bercetak

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 `writing paper' provided by the invigilators.
   Answer questions in **Section B** and **Section C** in detail.
   You may use equations, diagrams, tables, graphs and other suitable methods to explain your answer.
   Jawab **satu** *soalan daripada* **Bahagian B** *dan* **satu** *soalan daripada* **Bahagian C.** *Tuliskan jawapan bagi* **Bahagian B** *dan* **Bahagian C** *pada kertas tulis yang disediakan.* *Jawab* **Bahagian B** *dan* **Bahagian C** *dengan terperinci.* *Anda boleh menggunakan persamaan, gambar rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda.*

4. Show your working. It may help you to get marks.
   Tunjukkan kerja mengira.Ini membantu anda mendapatkan markah.

5. If you wish to change your answer, neatly cross out the answer that you have done. Then write down the new answer.
   Sekiranya anda hendak membatalkan sesuatu jawapan, buat garisan di atas jawapan itu.

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

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

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

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

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

Section A
Bahagian A
[60 marks]
[60 markah]

https://cikguadura.wordpress.com/
Answer **all** questions in this section
*Jawab **semua** soalan dalam bahagian ini.*

1 Diagram 1.1 shows the change of the states of matter of an ice cubes which turn to liquid after a while.
Rajah 1.1 *menunjukkan perubahan keadaan jirim bagi kiub ais yang bertukar menjadi cecair selepas beberapa ketika.*

Diagram 1.1 / *Rajah* 1.1

(a)   Based on Diagram 1.1,
Berdasarkan Rajah 1.1*,*

(i)   state the process of physical change that occurred.
nyatakan proses perubahan fizik yang berlaku.

………………………………………………………………………………

[1 *mark*]

1(a)(i)

1

(ii) Draw the arrangement of particles in the state of matter after the process occur.
Lukis susunan zarah-zarah dalam keadaan jirim selepas berlakunya proses tersebut.

1(a)(ii)

[1 *mark*]

1

(b)   Based on the process occurs in Diagram 1.1 , state the change to :
Berdasarkan proses yang berlaku dalam Rajah 1.1, nyatakan perubahan
yang berlaku kepada :

    (i)   the kinetic energy of the particles
        tenaga kinetik zarah-zarah

        …………………………………………………………………………………
                                    [1 *mark*]

1(b)(i)

1

    (ii) the forces of attraction between particles
         daya tarikan antara zarah-zarah

        …………………………………………………………………………………
                                      [1 *mark*]

1(b)(ii)

1

(c)   Diagram 1.2 shows an atom of element Z based on the model proposed by
James Chadwick.
Rajah 1.2 menunjukkan satu atom unsur Z berdasarkan model atom yang
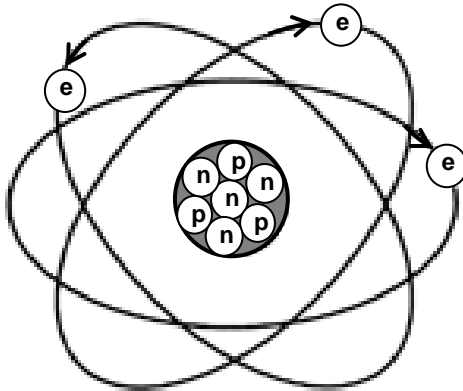*dikemukakan oleh James Chadwick.*

Key / *Kekunci* :

    p : proton / *proton*
    n : neutron / *neutron*
    e : electron / *elektron*

Diagram 1.2 / *Rajah* 1.2

(i) Complete the table below to compare the relative mass and the charge of the following subatomic particles :
Lengkapkan jadual di bawah untuk membandingkan jisim relatif dan cas bagi zarah-zarah subatom berikut :

Subatomic particle *Zarah subatom*	Relative mass *Jisim relatif*	Relative charge *Cas relatif*
proton *proton*		
electron *elektron*		

1(c)(i)

2

[2 *marks*]

(ii) State the nucleon number for atom Z.
Nyatakan nombor nukleon bagi atom Z.

1(c)(ii)

....

[1 *mark*]

1

(iii) Write the symbol of Z element in the form of $_X^A Z$

Tuliskan simbol unsur Z dalam bentuk $_X^A Z$

1(c)(iii)

....

[1 *mark*]

1

(iv) Atom Y and atom Z are isotopes of an element.
What is the proton number of atom Y?
Atom Y dan atom Z adalah isotop bagi suatu unsur.
Apakah nombor proton bagi atom Y?

1(c)(iv)

....

[1 *mark*]

1

Total A1

9

2 (a) Tartaric acid is used as flavouring in food and beverages. Diagram 2.1 shows the molecular formula of tartaric acid.
Asid tartarik digunakan sebagai perisa dalam makanan dan minuman.
Rajah 2.1 menunjukkan formula molekul bagi asid tartarik.

$$\boxed{C_4H_6O_6}$$

Diagram 2.1 / *Rajah* 2.1

(i) What is the meaning of molecular formula?
Apakah yang dimaksudkan dengan formula molekul?

....

....
[1 *mark*]

2(a)(i)

| 1 |

(ii) Write the empirical formula of tartaric acid.
Tulis formula empirik bagi asid tartarik.

....
[1 *mark*]

2(a)(ii)

| 1 |

(iii) State the difference between molecular formula and empirical formula of tartaric acid.
Nyatakan perbezaan antara formula molekul dan formula empirik bagi asid tartarik.

....

....
[1 *mark*]

2(a)(iii)

| 1 |

(b) Diagram 2.2 shows a chemical equation for a reaction.
Rajah 2.2 *menunjukkan satu persamaan kimia bagi suatu tindak balas.*

$$2KI(aq) \; + \; Pb(NO_3)_2(aq) \; \rightarrow \; 2KNO_3(aq) \; + \; PbI_2(s)$$

$$2KI(ak) \; + \; Pb(NO_3)_2(ak) \; \rightarrow \; 2KNO_3(ak) \; + \; PbI_2(p)$$
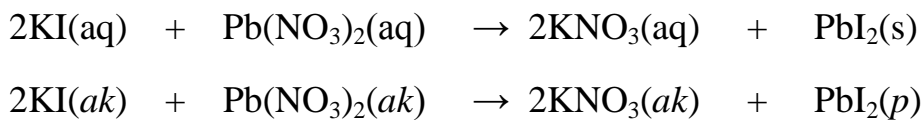
Diagram 2.2 / *Rajah* 2.2

Based on the equation, answer the following questions;
Berdasarkan persamaan itu, jawab soalan-soalan berikut;

(i) State the name of reactants and a products.
Nyatakan nama bagi bahan tindak balas dan hasil tindak balas.

Reactants: …………………………………………….……………
Bahan tindak balas

Products: ………..……………………………………………………
Hasil tindak balas

[2 *marks*]

2(b)(i)

2

(ii) What is the physical state of PbI_2?
Apakah keadaan fizik bagi PbI_2?

....
[1 *mark*]

2(b)(ii)

1

(iii) In this reaction, 50 cm^3 of 0.5 mol dm^{-3} $Pb(NO_3)_2$ solution has reacted with KI solution. Calculate the mass of PbI_2 formed.
[Relative atomic mass : Pb = 207 ; I = 127]
Dalam tindak balas ini, 50 cm^3 *larutan* $Pb(NO_3)_2$ 0.5 mol dm^{-3} *telah bertindak balas dengan larutan* KI. *itung jisim* PbI_2 *yang terbentuk.*
[*Jisim atom relatif* : Pb = 207 ; I = 127]

2(b)(iii)

[3 *marks*]

1

Total A2

9

3 Standard representation of sodium and oxygen are stated respectively in diagram 3.1

Perwakilan piawai bagi natrium dan oksigen masing-masing dinyatakan dalam Rajah 3.1

$$^{23}_{11}Na \qquad ^{16}_{8}O$$
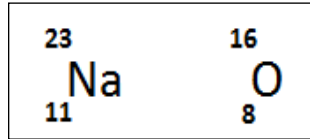
Diagram 3.1
Rajah 3.1

(a) (i) State the electron arrangement of sodium ion and oxide ion.
Nyatakan susunan elektron bagi ion natrium dan ion oksida.

Sodium ion / *ion natrium* :………………………………………………………

Oxide ion /*ion oksida*:…………………………………………………....

3(a)(i)

[2 marks]

| | 2 |

(ii) Compare the size of sodium and oxygen atom. Explain your answer.
Banding saiz atom natrium dan atom oksigen. Terangkan jawapan anda.

....

....

....

3(a)(ii)

| | 2 |

[2 marks]

(b) (i) Sodium atom and oxygen atom are able to form a compound. Draw the electron arrangement of the compound.

Atom natrium dan atom oksigen boleh membentuk suatu sebatian. Lukiskan susunan elektron sebatian itu.

3(b)(i)

[2 marks]

| | 2 |

(ii) Write the chemical formula of the compound formed.

Tuliskan formula kimia bagi sebatian yang terhasil.

3(b)(ii)

1

....

[1 mark]

(c) (i) State one observation when water are poured onto the compound in a test tube

Nyatakan satu pemerhatian apabila air dituang kepada sebatian tersebut di dalam sebuah tabung uji.

3(c)(i)

1

....

[1 mark]

(ii) Write a balance chemical equation for the reaction.

Tuliskan persamaan kimia seimbang bagi tindakbalas itu.

3(c)(ii)

2

....

[2 marks]

Total A3

10

4 Diagram 3.1 shows the set-up apparatus to study a chemical cell.
Rajah 3.1 menunjukkan susunan radas untuk mengkaji suatu sel kimia.
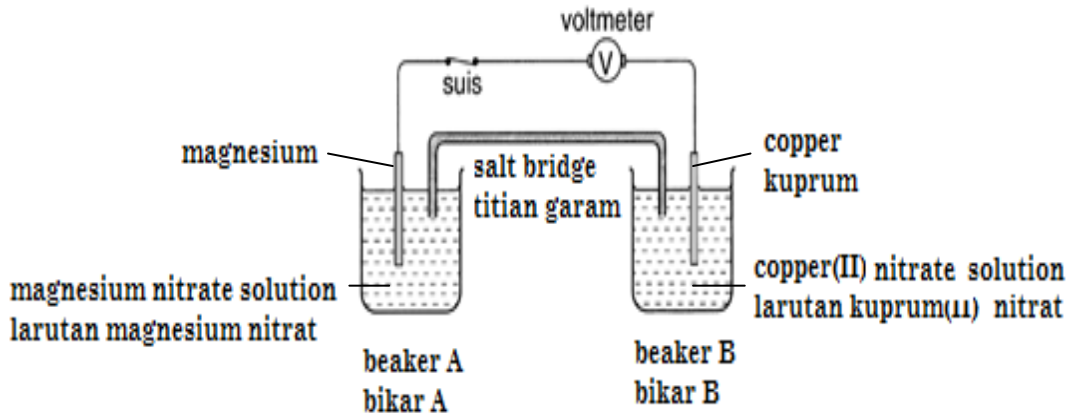
Diagram 3.1 /*Rajah 3.1*

(a) State all ions present in beaker A.
Nyatakan semua ion yang hadir dalam bikar A.

……………………………………………………………………………………...................
[1 mark]

4(a)

1

(b) Dilute sulphuric acid is used as a salt bridge in the cell. Suggest another chemical substance that can replace sulphuric acid.
Asid sulfurik cair telah digunakan sebagai titian garam dalam sel tersebut. Cadangkan bahan kimia lain yang boleh menggantikan asid sulfurik.

……………………………………………………………………………………...........
[1 mark]

4 (b)

1

(c) (i) Referring to beaker B, state the process that occurs at copper electrode.
Merujuk kepada bikar B, nyatakan proses yang berlaku di elektrod kuprum

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

4(c)(i)

1

(ii) Explain your answer in (c)(i) based on the change in oxidation number.
Jelaskan jawapan anda di (c)(i) berdasarkan perubahan nombor pengoksidaan.

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

4(c)(ii)

1

(d) Write the half-equations for the reaction occurred at both terminals.
Tuliskan setengah persamaan bagi tindakbalas yang berlaku pada kedua-dua terminal.

Negative terminal: ……………………………………………….........................
Terminal negatif

Positive terminal: ……………………………………………….........................
Terminal positif

[2 marks]

(d)

2

(e) The voltmeter reading in Diagram 3.1 is 2.7V.
Bacaan voltmeter dalam Rajah 3.1 ialah 2.7V.

Predict the potential difference if copper electrode is replaced with silver
Ramalkan beza upaya jika elektrod kuprum digantikan dengan argentum

……………………………………………………………….............................

[1 mark]

4(e)

1

(f) Magnesium and magnesium nitrate solution in Diagram 3 are replaced with silver and silver nitrate solution.
Magnesium dan larutan magnesium nitrat dalam Rajah 3 digantikan dengan argentum dan larutan argentum nitrat.

   (i) State the flow of electron in the cell.
   Nyatakan arah pengaliran elektron dalam sel tersebut.

   ………………………………………………………………….. ……

   [1 mark]

4(f)(i)

1

   (ii) Write the ionic equation for the reaction occurs in the cell in (f)(i).
   Tulis persamaan ion bagi tindakbalas yang berlaku dalam sel di (f)(i).

   ………………………………………………………………….. ……

   [2 marks]

4(f)(ii)

2

Total A4

10

5 Sulphuric acid is a strong acid. Table 5.1 shows two solutions of sulphuric acid, P and Q of different concentrations.
Asid sulfurik ialah asid kuat. Jadual 5.1 menunjukkan dua larutan asid sulfurik, P dan Q dengan kepekatan yang berlainan.

Sulphuric acid solution *Larutan asid sulfurik*	Concentration (moldm^{-3}) *Kepekatan (moldm^{-3})*
P	0.005
Q	0.05

Table 5.1/ *Jadual 5.1*

(a) State the meaning of strong acid.
Nyatakan maksud asid kuat.

5(a)

....

....
[2 marks]

2

(b) Solutions P and Q have different pH values.
Larutan P dan Q mempunyai nilai pH yang berbeza.

(i) Which solution gives a lower pH value?
Larutan yang manakah memberi nilai pH yang lebih rendah?

5(b)(i)

....
[1 mark]

1

(ii) Give one reason for the answer in 5(b)(i).
Beri satu sebab bagi jawapan di 5 (b)(i).

5(b)(ii)

....

....
[1 mark]

1

Diagram 5.1 shows the apparatus used in the titration process between an aqueous potassium hydroxide solution and dilute sulphuric acid by using indicator A.
Rajah 5.1 menunjukkan radas yang digunakan dalam proses pentitratan antara larutan akueus kalium hidroksida dengan asid sulfurik cair dengan menggunakan penunjuk A.

Apparatus P
Radas P

Dilute sulphuric acid
Asid sulfurik cair

25.0 cm^3 of 1.0 mol dm^{-3}
potassium hydroxide solution
25.0 cm^{3}larutan kalium hidroksida
1.0 mol dm^{-3}

25.0 cm^3 of 1.0 mol dm^{-3} potassium hydroxide solution + indicator A
25.0 cm^{3}larutan kalium hidroksida 1.0 mol dm^{-3} + penunjuk A
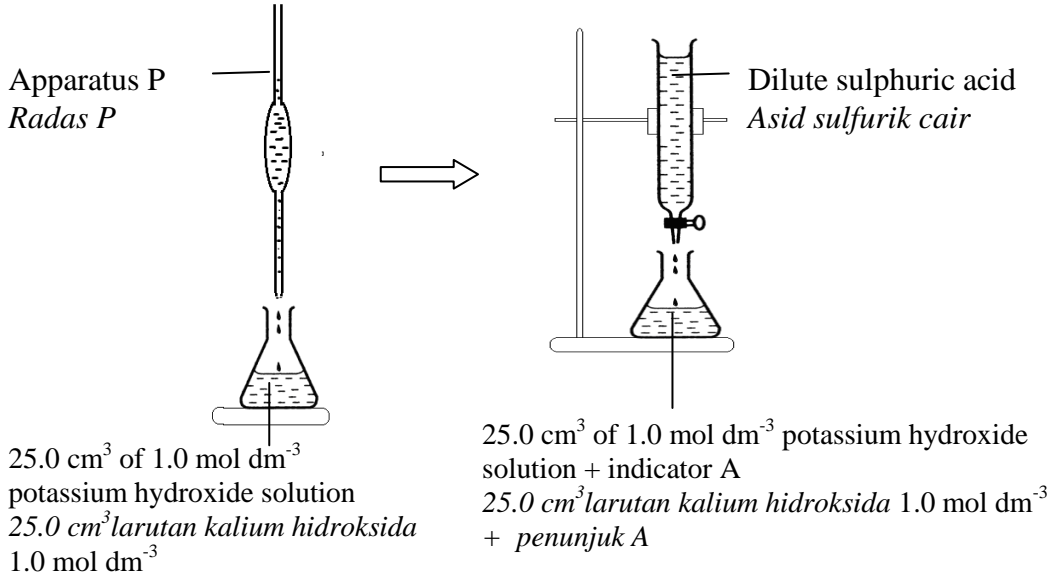
Diagram 5.1/ *Rajah 5.1*

(c) Name:
Namakan:

(i) indicator A:
penunjuk A : ....
[1 mark]

5(c)(i)

1

(ii) the process occur in diagram 5.1.
proses yang berlaku dalam rajah 5.1.

....
[2 marks]

5(c)(ii)

1

(iii) Based on answer in 5(c)(i), state the colour change of the solution in conical flask at the end point.
Berdasarkan jawapan di 5(c)(i), nyatakan perubahan warna larutan dalam kelalang kon pada takat akhir.

....
[1 mark]

5(c)(iii)

1

(d) (i) Write a balanced chemical equation for the reaction between potassium hydroxide solution with sulphuric acid.
Tulis persamaan kimia yang seimbang bagi tindak balas antara larutan kalium hidroksida dengan asid sulfurik.

2

....

[2 marks]

(ii) In this experiment, 10.00 cm^3 of dilute sulphuric acid is needed to neutralise completely 25.0 cm^3 of 1.0 mol dm^{-3} potassium hydroxide solution. Calculate the molarity of dilute sulphuric acid.
Dalam eksperimen ini, 10.00 cm^3 asid sulfurik cair diperlukan untuk meneutralkan dengan lengkap 25.0 cm^3 larutan kalium hidroksida 1.0 mol dm^{-3}. Hitung kemolaran asid sulfurik cair.

[2 marks]

2

Total A5

11

6 Table 6.1 shows the result of two experiments to investigate the rate of reaction between zinc powder and two different acids.
Jadual 6.1 menunujukkan keputusan dua eksperimen untuk mengkaji kadar tindakbalas antara serbuk zink dengan dua asid yang berbeza.

Experiment *Eksperimen*	Explanation *Penerangan*	Time taken for complete reaction *Masa yang diambil untuk tindak balas lengkap*
I	Zinc powder + 100 cm^3 of 0.5 mol dm^{-3} sulphuric acid *Serbuk zink + 100 cm^3 asid sulfurik 0.5 mol dm^{-3}*	40 s
II	Zinc powder + 100 cm^3 of 0.5 mol dm^{-3} hidrochloric acid *Serbuk zink + 100 cm^3 asid hidroklorik 0.5 mol dm^{-3}*	60 s

Table 6.1
Jadual 6.1

(a) State a factor that can affect the rate of reaction in the experiment.
Nyatakan faktor yang mempengaruhi kadar tindak balas bagi eksperimen ini.

6(a)

……………………………………………………………………………………………

[1 mark]

1

(b)(i) Given that the chemical equation for Experiment 1 is as below:

Zn(s) + H$_2$SO$_4$(aq) → ZnSO$_4$(aq) + H$_2$ (g)
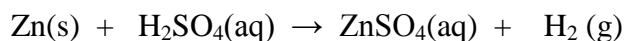
Based on the given equation, state the observable changes to determine the rate of reaction?
Diberi persamaan kimia bagi tindakbalas Eksperimen1 seperti berikut:

Zn(p) + H$_2$SO$_4$(ak) → ZnSO$_4$(ak) + H$_2$ (g)
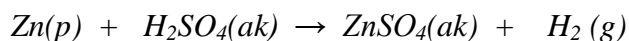
Berdasarkan persamaan yang diberi,nyatakan perubahan yang boleh diperhatikan untuk menentukan kadar tindakbalas?

6(b)(i)

1

……………………………………………………………………………………………

[1 mark]

(ii) Draw the set up apparatus to determine the rate of reaction for the experiment above.
Lukiskan susunan radas untuk menentukan kadar tindak balas bagi eksperimen di atas.

6(b)(ii)

[2 marks]

	2

(c)(i) Write the ionic equation for Experiment II
Tuliskan persamaan ion bagi tindak balas bagi Eksperimen II.

6(c)(i)

……………………………………………………………………………………….
[1 mark]

	1

(ii) Calculate the maximum volume of gas released in Experiment II.
[Molar volume of gas = 24 dm^3 mol^{-1}]
Hitung isipadu maksimum gas yang dibebaskan di dalam Eksperimen II.
[Isipadu molar gas = 24 dm^3 mol^{-1}]

6(c)(ii)

[2 marks]

	2

(d)(i) Diagram 6.2 shows the graph of volume of gas released against time for Experiment 1. Sketch the curve for Experiment 2 in the same axis in Diagram 6.2.
Rajah 6.2 menunjukkan graf isipadu gas melawan masa untuk Eksperimen 1. Lakarkan lengkungan untuk Eksperimen II pada paksi yang sama dalam Rajah 6.2.

[1 marks]

Volume of gas (dm^3)
Isipadu gas(dm^3)

V

40   Time(s)
      Masa (s)

Diagram 6.2
Rajah 6.2

6(d)(i)

1
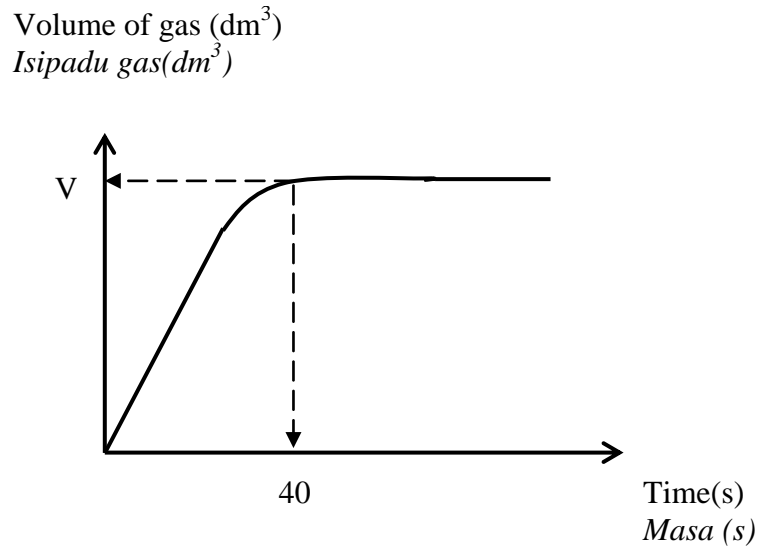
(ii) Based on your answer in (d)(i), explain the difference of the rate of reaction between Experiment 1 and Experiment II by using collision theory.
Berdasarkan jawapan anda di (d)(i), bandingkan kadar tindakbalas di antara Eksperimen 1 dan Eksperimen II dengan menggunakan teori pelanggaran.

…………………………………………………………………………………...

……………………………………………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………

[3 marks]

6(d)(ii)

3

Total A6

11

Section B
Bahagian B
[20 *marks*]
[20 markah]

Answer any **one** *question.*
The time suggested to answer this section is 30 minutes.

7(a) Fermentation is a metabolic process performed by almost all types of bacteria .Humans have used fermentation to produce food and beverages since the Neolithic age. For example, fermentation is used for preservation in a process that produces lactic acid as found in such sour foods as pickled cucumbers, kimchi and yogurt as well as for producing alcoholic beverages such as wine and beer.

Penapaian adalah suatu proses metabolik bagi hampir semua jenis bakteria. Manusia menggunakan penapaian untuk menhasilkan makanan dan minuman sejak zaman Neolitik. Sebagai contoh, penapaian digunakan untuk mengawet dalam proses yang menghasilkan asid laktik dalam makanan masam seperti jeruk timun, kimchi dan susu masam, juga dalam menghasilkan minuman beralkohol seperti wain dan bir.

(i)   State the name of the alcohol produce during fermentation of glucose and give three physical properties of the alcohol .
Nyatakan nama alkohol yang terhasil semasa penapaian glukosa dan berikan tiga sifat-sifat fizik alkohol tersebut.

[4 marks]

(ii) Alcohol reacts with carboxylic acid to produce a fragrant smell substance known as ester. By using the named alcohol as your answer in (a)(i) and propanoic acid as reactants,

- State the name of the reaction
- Write a chemical equation for the reaction.
- State the name of the ester produced.
- Draw the structural formula of the ester produced
- Write the general formula for the homologous series of ester

Alkohol bertindakbalas dengan asid karboksilik menghasilkan bahan berbau harum yang dikenali sebagai ester. Dengan menggunakan alkohol dalam jawapan anda di (a)(i) dan asid propanoik sebagai bahan tindakbalas ,

- *Nyatakan nama tindak balas tersebut*
- *Tuliskan persamaan kimia bagi tindak balas itu*
- *Nyatakan nama ester yang terhasil*
- *Lukiskan formula struktur bagi ester tersebut*
- *Tuliskan formula am bagi siri homolog ester*

[6 marks]

7 (b) Diagram 7.1 shows the thermochemical equation for the precipitation reaction between 20 cm^3 0.5 mol dm^{-3} potassium chloride solution and 20 cm^3 0.5 mol dm^{-3} silver nitrate solution.
Rajah 7.1 menunjukkan persamaan termokimia bagi tindakbalas pemendakan antara 20 cm^3 0.5 mol dm^{-3} larutan kalium klorida dan 20 cm^3 0.5 mol dm^{-3} larutan argentum nitrat

$$KCl + AgNO_3 \rightarrow AgCl + KNO_3, \quad \Delta H = -65.5 \text{ kJ mol}^{-1}$$

Diagram 7.1 / *Rajah 7.1*

(i) State the meaning of Heat of Precipitation for this reaction.
Nyatakan maksud Haba Pemendakan untuk tindakbalas ini

[1 mark]
1 markah

(ii) Draw the energy level diagram for the reaction.
Lukis gambar rajah aras tenaga bagi tindak balas ini.

[2marks]
[*2 markah*]

(iii) Calculate the change in temperature for this precipitation reaction.
[Specific heat capacity of solution = 4.2 Jg^{-1}°C^{-1} ,
Density of solution = 1g cm^{-3}]
Hitung perubahan suhu bagi tindakbalas pemendakan ini.
[Muatan Haba tentu larutan= 4.2 Jg^{-1}°C^{-1} , Ketumpatan larutan = 1g cm^{-3}]

State the temperature change for the reaction if sodium chloride solution is used to replace potassium chloride solution while other conditions remain the same. Give your reason.
Nyatakan perubahan suhu bagi tindak balas pemendakan jika larutan natrium klorida digunakan menggantikan larutan kalium klorida manakala lain-lain keadaan kekal sama. Berikan alasan anda.

[7 marks]
[7 markah]
https://cikguadura.wordpress.com/

8 (a) Diagram 8.1 show ammonium sulphate formed from the reaction between substance X and ammonia. Substance X is produced from Contact Process whereas ammonia from Process Z. Pollutant Y is the by product in Contact Process.
Rajah 8.1 *menunjukkan penghasilan ammonium sulfat daripada tindak balas bahan* X *dan ammonia. Bahan* X *dihasilkan daripada Proses Sentuh manakala ammonia dihasilkan daripada Proses* Z. *Bahan pencemar* Y *adalah hasil sampingan Proses Sentuh* .
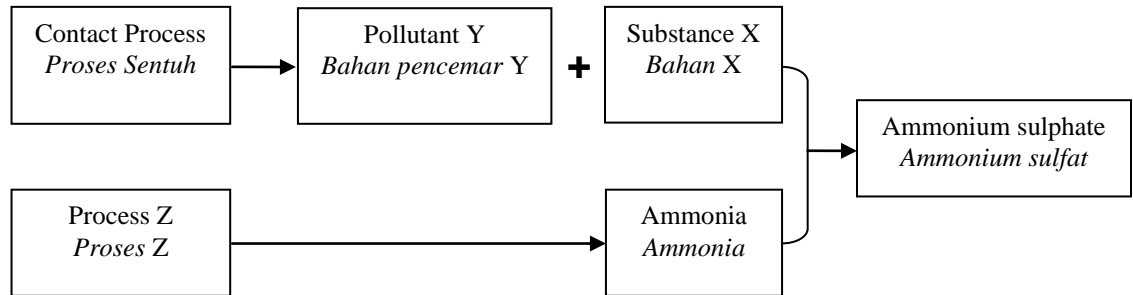
Diagram 8.1/ *Rajah* 8.1

(i) State the name of substance X and pollutant Y.
Nyatakan nama bahan X *dan bahan pencemar* Y.

[2 *marks*]

(ii) State one use of ammonium sulphate.
Write the chemical equation for the reaction between substance X and ammonia to produced ammonium sulphate.
Nyatakan satu kegunaan ammonium sulfat.
Tuliskan persamaan kimia bagi tindak balas antara bahan X *dan ammonia untuk menghasilkan ammonium sulfat.*

[3 *marks*]

(iii) Describe briefly Process Z in industry to produce ammonia.
Huraikan secara ringkas Proses Z *dalam industri untuk menghasilkan ammonia.*

[4 *marks*]

(iv) State three effects of pollution caused by pollutant Y.
Nyatakan tiga kesan pencemaran yang disebabkan oleh bahan pencemar Y.

[3 *marks*]

(b) Describe the cleansing action of soap to remove dirt and grease from the clothes.
Huraikan tindakan pencucian sabun untuk menanggalkan kekotoran dan gris daripada pakaian.

[6 marks]

(c) Name two types of modern medicine and state their functions.
Namakan dua jenis ubat moden dan nyatakan fungsinya.

[2 mark]

9 (a) Diagram 9.1 shows the time taken for meat to cook using different size of lamb meat
Rajah 9.1 menunjukkan masa yang diambil untuk memasak daging menggunakan saiz daging kambing yang berbeza.

120 minutes	20 minutes
120 *minit*	20 *minit*

Diagram 9.1 / *Rajah* 9.1

Explain why different size of meat takes different times to cook?
Terangkan mengapa saiz daging yang berbeza mengambil masa yang berbeza untuk masak?

[2 *marks*]

(b) Two experiments are carried out to investigate the factor affecting the rate of reaction between carbonate of P and an acid Q. Table 9.1 shows the reactants and the time taken to collect 30 cm^3 of carbon dioxide gas released.
Dua eksperimen dijalankan untuk mengkaji faktor yang mempengaruhi kadar tindak balas antara P karbonat dan asid Q. Jadual 9.1 menunjukkan bahan tindak balas dan masa yang diambil untuk mengumpul 30 cm^3 gas karbon dioksida yang terbebas.

Experiment *Eksperimen*	Reactants *Bahan tindak balas*		Time taken (s) *Masa diambil (s)*
I	Carbonate of P powder in excess *Serbuk P karbonat berlebihan*	50 cm^3 of 1.0 mol dm^{-3} acid Q *50 cm^3 asid Q 1.0 mol dm^{-3}*	10
II	Carbonate of P granule in excess *Ketulan P karbonat berlebihan*	50 cm^3 of 1.0 mol dm^{-3} acid Q *50 cm^3 asid Q 1.0 mol dm^{-3}*	20

Table 9.1/ *Jadual* 9.1

(i) State **one** example which could be carbonate of P and **one** which could be acid Q.
*Nyatakan **satu** contoh yang mungkin bagi P karbonat dan **satu** contoh yang mungkin bagi asid Q.*

By using the carbonate of P and acid Q, write the chemical equation for the reaction occured.
Menggunakan P karbonat dan asid Q tersebut, tulis persamaan kimia bagi tindak balas yang berlaku.

[4 *marks*]

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

[4 *marks*]

(c)

> When sodium thiosulphate, $Na_2S_2O_3$ solution reacts with sulphuric acid, H_2SO_4, a precipitate is formed.
> *Apabila larutan natrium tiosulfat , $Na_2S_2O_3$ bertindak balas dengan asid sulfurik, H_2SO_4, suatu mendakan terbentuk*

Based on the statement above, name the precipitate formed.
Describe a laboratory experiment to investigate the effect of temperature on the rate of reaction between sodium thiosulphate, $Na_2S_2O_3$ solution and sulphuric acid, H_2SO_4.

Berdasarkan pernyataan di atas, namakan mendakan yang terbentuk.
Huraikan satu eksperimen makmal untuk mengkaji kesan suhu terhadap kadar tindak balas di antara larutan natrium tiosulfat, $Na_2S_2O_3$ dengan asid sulfurik, H_2SO_4.

Your answer must include the following:
Jawapan anda perlu mengandungi perkara berikut:

- List of materials
  Senarai bahan

- List of apparatus
  Senarai radas

- Procedure of the experiment and result
  Prosedur eksperimen dan keputusan

- Conclusion
  Kesimpulan

[10 marks]

10   Diagram 10.1shows the set-up of apparatus to prepare two solutions of hydrogen chloride in solvent X and solvent Y.
Rajah 10.1 menunjukkan susunan radas untuk menyediakan dua larutan hidrogen klorida di dalam pelarut X dan pelarut Y.
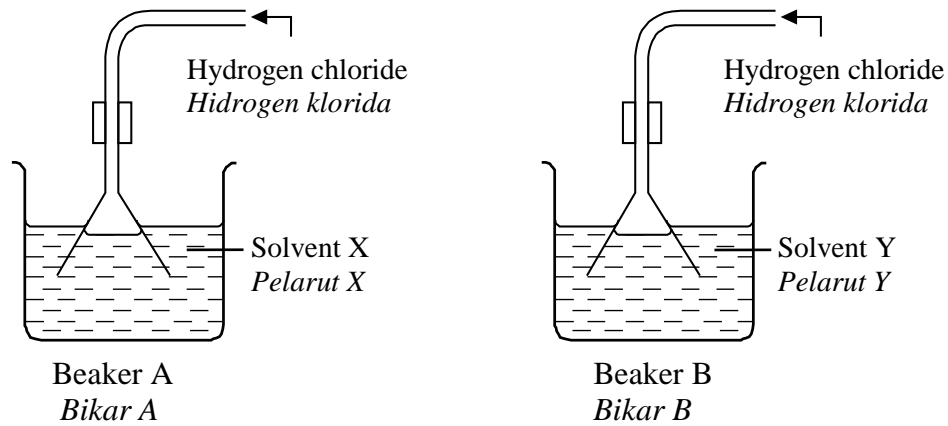
Diagram 10.1/ *Rajah 10.1*

Table 10.1 shows the pH values of the two solutions of hydrogen chloride in solvent X and solvent Y.
Jadual 10.1 menunjukkan nilai pH bagi dua larutan hidrogen klorida dalam pelarut X dan pelarut Y.

Solution *Larutan*	pH value *Nilai pH*
Hydrogen chloride in solvent X *Hidrogen klorida dalam pelarut X*	7
Hydrogen chloride in solvent Y *Hidrogen klorida dalam pelarut Y*	1

Table 10.1/*Jadual 10.1*

(a)   (i)   Name a suitable substance that can be used as solvent X and solvent Y.
Namakan bahan yang sesuai yang boleh digunakan sebagai pelarut X dan pelarut Y.

[2 marks]
[2 *markah*]

(ii) Describe a chemical test to differentiate the two solutions of hydrogen chloride in solvent X and solvent Y. *Explain your answer.*
Huraikan satu ujian kimia untuk membezakan dua larutan hidrogen klorida di dalam pelarut X dan pelarut Y. Terangkan jawapan anda.

[6 marks]
[6 *markah*]

(b) (i) From table 10.1, choose suitable hydrogen chloride that can be used to prepare a soluble zinc salt. Explain your answer.
Dari jadual 10.1, pilih hidrogen klorida yang sesuai yang digunakan untuk menyediakan satu garam zink terlarut. Terangkan jawapan anda.

[2 *marks*]
[2 markah]

(ii) By using hydrochloric acid and one suitable substance, describe an experiment to prepare dried zinc chloride salt.
Dengan menggunakan asid hidroklorik dan satu bahan yang sesuai, huraikan satu eksperimen untuk menyediakan garam zink klorida yang kering.

[10 markah]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

PERIODIC TABLE OF ELEMENTS

Key:
← Proton Number
← Symbol of Elements
← Name of the element
← Relative atomic mass

11
Na
Sodium
23

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 **H** Hydrogen 1																	2 **He** Helium 4
3 **Li** Lithium 7	4 **Be** Beryllium 9											5 **B** Boron 11	6 **C** Carbon 12	7 **N** Nitrogen 14	8 **O** Oxygen 16	9 **F** Fluorine 19	10 **Ne** Neon 20
11 **Na** Sodium 23	12 **Mg** Magnesium 24						Transition Elements					13 **Al** Aluminum 27	14 **Si** Silicon 28	15 **P** Phosphorus 31	16 **S** Sulfur 32	17 **Cl** Chlorine 35.5	18 **Ar** Argon 40
19 **K** Potassium 39	20 **Ca** Calcium 40	21 **Sc** Scandium 45	22 **Ti** Titanium 48	23 **V** Vanadium 51	24 **Cr** Chromium 52	25 **Mn** Manganese 55	26 **Fe** Iron 56	27 **Co** Kobalt 59	28 **Ni** Nickel 59	29 **Cu** Copper 64	30 **Zn** Zinc 65	31 **Ga** Gallium 70	32 **Ge** Germanium 73	33 **As** Arsenic 75	34 **Se** Selenium 79	35 **Br** Bromine 80	36 **Kr** Krypton 84
37 **Rb** Rubidium 85.5	38 **Sr** Strontium 88	39 **Y** Yttrium 89	40 **Zr** Zirconium 91	41 **Nb** Niobium 93	42 **Mo** Molybdenum 96	43* **Tc** Technetium 98	44 **Ru** Ruthenium 101	45 **Rh** Rhodium 103	46 **Pd** Palladium 106	47 **Ag** Silver 108	48 **Cd** Cadmium 112	49 **In** Indium 115	50 **Sn** Tin 119	51 **Sb** Antimony 122	52 **Te** Tellurium 128	53 **I** Iodine 127	54 **Xe** Xenon 131
55 **Cs** Cesium 144	56 **Ba** Barium 137	57 **La** Lanthanum 139	72 **Hf** Hafnium 178.5	73 **Ta** Tantalum 181	74 **W** Tungsten 184	75 **Re** Rhenium 186	76 **Os** Osmium 190	77 **Ir** Iridium 192	78 **Pt** Platinum 195	79 **Au** Gold 197	80 **Hg** Mercury 201	81 **Tl** Thallium 204	82 **Pb** Lead 207	83 **Bi** Bismuth 209	84 **Po** Polonium 210	85 **At** Astatine 210	86 **Rn** Radon 222
87 **Fr** Francium 223	88 **Ra** Radium 226	89 **Ac** Actinium 227	104* **Unq**	105* **Unp**	106* **Unh**	107* **Uns**	108* **Uno**	109* **Une**									

* - Not exist naturally
* - elements not yet discovered

Lanthanide Series

58 **Ce** Cerium 140	59 **Pr** Praseodimiu 141	60 **Nd** Neodymiu 144	61* **Pm** Promethiu 147	62 **Sm** Samariu 150	63 **Eu** Europiu 152	64 **Gd** Gadoliniu 157	65 **Tb** Terbiu 159	66 **Dy** Dysposium 162.5	67 **Ho** Holmiu 165	68 **Er** Erbium 167	69 **Tm** Tulium 169	70 **Yb** Ytterbium 173	71 **Lu** Lutetiu 175

Actinide Series

90 **Th** Thorium 232	91 **Pa** Protactinium 231	92 **U** Uranium 238	93* **Np** Neptunium 237	94* **Pu** Plutonium 242	95* **Am** Americium 243	96* **Cm** Kurium 247	97* **Bk** Berkelium 247	98* **Cf** Californium 251	99* **Es** Einsteinium 254	100* **Fm** Fermium 253	101* **Md** Mendelevium 256	102* **No** Nobelium 254	103* **Lr** Lawrendiu 260

NAMA : ………………………………………………..

TINGKATAN : ……………………………

**JABATAN PELAJARAN NEGERI MELAKA
DENGAN KERJASAMA
MAJLIS PENGETUA SEKOLAH MALAYSIA
CAWANGAN MELAKA**

PEPERIKSAAN PERCUBAAN SPM 2016

4541/3

NEGERI MELAKA

KIMIA
Kertas 3
Ogos/Sept
1 ½ iam

Satu jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tulis **nama** dan **tingkatan** anda pada ruangan yang disedikan di atas.*

2. *Kertas soalan ini adalah dalam **dwibahasa**.*

3. *Soalan dalam Bahasa Inggeris mendahului soalan yang sepadan dalam Bahasa Melayu.*

Untuk kegunaan pemeriksa sahaja		
Soalan	Markah Penuh	Markah diperolehi
1	33	
2	17	
Jumlah	50	

Kertas soalan ini mengandungi 12 halaman bercetak

4541/3

[Lihat sebelah

SULIT

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of two questions: **Question 1** and **Question 2**.
   *Kertas soalan ini mengandungi dua soalan: **Soalan** 1 dan **Soalan** 2.*

2. Answer **all** questions. Write your answers for **Question 1** in the spaces provided in this question paper.
   *Jawab **semua** soalan. Tulis jawapan anda bagi **Soalan** 1 pada ruang yang disediakan dalam kertas soalan ini.*

3. Write your answers for **Question 2** on the 'helaian tambahan' provided by the invigilators. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answers.
   *Tulis jawapan anda bagi **Soalan** 2 dalam helaian tambahan yang dibekalkan oleh pengawas peperiksaan. Anda boleh menggunakan persamaan, 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. The diagrams in the questions are not drawn to scale unless stated.
   Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

6. The marks allocated for each question or sub-part of a question are shown in brackets.
   Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.

7. 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 baharu.

8. You may use a scientific calculator.
   Anda dibenarkan menggunakan kalkulator saintifik.

9. 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.

10. Tie the extra sheet together with this question paper and hand in to the invigilator at the end of the examination.
    Ikat helaian tambahan bersama-sama kertas soalan ini dan serahkan kepada pengawas peperiksaan pada akhir peperiksaan.

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

1 A student have conduct an experiment to compare the strength of four different acid which are acid P, acid Q, acid R and acid S. Concentration of all the acids is 0.1 mol dm^{-3}. Universal indicator was used to measure the pH value of the acids and the colours obtained was compared with universal indicator chart in Diagram 1.1

Seorang pelajar telah menjalankan satu eksperimen untuk membandingkan kekuatan empat asid yang berlainan iaitu asid P, asid Q, asid R dan asid S. Kepekatan keempat-empat asid ialah 0.1 mol dm^{-3}. Penunjuk universal digunakan untuk mengukur nilai pH kesemua asid dan warna-warna yang diperolehi dibandingkan dengan carta penunjuk universal dalam Rajah 1.1

Universal Indicator Chart *Carta Penunjuk Universal*	
pH *pH*	**Warna** *Colour*
1	Red *Merah*
3	Orange *Jingga*
5	Yellowish orange *Jingga kekuningan*
6	Yellow *Kuning*
7	Green *Hijau*
8	Yellowish green *Hijau kekuningan*
10	Bluish green *Hijau kebiruan*
12	Blue *Biru*
14	Purple *Ungu*

Diagram 1.1
Rajah 1.1

(a) The results of the experiment are shown in Table 1.1
Keputusan eksperimen ditunjukkan dalam Jadual 1.1

Acid solution *Larutan asid*	Colour of indicator *Warna penunjuk*	pH value *Nilai pH*
Acid P *Asid P*	Red *Merah*	
Acid Q *Asid Q*	Yellowish orange *Jingga kekuningan*	
Acid R *Asid R*	Yellow *Kuning*	

Table 1.1
Jadual 1.1

Based on universal indicator chart, complete Table 1.1 by stating the possible pH value for acid P, acid Q and acid R.
Berdasarkan carta penunjuk universal, lengkapkan Jadual 1.1 dengan menyatakan nilai pH yang mungkin bagi asid P, asid Q dan asid R

[3 *marks*]
[3 *markah*]

1(*a*)

3

(b) For this experiment, state
Bagi eksperimen ini, nyatakan

(i) The manipulated variable
Pembolehubah dimanipulasikan

………………………………………………………………………

(ii) The responding variable
Pembolehubah bergerak balas

………………………………………………………………………

(iii) The constant variable.
Pembolehubah dimalarkan.

………………………………………………………………………

[3 *marks*]
[3 *markah*]

1(*b*)

3

(c) Based on the colour of universal indicator observed, state the inference for acid P, Q and R
Berdasarkan warna penunjuk universal yang diperhatikan, nyatakan inferens bagi asid P, Q dan R.

Acid P : ....
Asid P

....

Acid Q : ....
Asid Q

....

Acid R : ....
Asid R

....

[3 *marks*]
[3 *markah*]

1(*c*)

| 3 |

(d) State the relationship between the pH value and the strength of acid.
Nyatakan hubungan antara nilai pH dengan kekuatan asid.

……………………………………………………………………………

……………………………………………………………………………
[3 *marks*]
[3 *markah*]

1(*d*)

| 3 |

(e) State the operational definition of strong acid for this experiment.
Nyatakan definisi secara operasi bagi asid kuat bagi eksperimen ini.

……………………………………………………………………………

……………………………………………………………………………
[3 *marks*]
[3 *markah*]

1(*e*)

| 3 |

(f) 25.0cm^3 of 0.2 mol dm^{-3} sodium hydroxide solution is titrated against 0.1 mol dm^{-3} acid P using phenolphthalein as an indicator. The titration is repeated twice. The results are shown in Table 1.2

25.0 cm^3 *larutan natrium hidroksida,* 0.2 mol dm^{-3} *dititratkan dengan* 0.1 mol dm^{-3} *asid* P *menggunakan fenolftalin sebagai penunjuk. Titratan diulang sebanyak dua kali. Keputusan yang diperolehi ditunjukkan dalam Jadual* 1.2
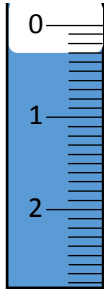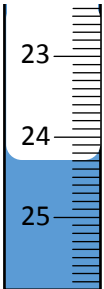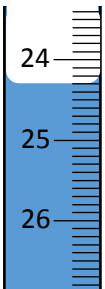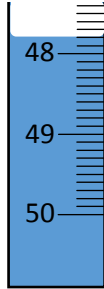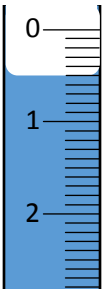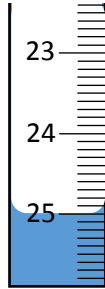
Set *Set*	Initial burette reading *Bacaan awal buret*	Final burette reading *Bacaan akhir buret*
I	....	....
II	....	....
III	....	....

Table 1.2

Jadual 1.2

6

Record the burette readings in the space provided in Table 1.2 on page 6.
Catat bacaan buret pada ruang yang disediakan dalam Jadual 1.2 pada halaman 6.

[*3 marks*]
[3 *markah*]

(g) Construct a table to record the initial burette readings, final burette readings and volume of acid P in Set I, Set II and Set III.
Bina satu jadual untuk merekod bacaan awal buret, bacaan akhir buret dan isipadu asid P *dalam Set* I*, Set* II *dan Set* III.

[*3 marks*]
[3 *markah*]

(h) The following equations show the ionisation of acid P and acid S in water.
Persamaan berikut menunjukkan pengionan asid P *dan asid S dalam air.*

$$H_2P \rightarrow 2H^+ + P^{2-}$$

$$HS \rightarrow H^+ + S^-$$
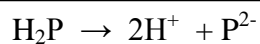
25.0 cm^3 of 0.1 mol dm-3 acid P is needed to neutralised 25.0 cm^3 of sodium hydroxide solution.
25.0 cm^3 *asid* P 0.1 mol dm^{-3} *diperlukan untuk meneutralkan* 25.0 cm^3 *larutan natrium hidroksida.*

Predict the volume of acid S needed to neutralised 25.0 cm^3 of sodium hydroxide solution.

Ramalkan isipadu asid S *yang diperlukan untuk meneutralkan* 25.0 cm^3 *larutan natrium hidroksida.*

....

[3 *marks*]
[3 *markah*]

(i)   (i)   Diagram 1.2 shows test carried out on ethanoic acid solution with calcium carbonate powder for Set I and glacial ethanoic acid with calcium carbonate powder for Set II.

Rajah 1. 2 *menunjukkan ujian yang dijalankan ke atas larutan asid etanoik dengan serbuk kalsium karbonat untuk* Set I *dan asid etanoik glasial dengan serbuk kalsium karbonat untuk* Set II.
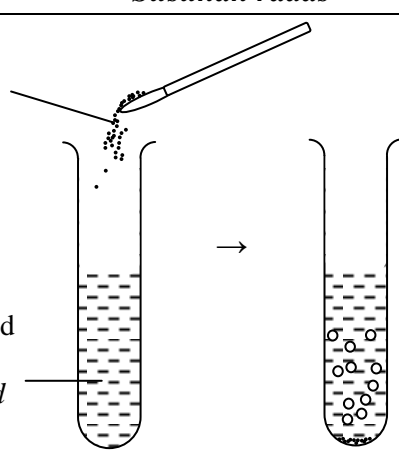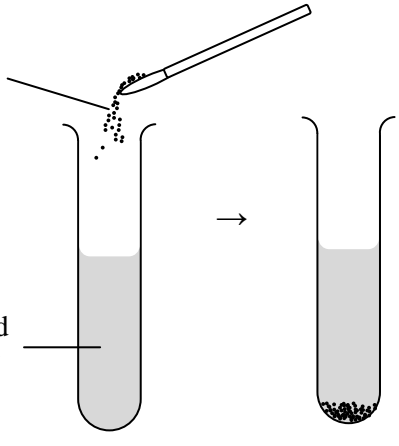
Set Set	Apparatus set-up Susunan radas
I	Calcium carbonate powder *Serbuk kalsium karbonat* Ethanoic acid solution *Larutan asid etanoik*
II	Calcium carbonate powder *Serbuk kalsium karbonat* Glacial ethanoic acid *Asid etanoik glasial*

Diagram 1.2
Rajah 1.2

Based on Diagram 1.2, state one observation.
Berdasarkan Rajah 1.2, *nyatakan satu pemerhatian.*

....

....

....

[3 *marks*]
[3 *markah*]

1*(i)(i)*

| 3 | |

(ii) State one hypothesis for the experiment in 1(i)(i)
Nyatakan satu hipotesis bagi eksperimen di 1(i)(i)

....

....

....

[3 *marks*]
[3 *markah*]

1*(i)(ii)*

| 3 | |

(j)   Classify the following acids into strong acids and weak acids.
Kelaskan asid-asid berikut kepada asid kuat dan asid lemah.

Nitric acid *Asid nitrik*	Citric acid *Asid sitrik*
Sulphuric acid *Asid sulfurik*	Carbonic acid *Asid karbonik*

Strong acid *Asid kuat*	**Weak acid** *Asid Lemah*

[3 *marks*]
[3 *markah*]

1(*j*)

3

2 Method to store metal depends on reactivity of metal towards oxygen. For example, sodium is kept in paraffin oil, calcium is put in a vacuumed desicator and zinc is wrapped with paper.
The reactivity of the metals is compared by observing the brightness of flame or glow when the metal burns in oxygen.
Kaedah penyimpanan logam bergantung kepada kereaktifan logam itu terhadap oksigen. Sebagai contoh, natrium disimpan dalam minyak parafin, kalsium disimpan dalam desikator yang kedap udara dan zink dibalut dengan kertas.
Kereaktifan logam dibandingkan dengan memerhatikan kecerahan nyalaan atau baraan semasa logam terbakar dalam oksigen.

Diagram 2.1 shows the set-up of apparatus for an experiment to determine the order of metals in the Reactivity Series.
Rajah 2.1 menunjukkan susunan radas bagi eksperimen untuk menentukan susunan logam-logam dalam Siri Kereaktifan Logam
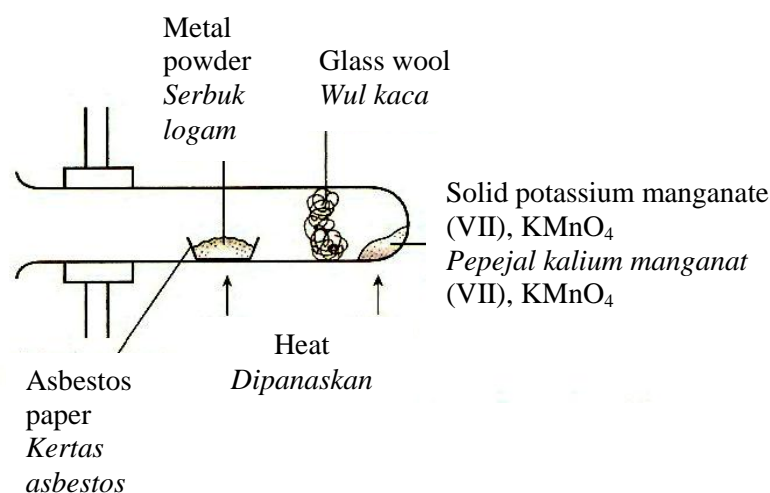
Diagram 2.1
Rajah 2.1

Referring to above situation, plan a laboratory experiment to arrange metals in terms of their reactivity with oxygen. You are required to use **four** different metals.
*Merujuk situasi di atas, rancang satu eksperimen makmal untuk menyusun logam-logam berdasarkan kereaktifan logam berkenaan bertindak balas dengan oksigen. Anda dikehendaki menggunakan **empat** jenis logam yang berlainan.*

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

(a) Problem statement
Pernyataan masalah

(b) All the variables
Semua pembolehubah

(c) Statement of the hypothesis
Pernyataan hipotesis

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

(e) Procedure for the experiment
Prosedur eksperimen

(f) Tabulation of data
Penjadualan data

[17 marks]
[17 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

PEPERIKSAAN PERCUBAAN SPM TAHUN 2016

NEGERI MELAKA

MS4541/1
MS4541/2

KIMIA
Ogos/Sept
2 ½ jam

SKEMA PEMARKAHAN KIMIA 1 DAN KIMIA 2
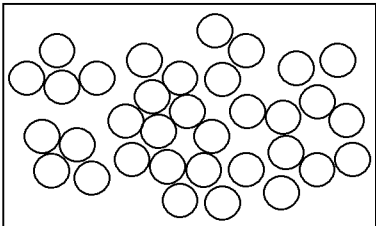
Skema Pemarkahan ini mengandungi **14** halaman bercetak

SKEMA PEMARKAHAN KIMIA 1, 4541/1
https://cikguadura.wordpress.com/

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

SKEMA PEMARKAHAN KIMIA 2, 4541/2

BAHAGIAN A

1	(a)	(i)	Melting		1
		(ii)	1. Same size of particles 2. Particles are packed closely together but not in orderly arrangement 		1
	(b)	(i)	Higher than in solid		1
		(ii)	Weaker than in solid		1
	(c)	(i)	i. Relative mass = 1 Relative charge = +1 ii. Relative mass = 0.0005 /0 Relative charge = -1	1 1	...2
		(ii)	7		1
		(iii)	$^{7}_{3}Z$ Accept: Z=Li		1
		(iv)	3		1
			https://cikguadura.wordpress.com/ **TOTAL**		**9**

Question	Answer	Submark	Σ Mark
2(a)(i)	The chemical formula that shows the actual number of an atom of element in a compound	1	1
(ii)	$C_2H_3O_3$	1	1
(iii)	Molecular formula shows the actual number of atom while empirical formula shows the simplest ratio of atom // The number of carbon atom, hydrogen atom and oxygen atom in molecular formula is greater than in empirical formula.	1	1
(b)(i)	Reactants : Potassium iodide and lead(II) nitrate Products : Potassium nitrate and lead iodide	1 1	2
(ii)	Solid	1	1
(iii)	Number of mole $Pb(NO_3)_2 = \frac{0.5 \times 50}{1000}$ // 0.025 1 mole $Pb(NO_3)_2$ produce 1 mole PbI_2 // 0.025 moles $Pb(NO_3)_2$ produce 0.025moles PbI_2 Mass of $PbI_2 = 0.025 \times [207 + 2(127)]g$ // 11.525g	1 1 1	3
	TOTAL		9

3	(a)	(i)		
			Sodium ion / *ion natrium* : 2.8	1
			Oxide ion / *ion oksida* : 2.8	1
		(ii)	Sodium atom are bigger than oxygen atom// Oxygen atom are smaller than sodium atom	1
			Sodium atom has three shell occupied with electron while oxygen atom has only two shell occupied with electron	1
	(b)	(i)	Able to draw the correct electron arrangement of sodium ion and oxide ion with correct charge	1
			Correct number of sodium ion and oxide ion	1
		(ii)	Na_2O	1
	(c)	(i)	The substance dissolved to form colourless liquid	1
		(ii)	1. Correct formulae of reactants and product 2. Balanced equation $Na_2O + H_2O \rightarrow 2NaOH$	1 1
			TOTAL MARKS	10

4	(a)		Mg^{2+}, NO_3^-, H^+, OH^-// Magnesium ion, nitrate ion, hydrogen ion and hydroxide ion	1
	(b)		Potassium nitrate solution// potassium chloride solution // Potassium sulphate solution // Sodium nitrate solution// Sodium chloride solution// Sodium sulphate solution Accept: any electrolyte which will not form precipitate	1
	(c)	(i)	Reduction	1
		(ii)	The oxidation number of copper change from +2 to 0	1
	(d)		Negative terminal: $Mg \rightarrow Mg^{2+} + 2e$	1
			Positive terminal: $Cu^{2+} + 2e \rightarrow Cu$	1
	(e)		More than 2.7V // Increases // [V]	1
	(f)	(i)	From copper to silver through connecting wires/ external circuit.	1
		(ii)	1. Correct formulae of ions 2. Balanced equation $Cu + 2Ag+ \rightarrow Cu^{2+} + 2Ag$	1 1
				10

5	(a)		Asid yang mengion lengkap dalam air	1	
			untuk menghasilkan kepekatan ion hidrogen yang tinggi	1	
	(b)	(i)	Larutan Q	1	
		(ii)	Larutan Q mempunyai kepekatan ion Hidrogen yang tinggi	1	
	(c)	(i)	Penunjuk fenolftalein [mana-mana larutan penunjuk yang **sesuai**]	1	
		(ii)	peneutralan	1	
		(iii)	Merah jambu kepada tanpa warna [perubahan warna yang sepadan dengan penunjuk]	1	
	(d)	(i)	$2KOH + H_2SO_4 \rightarrow K_2SO_4 + 2H_2O$ • formula bahan dan hasil betul • persamaan seimbang	1 + 1	
		(ii)	$M_a V_a / M_b V_b = 1/2$ $M_a = 25 \times 1 / 10 \times 2$ $= 1.25$ mol dm^{-3} • carakerja - 1 markah • jawapan betul - 1 markah	1 1	
				11	
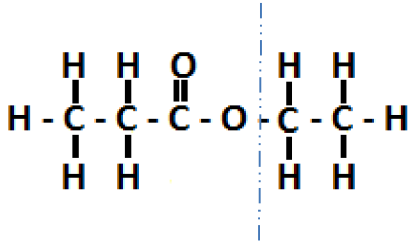
6	(a)		concentration kepekatan	1	
	(b)	i	Volume of hydrogen gas // mass of zinc// concentration of H_2SO_4 Gas hydrogen // H_2	1	
	(b)	ii	**Functional diagram** -rubber stopper above the conical flask mouth -clamping burette -plastik rubber insert into burette **Label the apparatus** 	1 1	___
	(c)	i	Ionic equation : $Zn + 2H^+ \rightarrow Zn^{2+} + H_2$ no of mol of HCl = 0.05 mol mol ratio ; 2 mol of HCl produced 1 mol of H_2	1 1	
		ii	0.05 mol of HCl produced 0.025 mol of H_2 volume = 0.025 X 24 = 0.6 dm^3 //600cm^3	1	
	(d)	i	Labelled axis y and x, volume and time Correct curve drawn 	1	
		ii	1. The number of H^+ ion in Experiment 1 is twice the number of H^+ion in Experiment 2// Concentration of H^+ionin Experiment 1		
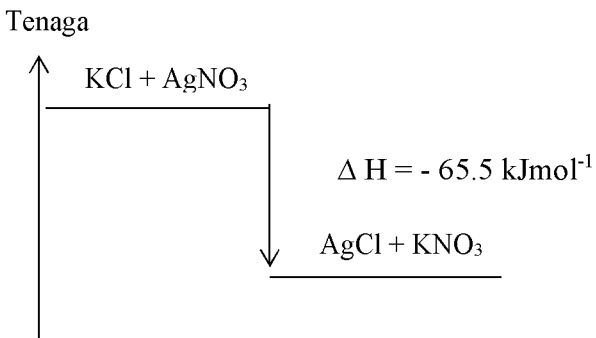
			is twice the concentration of H^+ ion in Experiment 2 2. Frequency of collision between H^+ ion and zinc atom in Experiment 1 is higher than Experiment 2 3. Frequency of effective collision in Experiment 1 is higher than Experiment 2 4. Rate of reaction for Experiment 1 is higher than Experiment 2. (Max – 3 marks)	3	
					11

BAHAGIAN B

7	(a)	(i)	[Able to state the correct name of the alcohol] Answer: **Ethanol** Able to state 3 correct properties of ethanol. <u>Sample answer</u> Miscible in water Colourless liquid Low melting/ boiling point/ easy to evaporate Cannot conduct electricity/non electrolyte Max 3 marks : 3 answer for physical	1 1+1+1	4
		(ii)	[Able to name the reaction correctly] Answer: Esterification	1	
			[Able to write the correct chemical equation for the reaction] 1. Correct formula of reactants 2. Correct formula of products Sample answer $C_2H_5OH + C_2H_5COOH \rightarrow C_2H_5COO\ C_2H_5\ +\ H_2O$	2	
			[Able to write the correct name of the ester] **Ethyl propanoate**	1	

			[Able to draw correct structural formula of the substance]	1	

$$H - \underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}} - \underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}} - \underset{}{\overset{\overset{O}{\parallel}}{C}} - O - \underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}} - \underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}} - H$$

			[Able to write the correct general formula of ester] Answer: $C_nH_{2n+1}COOC_mH_{2m+1}$	1	6

7	(b)	(i)	Haba yang **dibebaskan** apabila **1 mol mendakan argentum klorida** terbentuk	1	1
		(ii)	Tenaga KCl + AgNO₃ $\Delta H = - 65.5$ kJmol⁻¹ AgCl + KNO₃ 1. gambar rajah yang menunjukkan aras tenaga bagi tindak balas eksotermik 2. label – Tenaga, persamaan kimia atau persamaan ion yang betul, $\Delta H = -65.5$ kJmol⁻³	1 1	2

		(iii)	1. Pengiraan bil mol AgCl terbentuk 2 markah
			2. Perkaitan antara ΔH dan haba yang dibebaskan 1 markah
			3. Pengiraan perubahan suhu serta unit 2 markah
			
			ContohJawapan :
			
			1. Bil. mol AgCl = Bil mol AgNO₃ // KCl
			             = MV / 1000
			             = <u>0.5 x 20</u> // 0.01 mol
			                1000
				1
				
				1	

			2. 1 mol AgCl membebaskan 65500 J 0.01 mol AgCl membebaskan = <u>0.01 x 65500</u> = 655J	1	

			3. Haba yang dibebaskan =mcΘ
			        655 J = (20+20) x 4.2 x X
			         X = <u>655</u> °C// 3.89 °C
			                 40 x 4.2
				1
				
				1	

			4. Nilai perubahan suhu ialah sama // 3.89 °C	1	
			5. Bil mol mendakan AgCl tetap sama	1	7
			TOTAL		20

No			Rubric		Total marks
8	(a)	(i)	X : sulphuric acid	1	
			Y : sulphur dioxide	1	…..2
		(ii)	As fertilizer	1	
			$H_2SO_4 + 2NH_3 \rightarrow (NH_4)_2SO_4$		
			[*Correct formula of reactants & product*]	1	
			[*Balanced equation*]	1	…3
		(iii)	Nitrogen gas and hydrogen gas		
			Mix with ratio 1: 3 //		
			$N_2 + 3H_2 \rightarrow 2NH_3$	1	
			[*Correct chemical formula of reactants and balanced*]		
			Temperature = 400 – 500°C	1	
			Pressure = 200 atm		
			Catalyst = Iron [*any two*]	1+1	
					…4
		(iv)	Soil become acidic//acidic rain	1	
			pH of lake/river decreases,	1	
			aquatic life die//Building damage	1	…3
	(b)		1- soap dissolves in water and reduces the surface tension of water to wets the dirty blouse	1	
			2- the hydrophobic part of the anion dissolves in grease/ the hydrophilic part dissolves in water	1	
			3- grease is loosened and lifted off the surface by rubbing / scrubbing/ heating	1	
			4- the polar ends of anion / the hydrophilic part surround the grease and is lifted off the surface.	1	
			5- the grease is dispersed into smaller droplet / emulsified	1	
			6- rinsing away the dirty water removes the grease droplets	1	…6
	(c)			1	

TYPE	FUNCTION
Analgesics	Relieve pain
Antibiotics	Kill or inhibit growth of infectious bacteria
Psychotherapeutic	Control symptoms of mental illness

1

[Any two correct pairs]

…2

			TOTAL		**20**

9	(a)	1. The smaller the size of beef the larger the total surface area of beef exposed to heat	1	
		2. More heat absorbed	1	2
	(b) (i)	P : [*Name of suitable* <u>*metal karbonate*</u>] *Example* : **Calcium carbonate // Magnesium carbonate // Zinc carbonate //**	1	
		Q : [*Name of* <u>*suitable acid*</u>] *Example* : Hydrochloric acid // Sulphuric acid // Nitric acid	1	
		[*Chemical equation*] *Sample Answer* : $CaCO_3$ + **2HCl** → $CaCl_2$ + H_2O + CO_2		
		[*Correct formula of reactants and products*] [*Balanced chemical equation*]	1 1	4
	(ii)	Experiment I = $\dfrac{30}{10}$ = 3.0 **cm³ s⁻¹**	1 1	
		Experiment II = $\dfrac{30}{20}$ = 1.5 **cm³ s⁻¹** [*Correct value <u>with</u> unit*]	1 1	4

	(c)	Precipitate : Sulphur	1	1
		Materials: 0.2 mol dm^{-3} sodium thiosulphate, 1.0 mol dm^{-3} sulphuric acid, a piece of white paper marked 'X' at the centre.	1	
		Apparatus: 150 cm^3 conical flask, stopwatch, 50 cm^3 measuring cylinder, 10 cm^3 measuring cylinder, thermometer, Bunsen burner, wire gauze.	1	
		Procedure: Using a measuring cylinder, 50 cm^3 of 0.2 mol dm^{-3} sodium thiosulphate solution is measured and poured into a conical flask.	1	
		The conical flask is placed on top of a piece of white paper marked 'X' at the centre.	1	
		5 cm^3 of 1.0 mol dm^{-3} sulphuric acid is measured using another measuring cylinder.	1	
		The sulphuric acid is poured immediately and carefully into the conical flask. At the same time, the stop watch is satarted	1	
		The mixture in a conical flask is swirled.	1	
		The 'X' mark is observed vertically from the top of the conical flask through the solution.	1	
		The stopwatch is stopped once the 'X' mark disappears from view.	1	
		Step 1 – 7 are repeated using 50 cm^3 of 0.2 mol dm^{-3} sodium thiosulphate solution at 40°C, 50°C, 60 °C by heating the solution before 5 cm^3 of sulphuric acid is added in.	1	
		Conclusion The increase of temperature, increase the rate of reaction	1	Max 9
				20

10.	(a)	(i)	Solvent X : tetrachloromethane // methylbenzene // (name any organic solvent) Solvent Y : water *X pelarut: tetraklorometana // metilbenzena // (nama apa-apa pelarut organik)* *Pelarut Y: air*	1 1	2
		(ii)	***Procedure*** *1. Add 1 spatula of* <u>*zinc/ magnesium/ aluminium(solid*</u> <u>*metal carbonate*</u> *can be used to replace metals above) into the two beakers containing hydrogen chloride in solvent X and solvent Y respectively* *2. No changes in beaker A* *3. Gas bubbles formed in beaker B* *4. Hydrogen chloride in solvent X / tetrachloromethane / methylbenzene does not show acidic property/ H^+ is absent* *5. Hydrogen chloride in water shows acidic property/ H^+ is present* **Prosedur** 1. Tambah 1 spatula zink / magnesium / aluminium (pepejal karbonat logam) boleh digunakan untuk menggantikan logam di atas) ke dalam dua bikar mengandungi hidrogen klorida dalam pelarut X dan pelarut Y masing-masing 2. Tiada perubahan dalam bikar A 3. Gelembung gas terbentuk dalam bikar B 4. Hidrogen klorida dalam larutan X / tetraklorometana / methylbenzene tidak menunjukkan berasid harta / H + tidak hadir 5. Hidrogen klorida dalam air menunjukkan sifat berasid / H + hadir	1+1 1 1 1 1 1	Max 6
	(b)	(i)	*1. Hydrogen chloride in solvent Y/ water* *2.Dissociates/ ionised to form H^+ //show acid properties* 1. Hidrogen klorida dalam larutan Y / air 2. Mengion di dalam air membentuk H^+ //	1 1	2
		(ii)	Able to describe an experiment to prepare zinc chloride salt from hydrochloric acid and a suitable substance Procedure : 1. Measure **[20-100]cm^3 [0.1- 2.0 mol dm^{-3}]** of hydrochloric acid by using measuring cylinder 2. Pour the solution into a beaker and heat it	 1 1	

			3. Add zinc oxide / zinc carbonate / excessively	1	
			4. Stir the mixture		
			5. Filter the mixture	1	
			6. The filtrate is heated until saturated / 1/3 from the initial volume	1 1	
			7. The saturated solution is cooled at room temperature		
			8. Filter the salt formed	1	
			9. Rinse the salt with distilled water	1	
			10. Dry the salt with filter paper	1	
				1	10

Dapat menjelaskan eksperimen untuk menyediakan garam larut dari larutan hidrogen klorida dan sebatian yang sesuai

prosedur:
1. *Sukat __[20-100]cm³ [0.1-1.0moldm⁻³]__ asid hidroklorik menggunakan silinder penyukat dan*
2. *Tuangkan ke dalam bikar*
3. *Tambah zink oksida / zink karbonat / zink ke dalam bikar tadi __sehingga berlebihan__*
4. *Kacau campuran tersebut*
5. *Turas*
6. *Hasil turasan dipanaskan sehingga 1/3 daripada isipadu asal*
7. *Keringkan hasil turasan tersebut pada suhu bilik*
8. *Turas pepejal yang terbentuk*
9. *Bilas dengan air suling*
10. *Keringkan pepejal tersebut dengan kertas turas.*

		https://cikguadura.wordpress.com/		TOTAL	20

END OF MARK SCHEME

PEPERIKSAAN PERCUBAAN SPM 2016
https://cikguadura.wordpress.com/
NEGERI MELAKA

4541/3

KIMIA
Ogos/Sept
1 ½ jam

PERATURAN PEMARKAHAN KIMIA 3

Questions	Mark Scheme	Mark
1(a)	**Able to state all pH value correctly** **Answer** <table><tr><th>Acid solution</th><th>Colour of indicator</th><th>pH value</th></tr><tr><td>Acid P</td><td>Red</td><td>1</td></tr><tr><td>Acid Q</td><td>Yellowish orange</td><td>5</td></tr><tr><td>Acid R</td><td>Yellow</td><td>6</td></tr></table>	**3**
	Able to state any two pH value correctly	**2**
	Able to state any one pH value correctly	**1**
	No response or wrong response	**0**
1(b)	**Able to state all the variables correctly** **Sample answer** **Manipulated variable:** Type of acid // Acid P, Q, R and S // Four different acids **Responding variable:** pH value // Colour of indicator // Strength of acid **Fixed variable:** Concentration of acid // Universal indicator // volume of acid	**3**
	Able to state any two variables correctly	**2**
	Able to state any one variable // idea of _all_ variables	**1**
	No response or wrong response https://cikguadura.wordpress.com/	**0**

1(c)	Able to state all correct inferences	3

Acid	Inference
P	P is a strong acid // P ionize completely in water // P produces high concentration of hydrogen ions.
Q	Q is a weak acid // Q ionize partially in water // Q produces low concentration of hydrogen ions.
R	R is a weak acid // R ionize partially in water // R produces low concentration of hydrogen ions.

	Able to state any two inferences correctly.	2
	Able to state any one inferences // idea of _all_ inferences	1
	No response or wrong response	0

1(d)	Able to state the relationship between pH value with the strength of acid correctly. **Sample answer** When pH value increases, the strength of acid decreases. .	3
	Able to state the relationship between pH value with the strength of acid less correctly. **Sample answer** pH value is inversely proportional to the strength of acid.	2
	Able to give an idea **Sample answer** pH value is affected by strength of acid.	1
	No response or wrong response	0

1(e)	**Able to state the operational definition for strong acid correctly.**
	
	    1. Low pH value
	    2. Add universal indicator
	
	Sample answer
	
	Acid that shows low pH value when universal indicator is added into it.
		3

	Able to state the operational definition for strong acid less correctly.
	
	    1. Low pH value //
	    2. Add universal indicator
	
	Sample answer
	
	    i. Acid that shows low pH value. //
	    ii. Add universal indicator into the acid.
		2

	Able to state an idea of operational definition **Sample answer:** Colour of indicator change // pH less than 7 // Ionise completely	**1**
	No response or wrong response	**0**
1(f)	**Able to record all the burette readings accurately with two decimal place and with correct unit.** **Answers** 	Set	Initial burette reading	Final burette reading
I	$0.30 \ cm^3$	$24.30 \ cm^3$
II	$24.30 \ cm^3$	$47.80 \ cm^3$
III	$0.50 \ cm^3$	$25.00 \ cm^3$		**3**

| | Able to record all burette readings less correctly with or without unit | 2 |
| | | |

Sample answers

Set	Initial burette reading	Final burette reading
I	0.30	24.30
II	24.30	47.80
III	0.50	25.00

or

Set	Initial burette reading	Final burette reading
I	$0.3 \ cm^3$	$24.3 \ cm^3$
II	$24.3 \ cm^3$	$47.8 \ cm^3$
III	$0.5 \ cm^3$	$25 \ cm^3$

| | Able to record at least four burette readings less correctly | 1 |
| | | |

Sample answers:

Set	Initial burette reading	Final burette reading
I	1.7	24.3
II	24.3	48.2
III	0.5	25

| | No response or wrong response | 0 |

1(g)	Able to construct a table to record the initial burette readings, final burette readings and volume of acid for Set I, Set II and Set III that contain:
	
	      1. Correct titles
	      2. Readings and units
	
	Sample answer:
	
		Set	Initial burette reading (cm^3)	Final burette reading (cm^3)	Volume of acid (cm^3)

I	0.30	24.30	24.00
II	24.30	47.80	23.50
III	0.50	25.00	24.50		3
---	---	---

	Able to construct a less accurate table that contains the following:
	
	      1. Titles
	      2. Readings
	
	Sample answer:
	
		Set	Initial burette reading	Final burette reading	Volume of acid

I	0.3	24.3	24.0
II	24.3	47.8	23.5
III	0.5	25.0	24.5		2
	Able to construct a table that contains titles and readings for initial burette readings and final burette readings only. **Sample answer:** | Set	Initial burette reading	Final burette reading
---	---	---
I	0.3	24.3
II	24.3	47.8
III	0.5	25.0		1

	No response or wrong response	0
1(h)	**Able to predict the volume of acid S correctly with unit.** **Answer:** 50.0 cm³	**3**
	Able to predict the volume of acid S **Answer:** 50	**2**
	Able to give an idea to predict the volume of acid S **Sample answer:** more than 25 // more than acid P	**1**
	No response or wrong response	**0**
1(i)(i)	**Able to state the correct observation for _both_ set.** **Sample answers** **Set I :** Bubbles released // Calcium carbonate dissolve in ethanoic acid solution. **Set II :** No bubbles // Calcium carbonate does not dissolve in glacial ethanoic acid.	**3**
	Able to state correct observation for _any one_ set. **Sample answers:** **Set I :** Bubbles released // Calcium carbonate dissolve in ethanoic acid	**2**

	solution. **or** **Set II :** No bubbles // Calcium carbonate does not dissolve in glacial ethanoic acid.	
	Able to give an idea of the observation **Sample answers:** Calcium carbonate reacts with acid // Carbon dioxide gas	1
	No response or wrong response	0

1(i)(ii)	**Able to state the relationship between the manipulated variable and the responding variable and state the direction correctly.** **Sample answer:** Presence of water causes acid to show its properties.	3
	Able to state the relationship between the manipulated variable and the responding variable less correctly. **Sample answer:** Acid will shows its acidic properties when water presence.	2
	Able to state the idea of hypothesis **Sample answer:** Reaction occurs when water present.	1
	No response or wrong response	0

1(j)	**Able to classify all the acids correctly**	**3**
	Sample answer:	

Strong acid	Weak acid
Nitric acid Sulphuric acid	Citric acid Carbonic acid

	Able to classify any three acids correctly	**2**
	Able to classify any two acids correctly	**1**
	No response or wrong response	**0**

2(a)	**Able to state the problem statement correctly** **Sample answer:** Does different metal have different reactivity towards oxygen?	**3**
	Able to state the problem statement less correctly **Sample answer:** Does different metal have different reactivity	**2**
	Able to give an idea of problem statement **Sample answer:** Metal affect reactivity	**1**
	No response or wrong response	**0**

2(b)	**Able to state all the variables correctly**	
	Sample answer:	**3**
	Manipulated variable: Type of metal // Different metals // Any four different metals in Reactivity Series except K, Na & Ca.	
	Responding variable: Brightness / intensity of flame or glow // Reactivity of metal	
	Fixed variable: Potassium manganate(VII) // Quantity / mass of metals / potassium manganate(VII)	
	Able to state any two variables correctly	**2**
	Able to state any one variable correctly // idea of _all_ variables	**1**
	No response or wrong response	**0**
2(c)	**Able to state the relationship between the manipulated variable and the responding variable with direction correctly**	**3**
	Sample answer: The higher the position of metal in Reactivity Series, the brighter the flame or glow / the higher the reactivity of metal. // Going down Reactivity Series of metal, reactivity decreases.	
	Able to state the relationship between the manipulated variable and the responding variable.	**2**
	Sample answer: The brighter the flame or glow / the higher the reactivity of metal, the higher the position of metal in Reactivity Series. // The higher the position of metal, the brighter the reactivity of metal.	

| | Able to state an idea of hypothesis

Sample answer:
Position affects reactivity // Metals affects flame | **1** |
|---|---|---|
| | **No response or wrong response** | **0** |
| | | |
| **2(d)** | **Able to list all the materials and apparatus**

Sample answers:
Magnesium, Copper, Iron, Zinc, potassium manganate(VII), asbestos paper, glass wool, boiling tube, retort stand and clamp, bunsen burner, spatula and forcep | **3** |
| | **Able to list the following materials and apparatus**

Sample answers:
Magnesium, Copper, Iron, Zinc, potassium manganate(VII), glass wool, boiling tube, retort stand, bunsen burner and spatula | **2** |
| | **Able to list the following materials and apparatus**

Sample answers:
Any two metals, potassium manganate(VII), boiling tube / test tube and bunsen burner | **1** |
| | **No response or wrong response** | **0** |
| | | |
| **2(e)** | **Able to state all the steps of procedure correctly**

Sample answers:
   1. Put one spatulaful of potassium manganate(VII) in a boiling tube.
   2. Push in some glass wool into the tube and clamp it horizontally.
   3. Place one spatulaful of magnesium powder on a piece of asbestos paper and put it into the boiling tube.
   4. Heat the magnesium strongly and then heat the potassium | |

11

		manganate(VII). 5. Repeat steps 1 to 4 / experiment using copper, iron and zinc to replace the magnesium. 6. Record the observation.	
		Able to state the steps of procedure less correctly. **Sample answers:** 1. Put one spatula of potassium manganate(VII) in a boiling tube. 2. Put one spatula of magnesium powder into the boiling tube. 3. Heat the magnesium and potassium manganate(VII). 4. Repeat steps 1 to 3 / experiment using copper, iron and zinc to replace the magnesium. 5. Record the observation.	**2**
		Able to state idea of procedure for reactivity of metals.	**1**
		No response or wrong response	**0**
2(f)		**Able to tabulate the data with the following aspects** 1. Correct headings 2. List all metals Sample answer: <table><tr><td>**Metal**</td><td>**Observation**</td></tr><tr><td>Magnesium</td><td></td></tr><tr><td>Copper</td><td></td></tr><tr><td>Iron</td><td></td></tr><tr><td>Zinc</td><td></td></tr></table>	**2**

	Able to tabulate the data One correct heading / list of metal in table <u>**Sample answer:**</u> 	Metal	Observation
	| or |	
Magnesium	
Copper			1
---	---	---
	No response or wrong response https://cikguadura.wordpress.com/	0

PERATURAN PEMARKAHAN TAMAT