



**PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA
SEKOLAH MENENGAH PULAU PINANG**

PEPERIKSAAN PERCUBAAN SPM 2010

CHEMISTRY

Kertas 1

Sept./Oct.

1 $\frac{1}{4}$ jam

Satu jam lima belas minit

JANGAN BUKA KERTAS SOALANINI SEHINGGA DIBERITAHU

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

Kertas soalan ini mengandungi 30 halaman bercetak.

1. Diagram 1 shows the change of state of matter.
Rajah 1 menunjukkan perubahan keadaan jirim.

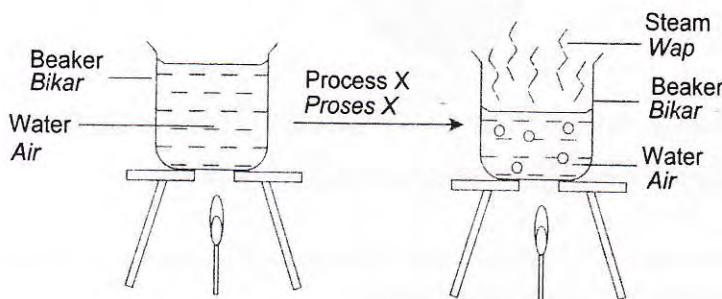


Diagram 1
Rajah 1

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

- A. Melting
Peleburan
- B. Boiling
Pendidihan
- C. Freezing
Pembekuan
- D. Condensation
Kondensasi

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

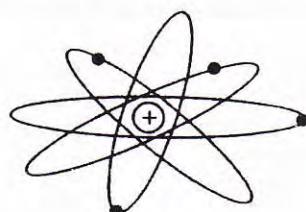


Diagram 2
Rajah 2

Which of the following is true of the atomic model?
Antara berikut, yang manakah benar mengenai model atom ini?

- I. Proposed by Neil Bohr
Dikemukakan oleh Neil Bohr
- II. Was built on the existence of the neutron
Dibina berasaskan kewujudan neutron
- III. Shows that electrons move in shells around the nucleus
Menunjukkan electron bergerak dalam orbit mengelilingi nukleus
- IV. Discovered through the bombardment experiment of alpha particles on gold foil.
Ditemui melalui eksperimen bedilan zarah alfa ke atas kerajang emas.

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

3. Diagram 3 shows the set-up of the apparatus to determine the empirical formula of a metal oxide.

Rajah 3 menunjukkan susunan radas untuk menentukan formula empirik suatu oksida logam.

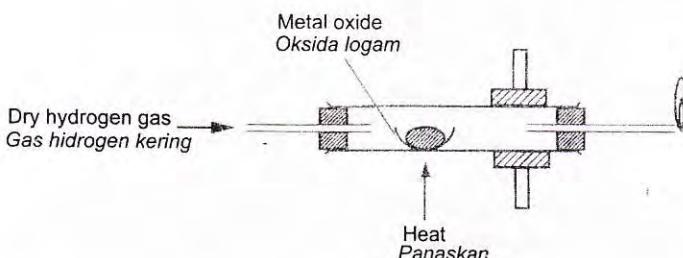


Diagram 3

Rajah 3

Which of the following metal oxides is suitable to be used in Diagram 3?

Antara oksida logam berikut, yang manakah sesuai digunakan dalam Rajah 3?

- A. Zink oxide
Zink oksida
- B. Magnesium oxide
Magnesium oksida
- C. Aluminium oxide
Aluminium oksida
- D. Copper(II) oxide
Kuprum (II) oksida

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

- A. Helium and krypton
Helium dan kripton
- B. Hydrogen and oxygen
Hidrogen dan oksigen
- C. Oxygen and krypton
Oksigen dan kripton
- D. Helium, hydrogen and oxygen
Helium, hidrogen dan oksigen

5. Diagram 4 shows the set-up of the apparatus for electrolysis.

Rajah 4 menunjukkan susunan radas yang digunakan dalam proses elektrolisis.

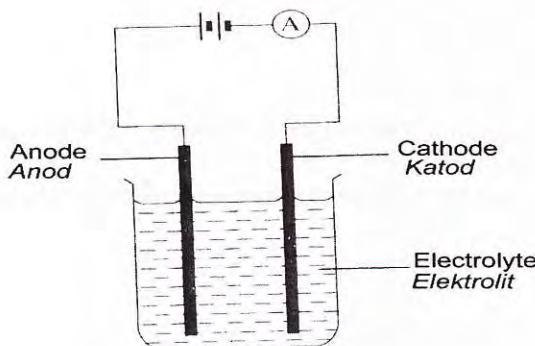


Diagram 4
Rajah 4

Which of the following compounds could be used as an electrolyte?

Antara sebatian berikut yang manakah boleh digunakan sebagai elektrolit?

- A. Ethanol
Etanol
- B. Kerosene
Kerosin
- C. Ethyl ethanoate
Etil etanoat
- D. Ethanoic acid
Asid etanoik

6. Which of the following statements is true about all bases?

Antara pernyataan berikut, yang manakah benar tentang semua bas?

- A. React with acids

Bertindak balas dengan asid

- B. Dissolve in water

Larut dalam air

- C. Contain hydroxide ions

Mengandungi ion-ion hidroksida

- D. Have alkaline properties

Mempunyai sifat alkali

7. Diagram 5 shows the set-up of the apparatus of an experiment.

Rajah 5 menunjukkan susunan radas bagi satu eksperimen.

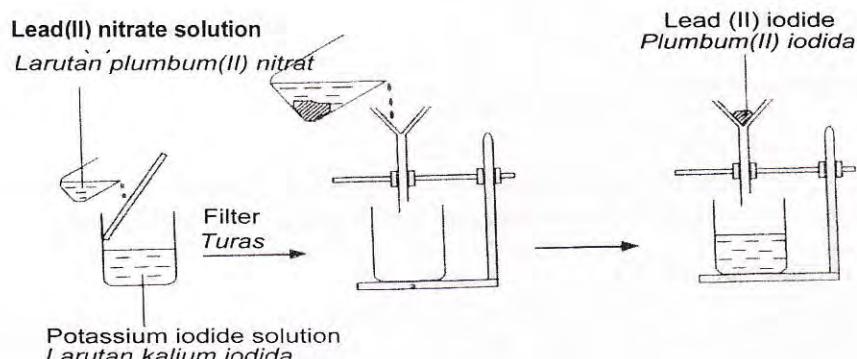


Diagram 5

Rajah 5

What is the process shown in Diagram 5?

Apakah proses yang ditunjukkan dalam Rajah 5?

- A. Preparation of insoluble salt

Penyediaan garam tak terlarutkan

- B. Preparation of soluble salt

Penyediaan garam terlarutkan

- C. Purification of insoluble salt

Penulenan garam tak terlarutkan

- D. Purification of soluble salt

Penulenan garam terlarutkan

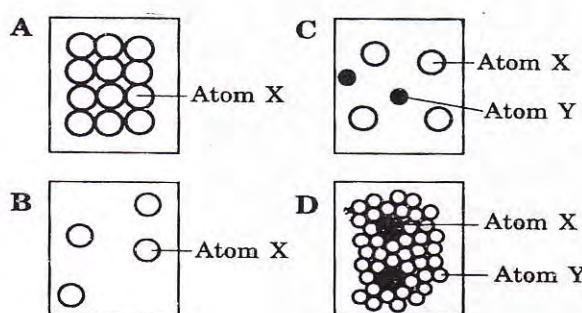
8. Which of the following ions form a white precipitate that dissolves in excess sodium hydroxide solution?

Antara ion-ion berikut yang manakah membentuk mendakan putih yang larut dalam larutan natrium hidroksida berlebihan?

- I. Al^{3+}
 - II. Mg^{2+}
 - III. Pb^{2+}
 - IV. Zn^{2+}
- A. I and II only
I dan II sahaja
- B. II and IV only
II dan IV sahaja
- C. I, II and III only
I, II dan III sahaja
- D. I, III and IV only
I, III dan IV sahaja

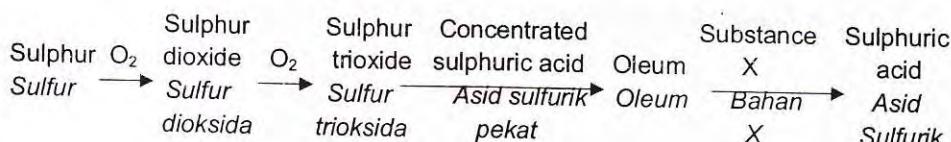
9. Which of the following shows the arrangement of atoms in an alloy?

Antara berikut, yang manakah menunjukkan susunan atom dalam suatu aloi?



10. The flow chart shows the stages in the production of sulphuric acid using the Contact process.

Carta alir menunjukkan peringkat-peringkat dalam pembuatan asid sulfurik menggunakan proses Sentuh.



What is **substance X?**

Apakah **bahan X?**

- A. Water
Air
- B. Sulphur
Sulfur
- C. Oxygen
Oksigen
- D. Sulphur dioxide
Sulfur dioksida

11. Diagram 6 shows the effect of a weight that is dropped onto a composite substance and its original component.

Rajah 6 menunjukkan kesan satu beban yang dijatuhkan ke atas bahan komposit dan komponen asalnya.

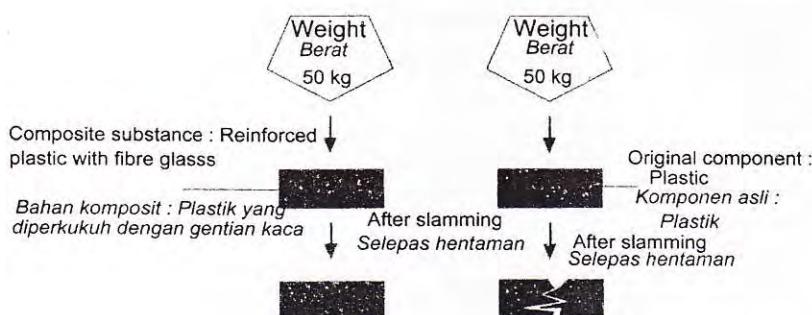


Diagram 6

Rajah 6

What is the characteristic of the composite substance?

Apakah sifat yang dimiliki oleh bahan komposit itu?

- A. Strong and hard
Kuat dan keras
- B. Strong and elastic
Kuat dan Kenyal
- C. Hard and ductile
Keras dan mulur
- D. Elastic and ductile
Kenyal dan mulur

12. Diagram 7 shows porcelain pots.

Rajah 7 menunjukkan pasu porselin.



Diagram 7

Rajah 7

What is the substance and the major component used in the making of porcelain pots?

Apakah bahan dan komponen utama untuk membuat pasu porselin?

	Substance <i>Bahan</i>	Major component <i>Komponen utama</i>
A	Glass <i>Kaca</i>	Cupronickel <i>Kupronikel</i>
B	Ceramic <i>Seramik</i>	Aluminium silicate <i>Aluminium silikat</i>
C	Polymer <i>Polimer</i>	Silicon dioxide <i>Silikon dioksida</i>
D	Alloy <i>Aloi</i>	Iron(II) oxide <i>Ferum (II) oksida</i>

13. Which of the following explains the meaning of effective collision?

Antara pemyataan berikut, yang manakah menjelaskan maksud perlanggaran berkesan?

- A. The collision where its energy is less than the activation energy
Perlanggaran yang tenaganya kurang daripada tenaga pengaktifan
- B. The collision that has a low energy
Perlanggaran yang berlaku mempunyai tenaga yang rendah
- C. The collision which takes place before a reaction
Perlanggaran yang berlaku sebelum sesuatu tindak balas
- D. The collision that causes a reaction
Perlanggaran yang menghasilkan tindak balas

14. Diagram 8 shows the structural formula of pent-1-ene.
Rajah 8 menunjukkan formula struktur bagi pent-1-ena.

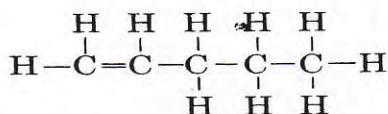
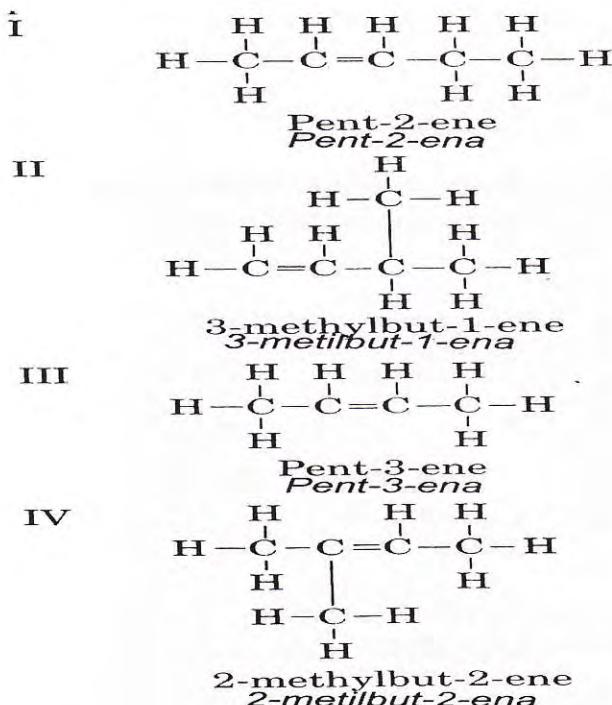


Diagram 8
Rajah 8

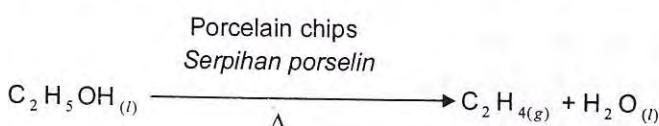
Which of the following are structural formulae and correct names for isomers of pent-1-ene?

Antara berikut yang manakah formula struktur dan nama yang betul bagi isomer-isomer pent-1-ena?



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

15. The following chemical equation shows the conversion of ethanol to ethene.
Persamaan kimia berikut menunjukkan penukaran etanol kepada etena.



What is the name of the process shown by the above equation?
Apakah nama proses yang ditunjukkan oleh persamaan di atas?

- A. Dehydration
Pendehidratan
- B. Oxidation
Pengoksidaan
- C. Reduction
Penurunan
- D. Fermentation
Penapaian

16. Diagram 9 represents the structural formula of a carbon compound.
Rajah 9 mewakili formula struktur bagi suatu sebatian karbon.

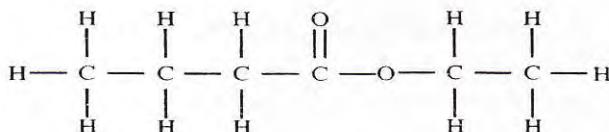


Diagram 9
Rajah 9

The compound is produced by the reaction between
Sebatian ini terhasil daripada tindak balas antara

- A. Ethanol and propanoic acid
Etanol dan asid propanoik
- B. Ethanol and butanoic acid
Etanol dan asid butanoik
- C. Propanol and ethanoic acid
Propanol dan asid etanoik
- D. Butanol and ethanoic acid
Butanol dan asid etanoik

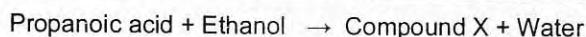
17. A rubber tapper faces a problem of coagulated latex. To solve the problem, he has to add a substance into the latex.

Choose the correct substance and explanation to solve the problem.

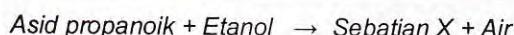
Seorang penoreh getah menghadapi masalah lateks menggumpal. Untuk menyelesaikan masalah itu, beliau perlu menambah suatu bahan ke dalam lateks itu. Pilih bahan dan penerangan yang betul untuk menyelesaikan masalah itu.

	Substance	Explanation
A	Ammonia solution <i>Larutan ammonia</i>	Contain OH ⁻ ion that neutralizes the H ⁺ ion from the lactic acid <i>Mengandungi ion OH⁻ yang meneutralkan ion H⁺ daripada asid laktik</i>
B	Ethanoic acid <i>Asid etanoik</i>	Contain ion that neutralizes the negative charge on the membrane of the rubber particle <i>Mengandungi ion yang meneutralkan cas negatif pada membran getah</i>
C	Sodium chloride solution <i>Larutan natrium klorida</i>	As a preservative to maintain the original state of the latex. <i>Sebagai pengawet untuk mengekalkan keadaan asal lateks</i>
D	Water <i>Air</i>	To make the latex more dilute <i>Menjadikan lateks lebih cair</i>

18. The following equation shows a chemical reaction.

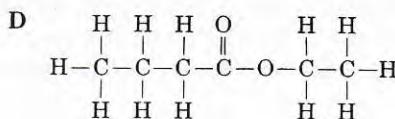
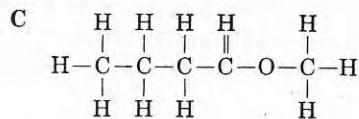
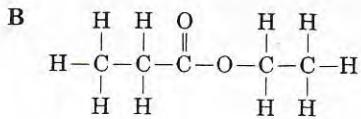
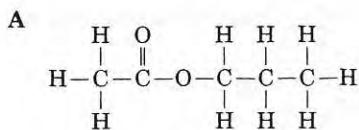


Persamaan berikut menunjukkan satu tindak balas kimia.



What is the structural formula of compound X?

Apakah formula struktur bagi sebatian X?



19. Psychiatric patients are always restless and normally experience difficulties in sleeping. Which medicine is suitable to treat these patients?

Pesakit psikiatrik sentiasa resah dan biasanya mengalami masalah sukar untuk tidur. Ubat yang manakah sesuai digunakan untuk merawat pesakit tersebut?

- A. Aspirin
Aspirin
- B. Codeine
Kodeina
- C. Barbiturate
Barbiturat
- D. Streptomycin
Streptomisin

20. Which of the following is true about soap or detergent?

Antara yang berikut, yang manakah benar tentang sabun atau detergen?

- A. Detergent forms scum in hard water.
Detergen membentuk kekat dalam air liat
- B. Soap forms scum in soft water.
Sabun membentuk kekat dalam air lembut
- C. Scum decreases the effectiveness of the cleansing action of a soap.
Kekat mengurangkan keberkesanan tindakan pencucian sabun
- D. The presence of magnesium ions in detergent forms scum.
Kehadiran ion magnesium dalam detergen menghasilkan kekat.

21. Diagram 10 shows the symbol for chlorine atom.

Rajah 10 menunjukkan simbol bagi atom klorin

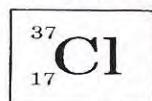


Diagram 10

Rajah 10

Which of the following is true based on the symbol in Diagram 10?
 Antara berikut, yang manakah benar berdasarkan Rajah 10?

	Proton number Nombor proton	Nucleon number Nombor nukleon	Number of electrons Bilangan elektron
A	17	37	17
B	17	20	17
C	20	37	20
D	37	17	37

22. The information shows the sub-atomic particles of atom W.

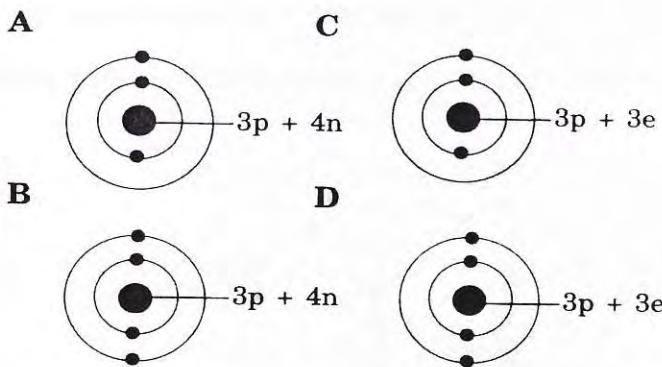
- Electron arrangement: 2.1
- Number of protons: 3
- Number of neutrons: 4

Maklumat berikut menunjukkan subatom bagi atom W.

- Susunan elektron: 2.1
- Bilangan proton: 3
- Bilangan neutron: 4

Which of the following diagrams shows an atom W?

Antara gambar rajah berikut yang manakah menunjukkan satu atom W?



23. Diagram 11 shows the electron arrangement of a compound formed between atoms P and Q.

Rajah 11 menunjukkan susunan elektron bagi sebatian yang terbentuk antara atom-atom P dan Q.

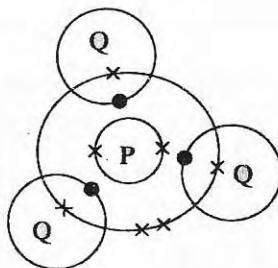


Diagram 11

Rajah 11

Which the following statement is true about the compound?
Antara berikut yang manakah benar tentang sebatian itu?

- A. It is an ionic compound
Sebatian itu adalah sebatian ion
- B. The compound is formed by covalent bonds
Sebatian itu terbentuk melalui ikatan kovalen
- C. The compound has high boiling point
Sebatian itu mempunyai takat didih yang tinggi
- D. The compound is formed by electron transfer
Sebatian itu terbentuk melalui pemindahan elektron

24. Diagram 12 shows the set-up of apparatus for the electrolysis of iron(II) sulphate solution.

Rajah 12 menunjukkan susunan radas bagi elektrolisis larutan ferum(II) sulfat.

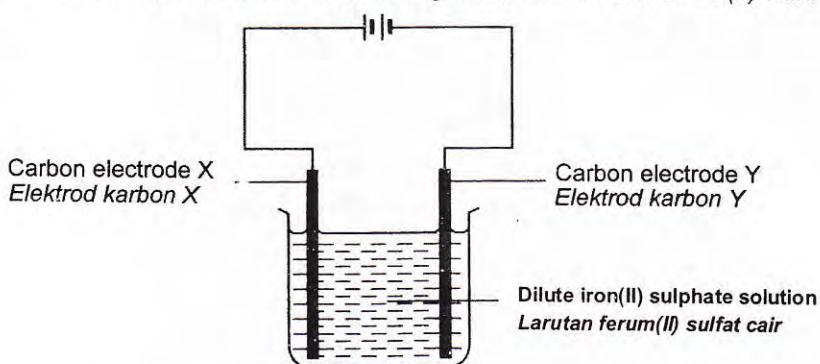


Diagram 12
Rajah 12

What is formed at carbon electrode X?
Apakah yang terbentuk di elektrod karbon X?

- A. Iron
Ferum
- B. Oxygen
Oksigen
- C. Sulphur dioxide
Sulfur dioksida
- D. Hydrogen gas
Gas hidrogen

25. The table shows the total volume of gas collected at regular intervals in a reaction.

Jadual menunjukkan jumlah isipadu gas yang terkumpul pada sela masa tertentu dalam suatu tindak balas.

Time/s <i>Masa/s</i>	0	30	60	90	120	150	180	210
Volume of gas / cm ³ <i>Isipadu gas / cm³</i>	0	2.0	3.7	5.2	6.4	7.3	8.6	8.6

What is the average rate of reaction in the second minute?

Berapakah kadar tindak balas purata dalam minit kedua?

- A. 0.040 cm³ s⁻¹
- B. 0.045 cm³ s⁻¹
- C. 0.053 cm³ s⁻¹
- D. 0.062 cm³ s⁻¹

26. Which of the following is a redox reaction?

Antara tindak balas berikut yang manakah tindak balas redoks?

- A. Displacement
Penyesaran
- B. Esterification
Pengestieran
- C. Neutralization
Peneutralan
- D. Double decomposition
Penguraian dubel

27. Diagram 13 shows an energy level diagram.

Rajah 13 menunjukkan satu gambar rajah aras tenaga

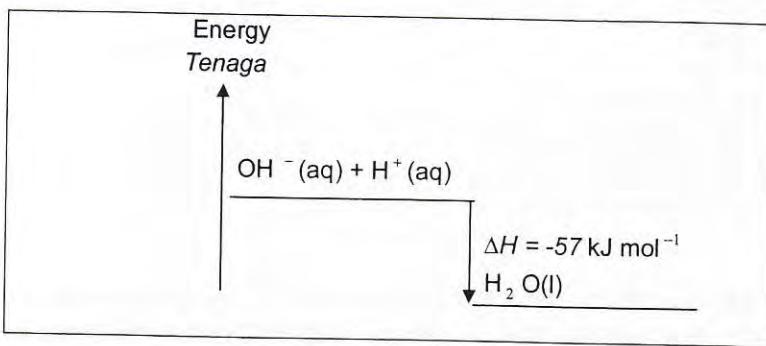


Diagram 13

Rajah 13

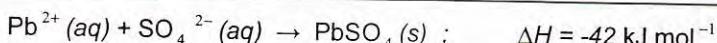
Based on Diagram 13, it can be concluded that

Berdasarkan Rajah 13, boleh disimpulkan bahawa

- A. The heat of neutralization is -57 kJ mol^{-1}
Haba peneutralan ialah -57 kJ mol^{-1}
- B. 57 kJ of energy is needed for the reaction
 57 kJ tenaga diperlukan untuk tindak balas ini
- C. The products of reaction contain more energy than the reactants
Hasil tindak balas mengandungi lebih banyak tenaga daripada bahan tindak balas
- D. The temperature at the end of the reaction is lower than that at the beginning of the reaction.
Suhu pada akhir tindak balas lebih rendah berbanding suhu awal tindak balas

28. The following chemical equation shows the reaction of the formation of lead (II) sulphate precipitate.

Persamaan kimia berikut menunjukkan tindak balas pembentukan mendakan plumbum(II) sulfat.



Which of the following is true about the reaction?

Antara berikut, yang manakah benar tentang tindak balas itu?

	Heat change Perubahan haba	Type of reaction Jenis tindak balas
A	Heat is released <i>Haba dibebas</i>	Endothermic <i>Endotermik</i>
B	Heat is absorbed <i>Haba diserap</i>	Exothermic <i>Eksotermik</i>
C	Heat is released <i>Haba dibebas</i>	Exothermic <i>Eksotermik</i>
D	Heat is absorbed <i>Haba diserap</i>	Endothermic <i>Endotermik</i>

29. Diagram 14 shows the atomic symbol of element X.

Rajah 14 menunjukkan simbol atom bagi unsur X.

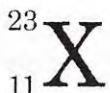


Diagram 14

Rajah 14

Which of the following is true about the sub-atomic particles of element X?

Antara berikut yang manakah benar tentang zarah subatom bagi unsur X?

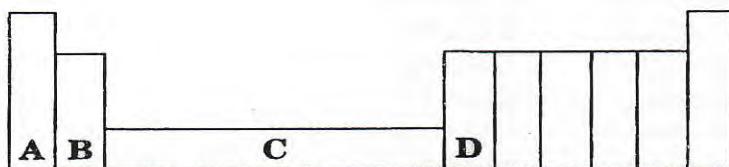
	Proton Number Nombor Proton	Nucleon Number Nombor Nukleon	Electron Arrangement Susunan Elektron
A	11	23	2.8.1
B	11	23	2.8.8.5
C	23	11	2.8.1
D	23	11	2.8.8.5

30. The following statements describe the characteristics of an element.

Pernyataan berikut menguraikan ciri-ciri suatu unsur.

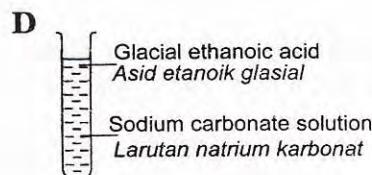
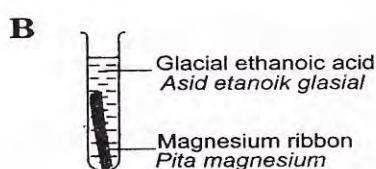
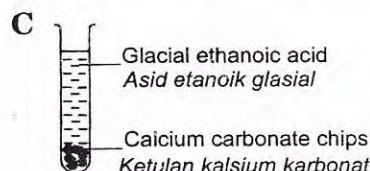
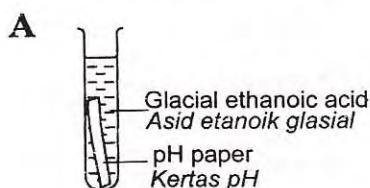
- Aqueous solutions of its ions are green or brown in colour.
Larutan akueus bagi ionnya adalah berwarna hijau atau perang
- Used as catalyst in the Haber Process
Digunakan sebagai mangkin dalam Proses Haber
- Has two oxidation number, +2 and +3.
Mempunyai dua nombor pengoksidaan, +2 dan +3

Which the following shows the position of this element in the Periodic Table?
 Antara yang berikut, yang manakah menunjukkan kedudukan unsur dalam Jadual Berkala.



31. Glacial ethanoic acid is put into four test tubes A, B, C and D. In which test tube does a reaction occur?

Asid etanoik glacial diisi dalam empat tabung uji A, B, C dan D. Dalam tabung uji manakah tindak balas berlaku?



32. The reaction between hydrochloric acid and sodium hydroxide is an exothermic reaction. The heat of reaction is 57 kJ mol^{-1} .

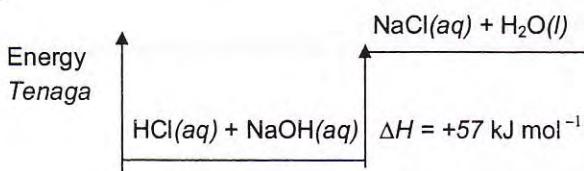
Which the following energy level diagrams represents the reaction?

Tindak balas antara asid hidroklorik dengan natrium hidroksida adalah tindak balas eksotermik.

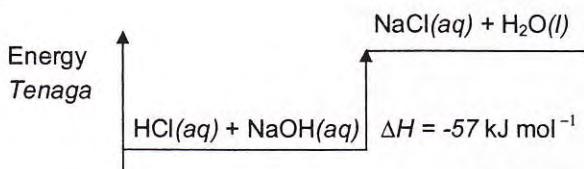
Haba tindak balas adalah 57 kJ mol^{-1} .

Antara gambar rajah aras tenaga berikut yang manakah mewakili tindak balas itu?

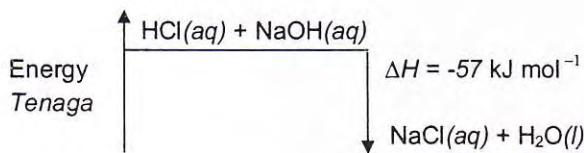
A.



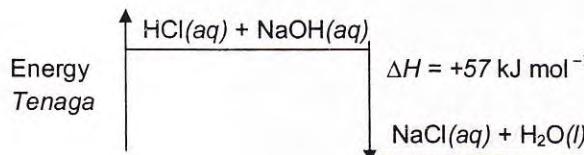
B.



C.



D.



33. Diagram 15 shows the electron shells in the substance formed between atoms of hydrogen and Y?

Rajah 15 menunjukkan petala elektron dalam sebatian yang terbentuk antara atom hidrogen dengan atom Y.

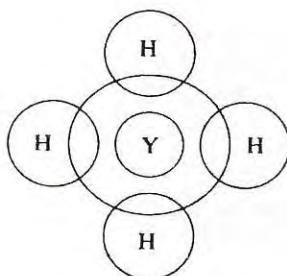


Diagram 15

Rajah 15

What is the electron arrangement of atom Y?

Apakah susunan elektron bagi atom Y?

- A. 2.4
- B. 2.8
- C. 2.8.6
- D. 2.8.8

34. If you want to cook 100 potatoes within a short time , which is the most suitable method?

Sekiranya anda ingin memasak 100 biji kentang dalam masa yang singkat, apakah kaedah yang paling sesuai dilakukan?

- A. Boil the potatoes in a pan
Merebus kentang dalam kuali leper
- B. Boil the potatoes in a pressure cooker
Merebus kentang dalam periuk tekanan
- C. Steam the potatoes in a steamer
Mengukus kentang dalam pengukus
- D. Fry the potatoes in a wok
Menggoreng kentang dalam kuali

35. Below is the half equation of a reaction.

Di bawah adalah setengah persamaan bagi satu tindak balas



What is meant by oxidation reaction based on the equation?

Apakah yang dimaksud dengan tindak balas pengoksidaan berdasarkan persamaan itu?

- A. Electrons are received by bromine
Elektron diterima oleh bromin
- B. Electrons are donated by bromine
Elektron diberikan oleh bromin
- C. Electrons are received by bromide ions
Elektron diterima oleh ion bromida
- D. Electrons are donated by bromide ions
Elektron diberikan oleh ion bromida

36. What is the number of molecules in 1 mole of ammonia, NH_3 ?

Use the information that the Avogadro constant = $6.0 \times 10^{23} \text{ mol}^{-1}$

Berapakah bilangan molekul dalam 1 mol ammonia, NH_3 ?

Gunakan maklumat pemalar Avogadro = $6.0 \times 10^{23} \text{ mol}^{-1}$

- A. 1.5×10^{23} molecules
 1.5×10^{23} molekul
- B. 6.0×10^{23} molecules
 6.0×10^{23} molekul
- C. 1.2×10^{24} molecules
 1.2×10^{24} molekul
- D. 2.4×10^{24} molecules
 2.4×10^{24} molekul

37. Diagram 16 shows the set-up of the apparatus used to electroplate an iron key with copper.

Rajah 16 menunjukkan susunan radas yang digunakan untuk menyadur kunci besi dengan kuprum.

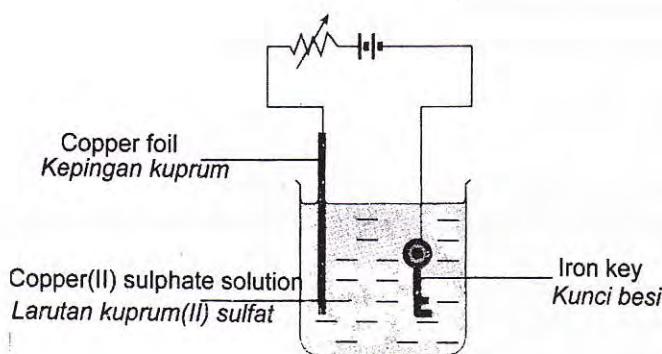


Diagram 16
Rajah 16

What is observed at the anode and cathode after 30 minutes?
Apakah yang diperhatikan di anod dan di katod selepas 30 minit?

	Anode Anod	Cathode Katod
A	Brown deposit formed <i>Enapan perang terbentuk</i>	Copper foil becomes thicker <i>Kepingan kuprum menjadi tebal</i>
B	Copper foil becomes thinner <i>Kepingan kuprum menjadi nipis</i>	Brown deposit formed <i>Enapan perang terbentuk</i>
C	Brown deposit formed <i>Enapan perang terbentuk</i>	Gas bubbles released <i>Gelembung gas terbebas</i>
D	Copper foil becomes thinner <i>Kepingan kuprum menjadi nipis</i>	Gas bubbles released <i>Gelembung gas terbebas</i>

38. Below is an ionic equation
Di bawah adalah suatu persamaan ion.



Which of the following is true of the equation?
Antara berikut yang manakah benar mengenai persamaan itu?

- A. Y^{2+} is oxidized
 Y^{2+} dioksidakan
- B. X is an oxidizing agent
 X adalah agen pengoksidaan
- C. X^{2+} is a reducing agent
 X^{2+} adalah agen penurunan
- D. X donates electrons to Y^{2+}
 X menderma electron kepada Y^{2+}

39. Which of the following is true about the heat of combustion ΔH , for ethanol, propanol and butanol?

Antara yang berikut, yang manakah benar bagi nilai haba pembakaran, ΔH , bagi etanol, propanol dan butanol?

	Ethanol <i>Etanol</i>	Propanol <i>Propanol</i>	Butanol <i>Butanol</i>
A	-2 015 kJ mol ⁻¹	-1 376 kJ mol ⁻¹	-725 kJ mol ⁻¹
B	-2 015 kJ mol ⁻¹	-2 676 kJ mol ⁻¹	-725 kJ mol ⁻¹
C	-2 676 kJ mol ⁻¹	-725 kJ mol ⁻¹	-1 376 kJ mol ⁻¹
D	-1 376 kJ mol ⁻¹	-2 015 kJ mol ⁻¹	-2 676 kJ mol ⁻¹

40. The electron arrangement of atom E is 2.8.7 and atom G has four valence electrons. What is the formula of the compound formed between E and G?

Susunan elektron bagi atom E ialah 2.8.7 dan atom G mempunyai empat elektron valens. Apakah formula sebatian yang terbentuk antara E dan G?

- A. GE_2
- B. GE_4
- C. G_2E
- D. G_4E

41. The diagram below shows the elements in Period 3 of the Periodic Table of Elements.

Rajah di bawah menunjukkan unsur-unsur dalam Kala 3 Jadual Berkala Unsur.

11 Na 23	12 Mg 24	13 Al 27	14 Si 28	15 P 31	16 S 32	17 Cl 35.5	18 Ar 40
----------------	----------------	----------------	----------------	---------------	---------------	------------------	----------------

Why does the size of the atoms decrease from sodium to argon in the period?

Mengapakah saiz atom berkurangan daripada sodium kepada argon dalam kala ini?

- A. The number of valence electrons increase
Bilangan electron valens bertambah
- B. The electronegativity of the elements increases
Keelektronegatifan unsur bertambah
- C. The attraction of the nucleus for electrons in the shell increases
Tarikan nukleus terhadap electron dalam petala bertambah
- D. The properties for the elements change from metallic to non-metallic
Sifat unsur-unsur berubah dari logam kepada bukan logam

42. Diagram 17 shows the set-up of the apparatus of a chemical cell.

Rajah 17 menunjukkan susunan radas satu sel kimia.

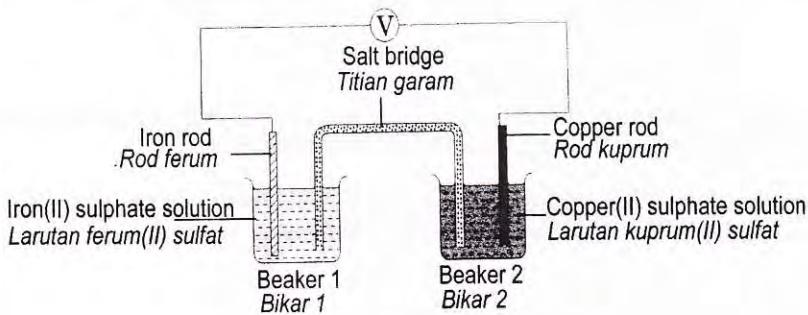


Diagram 17
Rajah 17

Which of the following happens in the chemical cell?

Antara berikut yang manakah berlaku dalam sel kimia itu?

- A. The iron rod becomes thicker
Rod ferum menjadi lebih tebal
- B. The copper rod becomes thinner
Rod kuprum menjadi lebih nipis
- C. The intensity of the blue colour of the copper (II) sulphate solution decreases
Keamatian warna biru larutan kuprum(II) sulfat berkurangan
- D. The colour of the solution in Beaker 1 changes from green to brown
Warna larutan dalam Bikar 1 bertukar daripada hijau ke perang

43. Diagram 18 shows the set-up of apparatus for the titration of potassium hydroxide solution with sulphuric acid.

Rajah 18 menunjukkan susunan radas bagi proses pentitratan larutan kalium hidroksida dengan asid sulfurik.

20 cm^3 of 0.1 mol dm^{-3} potassium hydroxide solution and phenolphthalein indicator

$20 \text{ cm}^3 0.1 \text{ mol dm}^{-3}$ larutan kalium hidroksida dan penunjuk fenolfftalein

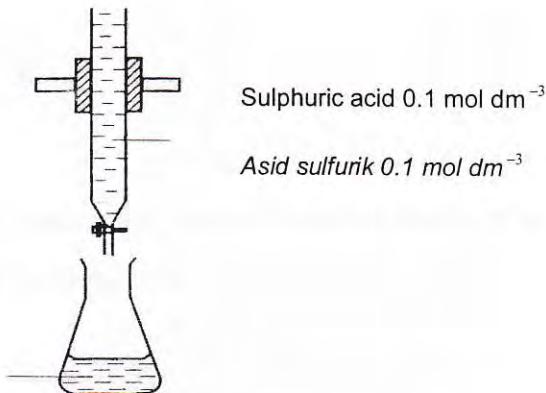


Diagram 18
Rajah 18

What is the total volume of the mixture in the conical flask at the end point of the titration in Diagram 18?

Berapakah jumlah isi padu campuran di dalam kelalang kon pada takat akhir pentitratan dalam Rajah 18?

- A. 10 cm^3
- B. 20 cm^3
- C. 30 cm^3
- D. 40 cm^3

44. What is the oxidation number of manganese in the ion MnO_4^- ?

Apakah nombor pengoksidaan mangan dalam ion MnO_4^- ?

- A. +2
- B. +3
- C. +7
- D. +8

45. A compound with formula X_2CO_3 has a relative formula mass of 138.
 What is the relative atomic mass of X?
 Use the information that the relative atomic mass of C=12 and O=16.

*Satu sebatian berformula X_2CO_3 mempunyai jisim formula relativ 138.
 Berapakah jisim atom relatif bagi X?
 Gunakan maklumat jisim atom relativ C=12 dan O=16.*

- A. 39
- B. 69
- C. 78
- D. 110

46. The equation below represents the reaction to extract aluminium from aluminium oxide

Persamaan di bawah mewakili tindak balas untuk mengekstrak aluminium daripada aluminium oksida.



What is the mass of aluminium that can be extracted from 102 g of aluminium oxide?
 [Relative atomic mass : O, 16; Al, 27]

Berapakah jisim aluminium yang boleh diekstrak dari 102 g aluminium oksida?

[Jisim atom relatif : O., 16 ; Al, 27]

- A. 13.5 g
- B. 27.0 g
- C. 54.0 g
- D. 108.0 g

47. Which of the following quantities of substance contain 6×10^{22} molecules?

[Relative atomic mass : H, 1; C, 12 ; O, 16; Avogadro's Constant : $6 \times 10^{23} \text{ mol}^{-1}$]

Antara kuantiti bahan berikut, yang manakah mengandungi 6×10^{22} molekul?

[Jisim atom relatif : H, 1; C, 12 ; O, 16; Pemalar Avogadro : $6 \times 10^{23} \text{ mol}^{-1}$]

- I. 1.8 g water
1.8 g air
- II. 1.0 g hydrogen gas
1.0 g gas hidrogen
- III. 3.2 g oxygen gas
3.2 g gas oksigen
- IV. 4.4 g carbon dioxide
4.4 g karbon dioksida

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

48. The equation shows the reaction between sulphuric acid and sodium hydroxide.
Persamaan menunjukkan tindak balas antara asid sulfurik dan sodium hidroksida.



What is the volume of 1.0 mol dm^{-3} sodium hydroxide solution which can neutralize 25.0 cm^3 of 1.0 mol dm^{-3} sulphuric acid?

Berapakah isi padu larutan natrium hidroksida 1.0 mol dm^{-3} yang boleh meneutralkan 25.0 cm^3 asid sulfurik 1.0 mol dm^{-3} ?

- A. 12.5 cm^3
- B. 25.0 cm^3
- C. 50.0 cm^3
- D. 75.0 cm^3

49. Diagram 19 shows the set-up of the apparatus for an experiment to determine the rate of reaction between sodium thiosulphate solution and sulphuric acid.

Rajah 19 menunjukkan susunan radas bagi eksperimen untuk menentukan kadar tindak balas di antara larutan natrium tiosulfat dan asid sulfurik.

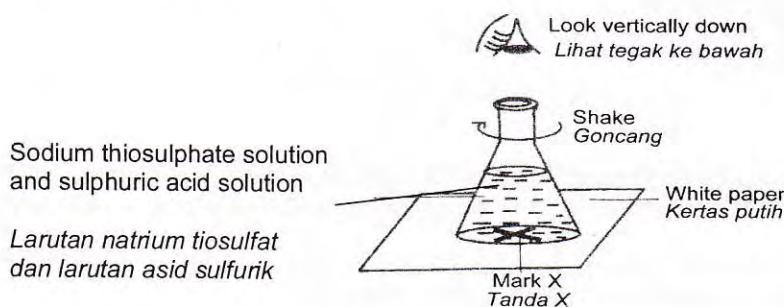


Diagram 19
Rajah 19

Which of the following combination of conditions take the shortest time for the mark X to disappear from sight?

Antara kombinasi keadaan berikut yang manakah mengambil masa paling singkat untuk tanda X hilang daripada penglihatan?

	Sulphuric acid Asid sulfurik		Sodium thiosulphate solution Larutan natrium tiosulfat		Temperature $/ ^\circ \text{C}$
	Volume $/ \text{cm}^3$ <i>Isipadu / cm³</i>	Concentration $/ \text{mol dm}^{-3}$ <i>Kepekatan / mol dm⁻³</i>	Volume / cm^3 <i>Isipadu / cm³</i>	Concentration / mol dm^{-3} <i>Kepekatan / mol dm⁻³</i>	Suhu $/ ^\circ \text{C}$
A	10	1.0	50	0.5	30
B	10	1.0	50	0.5	40
C	10	0.5	50	0.5	30
D	20	0.5	40	0.5	40

50. Diagram 20 shows an energy level diagram
Rajah 20 menunjukkan gambar rajah aras tenaga

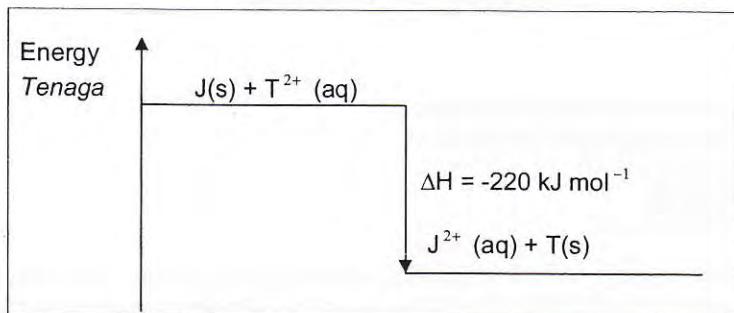


Diagram 20
Rajah 20

Based on Diagram 20 , what is the increase in temperature of the solution if excess J powder is added to 50 cm^3 of 0.2 mol dm^{-3} T salt solution?
 [Specific heat capacity of solution : $4.0 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$]

*Berdasarkan Rajah 20 , berapakah kenaikan suhu larutan jika serbuk larutan J berlebihan ditambah kepada $50 \text{ cm}^3 0.2 \text{ mol dm}^{-3}$ larutan garam T?
 [Muatan haba tentu larutan : $4.0 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$]*

- A. $4.4 \text{ }^{\circ}\text{C}$
- B. $5.5 \text{ }^{\circ}\text{C}$
- C. $8.8 \text{ }^{\circ}\text{C}$
- D. $11.0 \text{ }^{\circ}\text{C}$

END OF QUESTION PAPER
 KERTAS SOALAN TAMAT

NO. KAD
PENGENALAN

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ANGKA GILIRAN

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**PERSIDANGAN KEBANGSAAN
PENGETUA-PENGETUA
SEKOLAH MENENGAH MALAYSIA
CAWANGAN PULAU PINANG**

PEPERIKSAAN PERCUBAAN SPM 2010

CHEMISTRY

Kertas 2

Sept./Oct.

2½ jam

minit

Dua jam tiga puluh

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. Tulis nombor kad pengenalan dan angka giliran anda pada petak yang disediakan.
2. Kertas soalan ini adalah dalam dwibahasa.
3. Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.
4. Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.
5. Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.

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

Kertas soalan ini mengandungi 24 halaman bercetak.

Section A

Bahagian A

[60 marks]
[60 markah]

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

- 1 Diagram 1 shows part of the Periodic Table of Elements. A, B, C, D, E, F, and G do not represent the actual symbol of the elements.

Rajah 1 menunjukkan sebahagian daripada Jadual Berkala Unsur. A, B, C, D, E, F dan G tidak mewakili simbol sebenar unsur berkenaan.

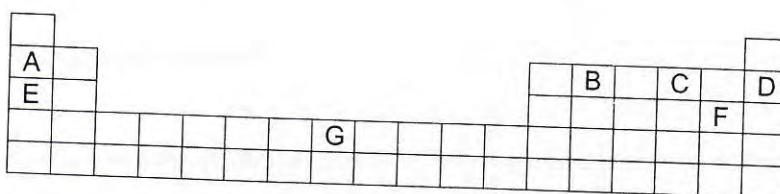


Diagram 1 *Rajah 1*

Using the letters in the Periodic Table of Elements in Diagram 1, answer the following questions.

Dengan menggunakan huruf-huruf yang terdapat dalam Jadual Berkala Unsur pada Rajah 1, jawab soalan-soalan berikut.

- (a) (i) State the elements that are placed in Period 3.

Nyatakan unsur-unsur yang terdapat dalam Kalimat

[1 mark]
[1 markah]

- (ii) How does the electronegativity of the elements stated in (a) (i) change across the period?

Bagaimanakah kelektronegatifan unsur-unsur tersebut dalam (a)(i) berubah apabila merentasi kala?

[1 mark]
[1 markah]

- (b) (i) Element B exists as isotopes. What is meant by isotopes?

Unsur B wujud sebagai isotop. Apakah yang dimaksudkan dengan isotop?

.....

.....

[1 mark]
[1 markah]

1(b)(i)

- (ii) State one use of isotope of element B in daily life.

Nyatakan satu kegunaan isotop bagi unsur B dalam kehidupan harian.

.....

[1 mark]
[1 markah]

1(b)(ii)

- (c) (i) Choose one element that is chemically unreactive.

Pilih satu unsur yang bersifat lengai secara kimia.

.....

[1 mark]
[1 markah]

1(c)(i)

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

Terangkan jawapan anda dalam (c) (i).

.....

[1 mark]
[1 markah]

1(c)(ii)

- (d) (i) State an element that can react with water to produce hydrogen gas.

Nyatakan satu unsur yang boleh bertindak balas dengan air untuk menghasilkan gas hidrogen.

.....

[1 mark]
[1 markah]

1(d)(i)

- (ii) Write a balanced chemical equation for the reaction stated in (d) (i).

Tulis persamaan kimia seimbang bagi tindak balas yang dinyatakan dalam (d) (i).

.....

[1 mark]
[1 markah]

1(d)(ii)

Lihat halaman sebelah

1 (e)

- (e) Write the electron arrangement for an atom of element F.
Tulis susunan elektron bagi atom unsur F.

.....

[1 mark]
[1 markah]

1 (f)

- (f) Which element forms coloured ions in aqueous solution?
Unsur yang manakah membentuk ion berwarna dalam larutan akueus?

.....

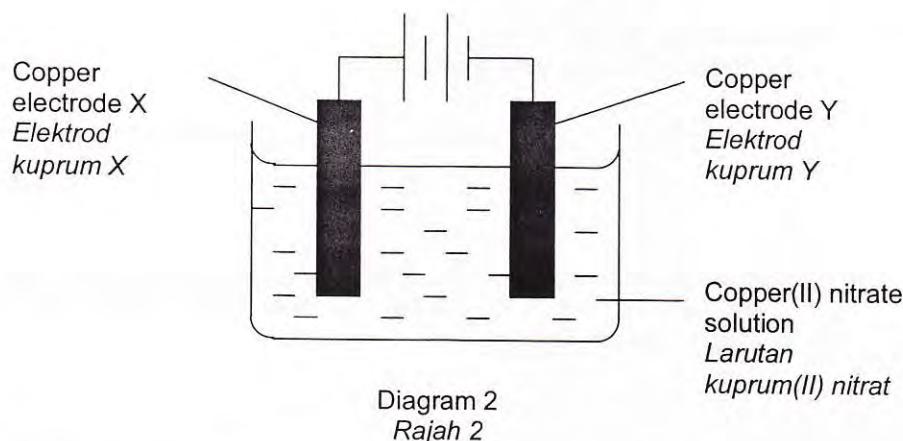
[1 mark]
[1 markah]

Total A1

10

- 2 Diagram 2 shows the apparatus set-up to study the electrolysis of copper(II) nitrate solution using copper electrodes.

Rajah 2 menunjukkan susunan radas untuk mengkaji elektrolisis larutan kuprum(II) nitrat dengan menggunakan elektrod kuprum.



Based on Diagram 2:
Berdasarkan Rajah 2:

- (a) Write the formulae for all the cations present in copper(II) nitrate solution.

Tulis formula bagi semua kation yang hadir dalam larutan kuprum(II) nitrat.

.....

[1 mark]
[1 markah]

- (b) (i) State the electrode that acts as a cathode.
Nyatakan elektrod yang bertindak sebagai katod.

2 (b)(i)

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

[1 mark]
[1 markah]

- (ii) Name the product formed at the cathode.
Namakan hasil yang terbentuk di katod.

2 (b)(ii)

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

[1 mark]
[1 markah]

- (c) The experiment has been carried out for 30 minutes and it is found that there is no change in the intensity of the blue copper(II) nitrate solution. Explain why.
Eksperimen telah dijalankan selama 30 minit dan didapati tiada perubahan pada keamatan warna biru larutan kuprum(II) nitrat. Terangkan mengapa.

2 (c)

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

[2 marks]
[2 markah]

- (d) (i) Write the half equation for the reaction that occurs at copper electrode X.
Tulis setengah persamaan bagi tindak balas yang berlaku di elektrod kuprum X.

2 (d)(i)

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

[1 mark]
[1 markah]

- (ii) If the electrolysis process is repeated by replacing copper electrodes with carbon electrodes, what will be observed at the electrode X?
Jika proses elektrolisis diulang dengan menggantikan kedua-dua elektrod kuprum dengan elektrod karbon, apakah yang akan diperhatikan di elektrod X?

2 (d)(ii)

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

[1 mark]
[1 markah]

- (e) A student intends to electroplate an iron spoon with silver metal based on the industrial application of electrolysis.

Seorang pelajar ingin menyadur sebatang sudu besi dengan logam perak berdasarkan kegunaan elektrolisis dalam industri.

- (i) Draw the apparatus set-up used to electroplate the iron spoon with silver metal.

Lukis susunan radas yang digunakan untuk menyadurkan sudu besi dengan logam perak.

2 (e)(i)

[2 marks]
[2 markah]

- (ii) Suggest one step that can be taken to ensure that the iron spoon is electroplated evenly.

Cadangkan satu langkah yang boleh diambil untuk memastikan penyaduran sekata pada sudu besi.

2 (e)(ii)

.....

[1 mark]
[1 markah]

Total A2

10

- 3 Table 3 shows the pH values of four solutions which have the same concentration.

Jadual 3 menunjukkan nilai-nilai pH bagi empat larutan yang mempunyai kepekatan yang sama.

Acid	pH value
0.1 mol dm ⁻³ hydrochloric acid 0.1 mol dm ⁻³ asid hidroklorik	1
0.1 mol dm ⁻³ nitric acid 0.1 mol dm ⁻³ asid nitric	1
0.1 mol dm ⁻³ ethanoic acid 0.1 mol dm ⁻³ asid etanoik	3
0.1 mol dm ⁻³ ethanoic acid in methylbenzene 0.1 mol dm ⁻³ asid etanoik dalam metilbenzena	7

Table 3
Jadual 3

- (a) (i) What is meant by acid?
Apakah yang dimaksudkan dengan asid?

3 (a)(i)

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

- (ii) Without using any indicator, describe a chemical test to show that a solution is an acid.

Tanpa menggunakan penunjuk,uraikan satu ujian kimia untuk menunjukkan bahawa suatu larutan itu berasid.

3 (a)(ii)

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

- (iii) Which of the acids in Table 3 is a strong acid?
Asid yang manakah dalam Jadual 3 merupakan asid kuat?

3 (a)(iii)

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

3 (a)(iv)

- (iv) Explain why the pH value of ethanoic acid in methylbenzene is pH 7.
Terangkan mengapa asid etanoik dalam metilbenzena mempunyai nilai pH 7.

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

[1 mark]
[1 markah]

- (b) Diagram 3 shows the apparatus set-up for the titration of sodium hydroxide solution and nitric acid in an experiment.
Rajah 3 menunjukkan susunan radas bagi pentitratian larutan natrium hidroksida dengan asid nitrik dalam satu eksperimen.

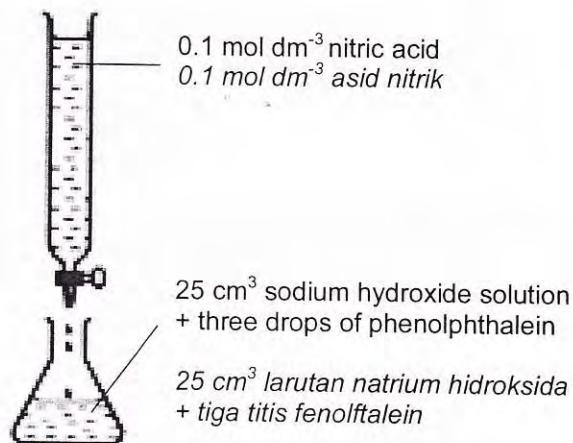


Diagram 3
Rajah 3

- (i) Name the type of reaction that occurs in this experiment.

Namakan jenis tindak balas yang berlaku dalam eksperimen ini.

3 (b)(i)

.....

[1 mark]
[1 markah]

- (ii) State the colour change of the solution in the conical flask when the end-point is reached.

Nyatakan perubahan warna larutan dalam kelalang kon semasa takat akhir tercapai.

3 (b)(ii)

.....

[1 mark]

[1 markah]

- (iii) Write a balanced chemical equation for the reaction between nitric acid and sodium hydroxide solution.

Tulis persamaan kimia seimbang bagi tindak balas di antara asid nitrik dan larutan natrium hidroksida.

3 (b)(iii)

.....

[1 mark]

[1 markah]

- (iv) In this experiment, 20 cm³ of nitric acid is needed to neutralize 25 cm³ of sodium hydroxide solution. Calculate the concentration of sodium hydroxide solution used.

Dalam eksperimen ini, 20 cm³ asid nitrik diperlukan untuk meneutralkan 25 cm³ larutan natrium hidroksida. Hitung kepekatan larutan natrium hidroksida yang digunakan.

3 (b)(iv)

[2 marks]

[2 markah]

Total A3

10

4

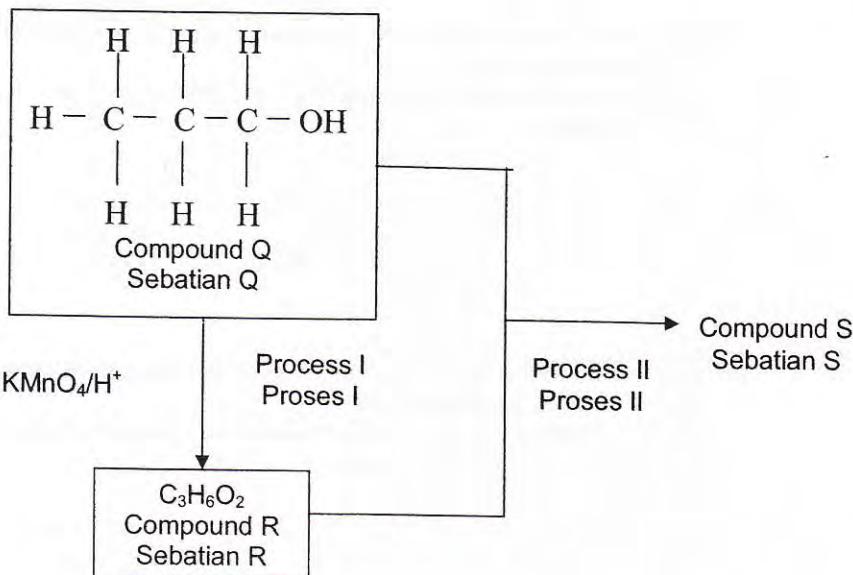
Diagram 4
Rajah 4

Diagram 4 shows a flow chart for a series of changes of carbon compounds from one homologous series to another homologous series.

Rajah 4 menunjukkan carta alir satu siri perubahan sebatian karbon dari satu siri homolog ke siri homolog yang lain.

- (a)(i) Draw the structural formula of compound R.
Lukis formula struktur bagi sebatian R.

4(a)(i)

[1 mark]
[1 markah]

- (ii) Name the homologous series for compound R.
Namakan siri homolog bagi sebatian R.

4(a)(ii)

[1 mark]
[1 markah]

- (iii) State **one** use of a(ii) in our daily life.
*Nyatakan **satu** kegunaan di a(ii) dalam kehidupan seharian.*

4(a)(iii)

[1 mark]
[1 markah]

- b(i) Write the general formula of compound Q.
Tuliskan formula am bagi sebatian Q.

.....
.....

[1 mark]
[1 markah]

4(b)(i)

- (ii) Name the reaction for the conversion of compound Q to compound R in Process I.
Namakan tindak balas yang menukar sebatian Q ke sebatian R dalam Proses I.

.....
.....

[1 mark]
[1 markah]

4(b)(ii)

- (iii) Write a balance chemical equation for the reaction in Process I.
Tulis persamaan kimia seimbang bagi Proses I.

.....
.....

[2 marks]
[2 markah]

4(b)(iii)

- (c)(i) In Process II, concentrated sulphuric acid is added to the mixture of compound Q and compound R to produce compound S. State the function of concentrated sulphuric acid in Process II?

Dalam Proses II, asid sulfurik pekat ditambah ke dalam campuran sebatian Q dan sebatian R untuk menghasilkan sebatian S. Nyatakan fungsi asid sulfurik pekat dalam Proses II.

.....
.....

[1 mark]
[1 markah]

4(c)(i)

- (ii) Name the compound S produced.
Namakan sebatian S yang terhasil.

.....
.....

[1 mark]
[1 markah]

4(c)(ii)

- (iii) State **one** special property of compound S.
*Nyatakan **satu** sifat istimewa bagi sebatian S.*

.....
.....

[1 mark]
[1 markah]

4(c)(iii)

Total A4

10

- 5 Table 5 shows the observations of an experiment to study the reactivity of metals with oxygen. Metal powder of T, U and V are heated vigorously in a flow of oxygen.

Jadual 5 menunjukkan pemerhatian eksperimen untuk mengkaji kereaktifan logam terhadap oksigen. Serbuk logam T, U dan V dipanaskan dengan kuat dalam aliran gas oksigen.

Metal Logam	Colour Warna	Observation Pemerhatian	Colour of residue Warna logam baki
T	Brown Perang	Glowing Berbara	Black powder Serbuk hitam
U	Grey Kelabu	Very bright flame Nyalaan sangat terang	White powder Serbuk putih
V	Grey Kelabu	Yellow powder glows brightly Serbuk kuning berbara terang	White powder Serbuk putih

Table 5
Jadual 5

5(a)

- (a) Name **one** substance that can be used to produce oxygen gas in this experiment.

*Namakan **satu** bahan yang boleh digunakan untuk menghasilkan gas oksigen dalam eksperimen ini.*

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

5(b)(i)

- (b)(i) State the reaction that occurs on the metals.
Nyatakan tindak balas yang berlaku pada logam.

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

5(b)(ii)

- (ii) Explain your answer for (b)(i).
Terangkan jawapan anda di (b)(i).

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

- (c) Based on the results of the experiment, arrange the metals, T, U and V, in ascending order of their reactivity towards oxygen.

Berdasarkan keputusan eksperimen, susun logam-logam, T, U, dan V dalam susunan menaik mengikut kereaktifan terhadap oksigen.

5(c)

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

- (d)(i) Draw a labelled diagram for the apparatus set-up of the experiment.

Lukis gambarajah berlabel bagi susunan radas dalam eksperimen ini.

5(d)(i)

[2 marks]
[2 markah]

- (ii) 4.8 g of metal U reacts with oxygen to produce 8.0 g of oxide U.

Determine the empirical formula of oxide U.

[Relative atomic mass: O, 16; U, 24]

4.8 g logam U bertindak balas dengan oksigen menghasilkan 8.0 g oksida U. Tentukan formula empirik bagi oksida U.

[Jisim atom relative: O, 16; U,24]

5(d)(ii)

[4 marks]
[4 markah]

Total A5

10

- 6 (a) Diagram 6.1 shows the flow chart for the preparation of detergent B.
Rajah 6.1 menunjukkan carta aliran untuk penyediaan detergen B.

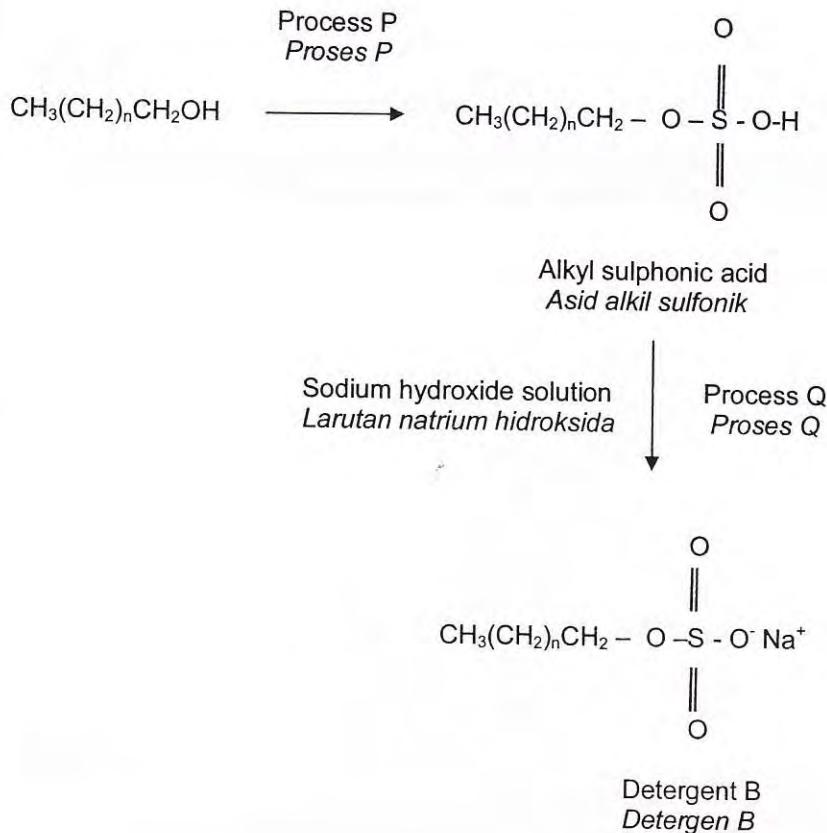


Diagram 6.1
Rajah 6.1

- 6(a)(i) (i) Name detergent B.
Namakan detergen B.

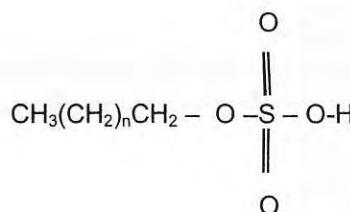
.....
[1 mark]
[1 markah]

- 6(a)(ii) (ii) State the Process Q.
Nyatakan Proses Q.

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

- (b) Based on the structure of detergent B, circle and label the hydrophilic part and hydrophobic part.

Berdasarkan struktur detergen B, bulatkan dan labelkan bahagian hidrofilik dan hidrofobik.



6(b)

[2 marks]
[2 markah]

- (c)(i) The cleansing action of a detergent is more effective than soap in hard water.

Tindakan pencucian detergen adalah lebih berkesan daripada sabun dalam air liat.

- (i) What is hard water?
Apakah air liat?

6(c)(i)

[1 mark]
[1 markah]

- (ii) Explain why detergent is more effective than soap in hard water.

Terangkan mengapa detergen adalah lebih berkesan daripada sabun dalam air liat.

6(c)(ii)

[2 marks]
[2 markah]

- (d) Diagram 6.2 shows a label of food packages.
Rajah 6.2 menunjukkan satu label pembungkus makanan.



Diagram 6.2
Rajah 6.2

6(d)(i)

- (i) Name **one** food additive used in the ice cream.
*Namakan **satu** bahan tambah makanan dalam ais krim ini.*

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

6(d)(ii)

- (ii) State the function of the food additive in (d)(i).
Nyatakan fungsi bahan tambah makanan dalam (d)(i).

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

6(d)(iii)

- (iii) Ethyl butanoate is an example of ester. Draw the structural formula of ethyl butanoate.
Etil butanoat adalah satu contoh ester. Lukiskan formula struktur bagi etil butanoat.

[1 mark]
[1 markah]

Total A6

10

Section B
Bahagian B

[20 marks]
[20 markah]

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

7. Diagram 7, shows 3 state of matter that is P, Q and R.
Rajah 7 menunjukkan 3 keadaan jirim, iaitu P, Q dan R.

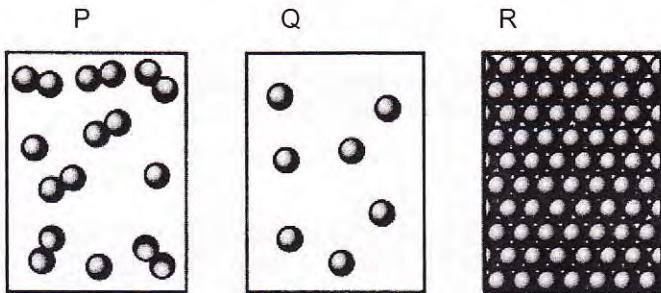


Diagram 7
Rajah 7

- (a) Based on Diagram 7, what is state of matter for P, Q and R.?
Berdasarkan rajah 7, apakah keadaan jirim bagi P, Q dan R?
- [3 marks]
[3 markah]
- (b) By using the kinetic theory of matter, explain how the following occurs.
Dengan menggunakan teori kinetik jirim,uraikan bagaimana perubahan di bawah berlaku.
- i. P change to Q
P berubah ke Q
 - ii. P change to R
P berubah ke R
 - iii. Q change to P
Q berubah ke P

In your explanation include the process occurs, the energy contents and the movement of the particles.
Huraian anda mestilah meliputi proses yang terlibat, kandungan tenaga dan pergerakan jirim.

[9 marks]
[9 markah]

- (c) When 31.0g copper carbonate, CuCO_3 is heated, copper oxide, CuO and carbon dioxide gas, CO_2 was formed in room temperature.

Apabila 31.0g kuprum karbonat, CuCO_3 dipanaskan kuprum oksida, CuO dan gas karbon dioksida, CO_2 dihasilkan pada keadaan bilik.

[Relative atomic mass: O, 16; C, 12; Cu, 64; 1 mole of gas occupies a volume of 24.0dm^3 in room condition]

[Jisim atom relative: O, 16; Cu, 64; 1 mol gas menempati isipadu 24.0dm^3 pada keadaan bilik]

- i. Write the chemical equation for the above reaction.
Tulis persamaan kimia bagi tindak balas di atas.

[2 marks]

[2 markah]

- ii. Calculate the mass of copper oxide produced.
Kira jisim kuprum oksida yang dihasilkan.

[3 marks]

[3 markah]

- iii. Calculate the volume of carbon dioxide gas produced in cm^3 .
Kira isipadu gas karbon dioksida yang dihasilkan dalam unit cm^3 .

[3 marks]

[3 markah]

8. A group of students conduct 2 experiments to study the factors affecting the rate of reaction.

Sekumpulan pelajar menjalankan 2 eksperimen untuk mengkaji faktor-faktor yang mempengaruhi kadar tindak balas.

The Table 8 below shows the information about the reactants.

Jadual 8 di bawah menunjukkan maklumat bagi bahan tindak balas yang digunakan.

Experiment Eksperimen	Reactants Bahan tindak balas
Experiment I Eksperimen I	Excess zinc granules and 25cm ³ of 1.0 moldm ⁻³ hydrochloric acid <i>Ketulan zink berlebihan dan 25cm³ asid hidroklorik 1.0 moldm⁻³</i>
Experiment II Eksperimen II	Excess zinc granules, 25cm ³ of 1.0 moldm ⁻³ hydrochloric acid and 5cm ³ of 1.0 moldm ⁻³ copper sulphate(II) solution <i>Ketulan zink berlebihan, 25cm³ asid hidroklorik 1.0 moldm⁻³ dan 5cm³ larutan kuprum(II) sulfat 1.0 moldm⁻³.</i>

Table 8
Jadual 8

Diagram 8 shows the result of two experiments.

Rajah 8 menunjukkan keputusan dua eksperimen di atas

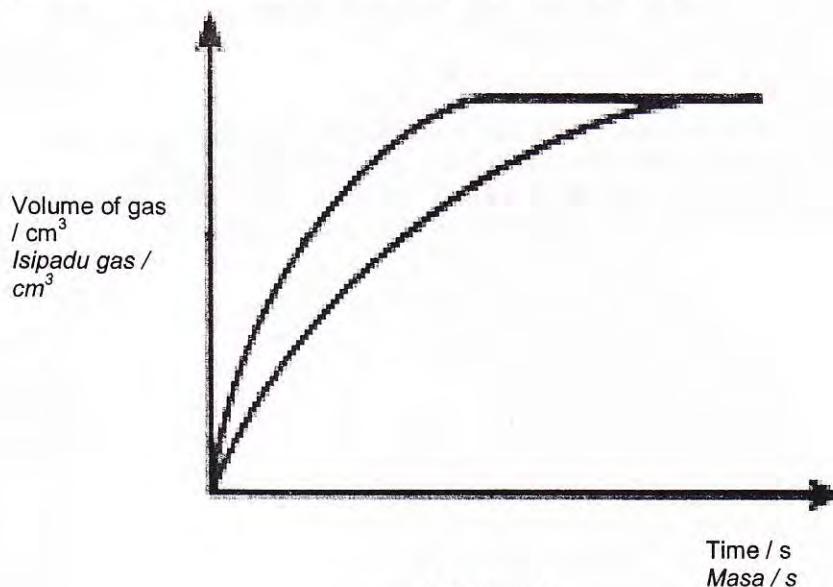


Diagram 8
Rajah 8

- (a) Based on the Diagram 8 above, label the curve for experiment I and experiment II.

Berdasarkan Rajah 8 di atas, labelkan lengkungan bagi eksperimen I dan eksperimen II.

[2 marks]
[2 markah]

- (b) i. Based on this experiment, what is the factor that affects the rate of the reaction?

Apakah faktor yang mempengaruhi kadar tindak balas bagi eksperimen ini?

[1 mark]
[1 markah]

- ii. What are other factors that affecting the rate of reaction?

Apakah faktor-faktor lain yang mempengaruhi kadar tindak balas?

[4 marks]
[4 markah]

- (c) Write the chemical equation for this experiment.

Tulis persamaan kimia bagi tindak balas di atas..

[3 marks]
[3 markah]

- (d) Based on Diagram 8, compare the rate of reaction between Experiment I and Experiment II. Your explanation must refer to the collision theory.

Berdasarkan Rajah 8, bandingkan kadar tindak balas eksperimen I dan eksperimen II. Huraian kamu mestilah merujuk kepada teori pelanggaran.

[7 marks]
[7 markah]

- (e) Calculate the maximum volume of gas liberated in this experiment. Given that the molar volume of any gas is $24\text{dm}^3 \text{ mol}^{-1}$ at room condition.

Kira isipadu maksimum, gas yang terhasil di dalam eksperimen ini. Isipadu molar bagi sebarang gas adalah $24\text{dm}^3 \text{ mol}^{-1}$ pada keadaan bilik.

[3 marks]
[3 markah]

Section C
Bahagian C

[20 marks]
[20 markah]

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

9. Table 9 below shows the location for the atoms of elements P, Q and R in the periodic table. These letters are not the actual symbols of the elements.
Jadual 9 di bawah menunjukkan kedudukan atom-atom bagi unsur-unsur P, Q dan R di dalam jadual berkala. Huruf-huruf ini bukan simbol sebenar bagi unsur-unsur.

Element <i>Unsur</i>	Group <i>Kumpulan</i>	Period <i>Kala</i>
P	14	2
Q	1	3
R	17	3

Table 9
Jadual 9

- (a) Based on the information in the Table 9, explain how **two compounds** can be formed from these atoms of elements. The two compounds should have **different types of bond**.
*Berdasarkan maklumat dalam Jadual 9, terangkan bagaimana **dua sebatian** boleh terbentuk daripada atom-atom bagi unsur-unsur ini. Dua sebatian itu hendaklah mempunyai **jenis ikatan yang berlainan**.*

[12 marks]
[12 markah]

- (b) Compare **two** physical properties below for the two different type of compounds formed in (a).
*Bandingkan **dua** sifat fizikal di bawah bagi dua jenis sebatian yang berbeza yang telah dibentukkan di (a).*
- Melting point
Takat lebur
 - Electrical conductivity
Kekonduksian elektrik

Explain the differences in each of the physical properties.
Terangkan perbezaan dalam setiap sifat fizikal tersebut.

[8 marks]
[8 markah]

10. Diagram 10 shows the energy diagram for two reactions.

Rajah 10 menunjukkan gambar rajah aras tenaga bagi dua tindak balas.

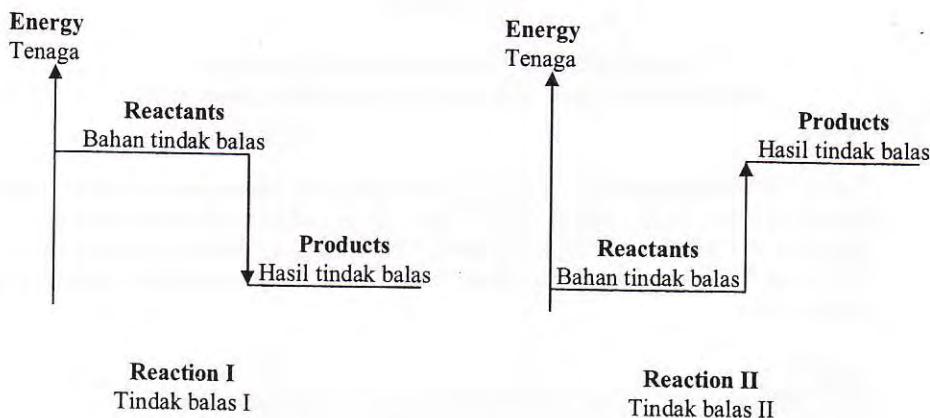


Diagram 10
Rajah 10

- (a) Compare and contrast between the energy level diagrams for reaction I and reaction II.

Banding bezakan di antara gambar rajah aras tenaga bagi tindak balas I dan tindak balas II.

[4 marks]
[4 markah]

- (b) Table 10 shows the molecular formula and the heat of combustion for ethanol and propanol.

Jadual 10 menunjukkan formula molekul dan haba pembakaran bagi etanol dan propanol.

Alcohol Alkohol	Molecular formula Formula molekul	Heat of combustion/kJ mol ⁻¹ Haba pembakaran/kJ mol ⁻¹
Ethanol <i>Etanol</i>	C ₂ H ₅ OH	-1376
Propanol <i>Propanol</i>	C ₃ H ₇ OH	-2026

Table 10
Jadual 10

Based on the information in table 10, compare the heat of combustion between ethanol and propanol. Explain why there is a difference in the values of the heat of combustion between ethanol and propanol.

Berdasarkan maklumat dalam jadual 10, bandingkan haba pembakaran di antara etanol dan propanol. Terangkan mengapa terdapat perbezaan nilai haba pembakaran bagi etanol dan propanol.

[4 marks]
[4 markah]

- (c) The heat of combustion of ethanol can be determined in the laboratory. Describe how to determine the heat of combustion of ethanol.
Haba pembakaran etanol boleh ditentukan di makmal. Huraikan bagaimana untuk menentukan haba pembakaran etanol.

Your answer should include the following:

Jawapan anda perlu mengandungi perkara-perkara berikut:

- Diagram of apparatus set-up
Gambar rajah susunan radas
- Procedure of the experiment
Prosedur eksperimen
- Three precautionary steps to get better results
Tiga langkah berjaga-jaga untuk mendapat keputusan lebih baik

[12 marks]
[12 markah]

END OF THE QUESTIONS
KERTAS SOALAN TAMAT

NO. KAD PENGENALAN

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ANGKA GILIRAN

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**PERSIDANGAN KEBANGSAAN
PENGETUA-PENGETUA
SEKOLAH MENENGAH MALAYSIA
CAWANGAN PULAU PINANG**

PEPERIKSAAN PERCUBAAN SPM 2010**4541/3****CHEMISTRY****Kertas 3****Sept./Oct.****1½ jam****Satu jam tiga puluh minit****JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

1. *Tulis nombor kad pengenalan dan angka giliran anda pada petak yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*
5. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

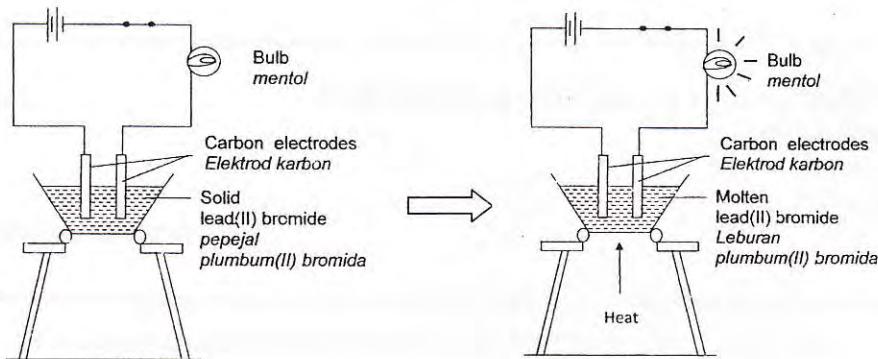
Untuk Kegunaan Pemeriksa		
Kod Pemeriksa:		
Soalan	Markah penuh	Markah Diperoleh
1		
2		
3		
Jumlah	50	

Kertas soalan ini mengandungi 10 halaman bercetak.

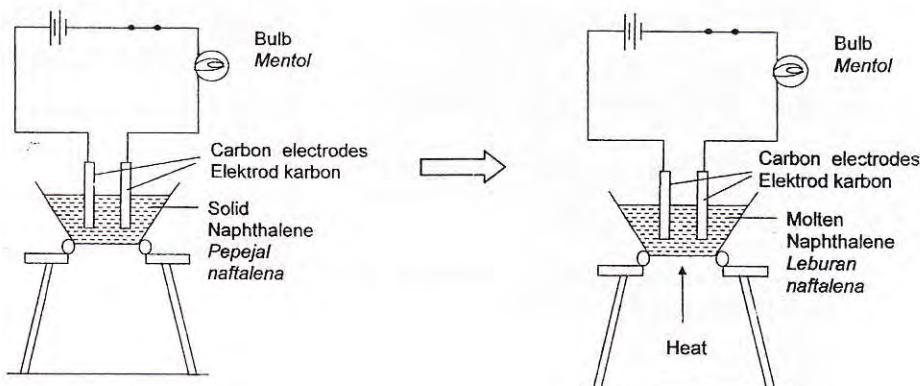
Answer all questions.
Jawab semua soalan.

- 1 Diagram 1 shows set up of apparatus to investigate the electrical conductivity of two compounds, lead (II) bromide and naphthalene in their molten states.
Rajah 1 menunjukkan dua set radas untuk mengkaji kekonduksian elektrik dua sebatian, plumbum(II) bromida dan naftalena dalam keadaan leburan.

Experiment I



Experiment II



- (a) State the observations for these experiment when the compounds are in their molten states.

Nyatakan pemerhatian bagi eksperimen ini apabila sebatian-sebatian tersebut berada dalam keadaan leburan. .

.....
.....

1(a)

[3 marks]
[3 markah]

- (b) Based on your observations in (a), state the inference for this experiment.

Berdasarkan pemerhatian anda di (a), nyatakan inferensi bagi eksperimen ini.

.....

1(b)

[3 marks]
[3 markah]

- (c) Compounds can be classified into ionic compound and covalent compound.

Complete Table 1 by classifying the compounds into ionic or covalent compounds.

Sebatian boleh dikelaskan kepada sebatian ion dari sebatian kovalen.

Lengkapkan Jadual 1 dengan mengelaskan kesemua sebatian tersebut kepada sebatian ion atau sebatian kovalen.

Name of compound <i>Nama sebatian</i>	Type of compound <i>Jenis sebatian</i>
Acetamide <i>asetamida</i>	
Magnesium oxide <i>Magnesium oksida</i>	
Sodium chloride <i>Natrium klorida</i>	
Sulphur <i>Sulfur</i>	

Table 1
Jadual 1

1(c)

[3 marks]
[3 markah]

- (d) Predict which type of compound has high melting and boiling points.

Ramalkan jenis sebatian yang manakah mempunyai takat lebur dan takat didih yang tinggi.

.....

1(d)

.....

[3 marks]
[3 markah]

Total 1

.....

12

- 2 An experiment is conducted to study the effect of the amount of catalyst on the rate of reaction.

0.2 g of manganese (IV) oxide powder is added to 30 cm³ of 20-volume hydrogen peroxide solution. The volume of gas released is collected and the burette reading is recorded at every 30 seconds intervals.

The experiment was repeated using 0.6 g of manganese (IV) oxide powder.

The diagram below shows the readings of the burette for each set of the experiment.

Suatu eksperimen dijalankan untuk mengkaji kesan kuantiti mangkin ke atas kadar tindak balas.

0.2 g serbuk mangan (IV) oksida ditambahkan kepada 30 cm³ larutan 20-isipadu hidrogen peroksa. Isipadu gas yang terbebas dikumpulkan dan bacaan buret direkodkan pada setiap 30 saat.

Eksperimen ini diulangi menggunakan 0.6 g serbuk mangan (IV) oksida.

Rajah di bawah menunjukkan bacaan buret bagi setiap set eksperimen.

Time(s) Masa(s)	0	30	60	90	120	150	180
Experiment I: 0.2 g of manganese (IV) oxide							
Eksperimen I: 0.2 g mangan (IV) oksida							
Burette reading/cm ³ Bacaan buret/cm ³

Time(s) Masa(s)	0	30	60	90	120	150	180
Experiment II: With 0.6 g of manganese (IV) oxide							
Eksperimen II ; 0.6 g mangan (IV) oksida							
Burette reading/cm ³ Bacaan buret/cm ³

- (a) Record the burette reading for each of the experiment in the spaces provided.
Rekod bacaan buret bagi setiap eksperimen di ruangan yang disediakan.

[3 marks]
[3 markah]

2(a)

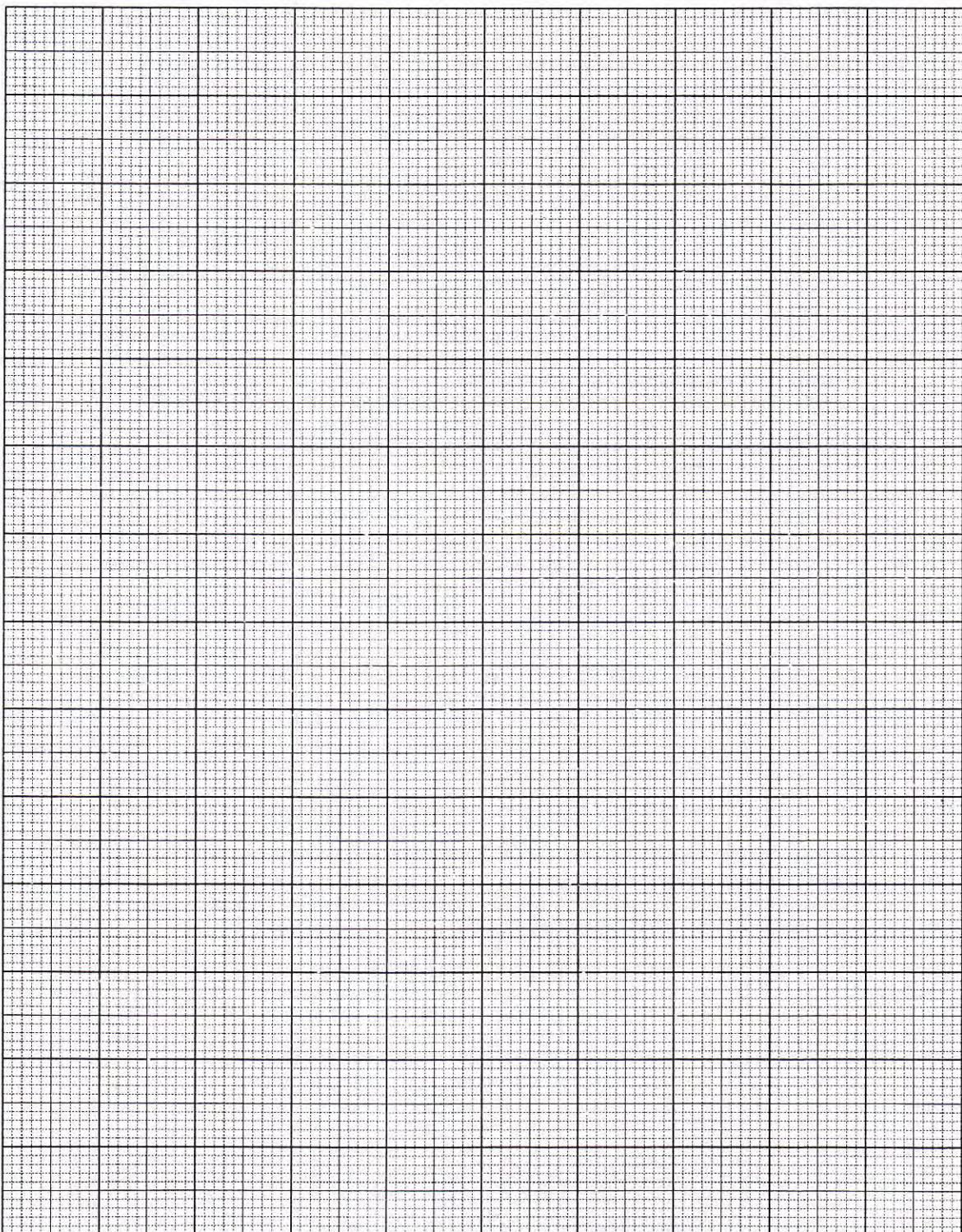
- (b) Construct a table and record the burette reading and the volume of oxygen gas collected for Experiment I and Experiment II.

Bina jadual dan rekodkan bacaan buret dan isipadu gas oksigen yan dikumpulkan bagi Eksperimen I dan Eksperimen II.

2(b)

[3 marks]
[3 markah]

(c)	<p>Based on the experiment, state the operational definition for rate of reaction. <i>Berdasarkan eksperimen, nyatakan definisi secara operasi bagi kadar tindak balas.</i></p> <p>.....</p>
(d)	<p>Plot a graph of volume of oxygen gas collected against time for both experiment on the graph paper provided. <i>Plot graf isipadu gas oksigen yang terkumpul terhadap masa bagi kedua-dua eksperimen di atas kertas graf yang disediakan.</i></p> <p>[3 marks] [3 markah]</p>



- (e) Based on the graph in (d), state the relationship between the amount of catalyst used and the rate of reaction.

Berdasarkan graf di (d), nyatakan hubungan antara kuantiti mangkin digunakan dengan kadar tindak balas.

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

2(e)

[3 marks]
[3 markah]

- (f) State all the variables for this experiment.

Nyatakan semua pembolehubah-pembolehubah bagi eksperimen ini.

Manipulated variable:

Pembolehubah dimanipulasikan:

.....

Responding variable:

Pemboleh ubah bergerak balas:

.....

Fixed variable:

Pemboleh ubah dimalarkan

.....

[3 marks]
[3 markah]

- (g) Sketch the graph obtained if both of the experiments are continued until the reaction is complete.

Lakarkan bentuk graf yang akan diperolehi apabila kedua-dua eksperimen ini diteruskan sehingga tindak balas lengkap.

2(g)

Total 2

21

[3 marks]
[3 markah]

3

Latex will coagulate when acid solution is added and will remain in liquid state when alkali solution is added

Lateks akan menggumpal apabila ditambah larutan asid dan akan kekal dalam keadaan cecair apabila ditambah larutan alkali.

Based on the statement above, plan an experiment to investigate the effect of the following substances on the coagulation of latex.

You are provided with ethanoic acid, ammonia solution and suitable apparatus.

Your planning should include the following aspects:

Berdasarkan pernyataan di atas, rancang satu eksperimen untuk mengkaji kesan bahan-bahan tersebut ke atas lateks. .

Anda dibekalkan dengan asid etanoik, larutan ammonia dan alat radas yang sesuai.

Perancangan anda haruslah mengandungi aspek-aspek berikut:

- (a) Aim of the experiment
Tujuan eksperimen
- (b) All the variables
Semua pembolehubah
- (c) Hypothesis
Hipotesis
- (d) List of materials and apparatus
Senarai bahan dan radas
- (e) Procedure of the experiment
Prosedur eksperimen
- (f) Tabulation of data.
Penjadualan data.

[17 marks]
[17 markah]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

Paper 1



PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA
SEKOLAH MENENGAH (CAWANGAN PULAU PINANG)
PEPERIKSAAN PERCUBAAN BERSAMA S.P.M 2010

SKEMA JAWAPAN

CHEMISTRY PAPAPER 1, 2 AND 3

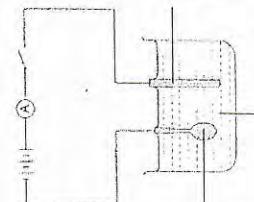
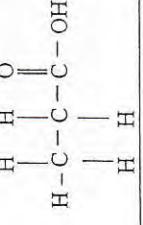
4541/1 (PAGE 1)

4541/2 (PAGE 2)

4541/3 (PAGE 14)

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

Paper 2

Question	Rubric	Sub Mark	Total Mark
1 (a) (i)	E and F // E dan F	1	1
(a) (ii)	Increases // Bertambah	1	1
(b) (i)	Atoms of the same element with the same number of protons but different number of neutrons // Atom-atom unsur sama yang mempunyai bilangan proton sama tetapi bilangan neutron berlainan	1	1
(b) (ii)	To study/estimate the age of fossils/artefacts // Mengkaji/menganggar usia bahan fosil/purba	1	1
(c) (i)	D	1	1
(c) (ii)	Atom D has stable/octet electron arrangement // Atom D mempunyai susunan elektron yang stabil/octet	1	1
(d) (i)	A/E	1	1
(d) (ii)	$2A + 2H_2O \rightarrow 2AOH + H_2$ // $2H_2 + 2H_2O \rightarrow 2EOH + H_2$	1	1
(e)	2.87	1	1
(f)	G	1	1
	Total	10	
2 (a)	Cu^{2+}, H^+	1	1
(b) (i)	Y/Copper electrode Y // Y/Elektrod Tupperum Y	1	1
(b) (ii)	Copper // Kuprum	1	1
(c)	Number/Rate of Cu^{2+} ions discharged at the cathode is the same as number/rate of Cu^{2+} ions formed at the anode // Bilangan/kadar ion Cu^{2+} yang dinyahcas di katod adalah sama dengan bilangan/kadar ion Cu^{2+} yang dibentuk di anod.	1	2
	The concentration of Cu^{2+} ions remains unchanged. // Kepekatan ion Cu^{2+} tidak berubah	1	
(d) (i)	$Cu \rightarrow Cu^{2+} + 2e$	1	1
(d) (ii)	Gas bubbles released // Gelembung-gelombung gas terbebas	1	1
(e) (i)	Apparatus set-up // Susunan radas Label	1	1
		2	
	Silver plate // kepingan argentum		
	Silver nitrate solution // larutan argentum nitrat		
(e) (ii)	Rotate the iron spoon slowly // Putar sudu besi segera perlahan	1	1
	Total	10	
3 (a) (i)	Use dilute silver nitrate solution // Guna larutan cair argentum nitrat	1	1
(a) (ii)	Use low electric current // Guna arus elektrik yang kecil (mana-mana satutu)	1	1
	Total	10	
3 (a) (i)	Substance that ionises/dissociates in water to produce hydrogen ions // Bahar yang mengion/mencerai dalam air untuk menghasilkan ion hidrogen	1	1
(a) (ii)	Add magnesium ribbon/marble chips/calcium carbonate // Tambah pita magnesium/kepingan marmar/kalsium karbonat	1	2
	Gas bubbles released/Gelembung gas terbebas/Pembuakan berlaku	1	
(a) (iii)	Hydrochloric acid/Nitric acid //	1	1
	Asid hidroklorik/Asid nitrik		
(a) (iv)	Ethanoic acid exists as neutral molecules //	1	1
	Asid etanik wujud sebagai molekul neutral		
(b) (i)	Neutralisation // Neutralisasi	1	1
b (ii)	Pink to colourless // Merah jambu kepada tanpa warna	1	1
b (iii)	$HNO_3 + NaOH \rightarrow NaN_3 + H_2O$	1	1
b (iv)	$\frac{0.1 \times 20}{M_b \times 25} = 1$	1	2
	$M_b = 0.08 \text{ mol dm}^{-3}$		
	Total	10	
4 (a) (i)			
(a) (ii)	Carboxylic acid Asid karboksilik	1	1
(a) (iii)	Food preservative//Flavouring//To make esters Pengawet makanan /Pensas /Untuk membuat ester	1	1
(b) (i)	$C_nH_{2n+1}OH$	1	1
(b) (ii)	Oxidation Pengoksidaan	1	1
(b) (iii)	$C_3H_7OH + 2[O] \rightarrow C_3H_5COOH + H_2O$	1+1	2
(c) (i)	As a catalyst Sebagai mangkin	1	1
(c) (ii)	Propyl propanoate Propil propanoat	1	1
	Total	10	

(c) (iii)	Sweet/Fragrant/ Fruity smell Berbau-manis/wang/buah-buahan	1	1
		Total	10
5 (a)	Potassium manganese(VII) Kaliun manganese(VII)	1	1
(b) (i)	Oxidation Pengoksidaan	1	1
(b) (ii)	The metal atoms release electrons//gain oxygen Atom logam melepaskan/menyerap kilitkan elektron// menerima oksigen	1	1
(c)	T, V, U	1	1
(d) (i)	Potassium manganese(VII) powder	Apparatus set-up // Susunatur rādas Label	1
		1	2
		Metal powder	
		Glass wool	
		Heat	
		Heat	
(d) (ii)	Element <i>Unsur</i> Mass (g) <i>Jisim</i> No. of moles <i>Bil. mol</i> Simplest ratio <i>Nisbah teringkas</i> Empirical formula <i>Formula empiriks</i>	U O 8/0.4 = 3.2 3.2/16 = 0.2 0.2/0.2 = 1 UO	1 1 1 1
			4
		Total	10
6 (a) (i)	Sodium alkyl sulphonate Natrium alkil sulfonat	1	1
(a) (ii)	Neutralisation Penetriran	1	1

(b)		1+1	2
(c) (i)	<p>Water that contains magnesium ion/ Mg^{2+} and calcium ion/ Ca^{2+}. Air yang mengandung ion magnesium/Mg^{2+} dan ion kalsium/ Ca^{2+}.</p>	1	1
(c) (ii)	<p>In hard water, soaps will react with magnesium ion/Mg^{2+} // calcium ion/ Ca^{2+} ions to form precipitate / scum Dalam air liat, sabun bertindak balas dengan ion magnesium/ Mg^{2+}// ion kalsium/ Ca^{2+} untuk membentuk mendakan/kekat</p> <p>Detergent does not form precipitate /scum Detergen tidak membentuk mendakan/kekat</p>	1	2
(d) (i)	<p>Brilliant blue// Menthol // Glucose syrup Brilliant blue// Menthol// Sirup glukos</p>	1	1
(d) (ii)	<p>Food colouring//Flavouring// Sweetener Pewarna makanan// Perisa// Pemanis</p>	1	1
(d) (iii)	$ \begin{array}{ccccccc} & H & H & O & H & H \\ & & & & & \\ H - C - C - & C - C - O - C - & C - H \\ & & & & & \\ & H & H & H & H & H \end{array} $	1	1
		Total	10

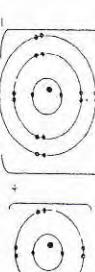
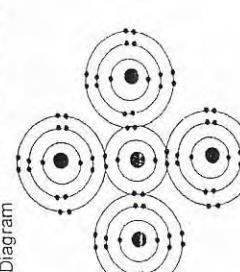
		$\text{CuCO}_3 \rightarrow \text{CuO} + \text{CO}_2$	
7c.i.		<p>1. Corrects reactants and mole Bahan tidak balas dan bilangan mol yang betul</p> <p>2. Corrects products and mole Hasil tidak balas dan bilangan mol yang betul</p>	1
7c.ii.		<p>1. No of mole of CuCO_3 Bilangan mol CuCO_3</p> $31 + A_r \text{ CuCO}_3 = 12 + 124 = 0.25$ <p>2. 1 mole of CuCO_3 produces 1 mole of CuO 1 mol CuCO_3 menghasilkan 1 mol CuO</p> <p>0.25 mole of CuCO_3 produces 0.25 mole of CuO 0.25 mol CuCO_3 menghasilkan 0.25 mol CuO</p> <p>3. Mass of CuO Jisim CuO</p> $0.25 \times 64 = 16 \text{ g}$	1
7c.iii.		<p>1. 1 mole of CuCO_3 produces 1 mole of CO_2 0.25 mole of CuCO_3 produces 0.25 mole of CO_2 1 mol CuCO_3 menghasilkan 1 mol CO_2 0.25 mol CuCO_3 menghasilkan 0.25 mol CO_2</p> <p>2. $0.25 \times 24 \text{ dm}^3 = 1.2 \text{ dm}^3$</p> <p>3. $= 1200 \text{ cm}^3$</p>	1
		Total	20

No	Mark Scheme	Marks	
		sub	total
7a.	P : liquid Q : gas R : solid	1 1 3	
7b.i.	<p>1. P can change to Q through boiling process P berubah kepada Q melalui proses pendidihan.</p> <p>2. When liquid is heated, the particles of the liquid gain kinetic energy and move faster as the temperature increase. Apabila cecair dipanaskan, zarah-zarah cecair menerima tenaga kinetik dan bergerak lebih cepat/tuju</p> <p>3. The particles have enough energy to completely break the forces holding them together, // The particles are now able to move freely and far apart, and gas is formed Zarah-zarah mempunyai tenaga yang mencukupi untuk memecahkan daya-daya yang memegang zarah-zarah cecair.// Zarah-zarah bergerak bebas dan berjauhan satu sama lain, maka terentuklah gas</p>	1 1 1	
7b.ii.	<p>1. P can be change to R through freezing process. P berubah kepada R melalui proses pembekuan.</p> <p>2. When the liquid cooled, the particles in liquid lose energy and move slower. Apabila cecair disejukkan, zarah-zarah cecair kehilangan tenaga dan bergerak semakin perlahan.</p> <p>3. As temperature drops, the liquid particles continue to lose more energy until they do not have enough energy to move freely and change into solid Semakin suhu menurun, zarah-zarah cecair akan kehilangan lebih banyak tenaga dan bergerak semakin perlahan. Lalu berubah ke bentuk pepejal.</p>	1 1 1	
7b.iii.	<p>1. Q can be change to P through condensation process. Q berubah kepada P melalui proses kondensasi</p> <p>2. When the gas cooled, the particles in gas lose energy and move slower. Apabila gas disesukkan, zarah-zarah di dalam keadaan gas akan kehilangan tenaga dan bergerak perlahan.</p> <p>3. The movement of particles becomes slow enough for the gas to change into liquid Pergerakan zarah-zarah yang semakin perlahan, membolehkan gas berubah kepada cecair.</p>	1 1 1	

No	Mark Scheme	Marks		Total
		Sub	Total	
8.	<p>1. Mark for experiment I Penandaan bagi eksperimen I</p> <p>2. Mark for experiment II Penandaan bagi eksperimen II</p> <p>3. Concentration of solution Kepakatan larutan</p> <p>4. Pressure of reaction involving gaseous reactants Tekanan bagi tindak balas yang melibatkan bahan tindak balas bersgas.</p>	1 1 1 1	2	4
8b.i.	<p>1. Total surface area of solid reactant Jumlah luas permukaan bagi bahan tindak balas pepejal</p> <p>2. Temperature of reaction Suhu tindak balas</p> <p>3. Pressure of reaction involving gaseous reactants Tekanan bagi tindak balas yang melibatkan bahan tindak balas bersgas.</p>	1 1 1	3	3
c.	<p>Zn + 2HCl \rightarrow CuSO₄ \rightarrow ZnCl₂ + H₂</p> <p>1. Corrects reactants and products Bahan tindak balas dan hasil tindak balas.</p> <p>2. The balance equation Persamaan kimia yang seimbang</p> <p>3. Write the catalyst used Mungkin yang digunakan ditulis</p>	1 1 1	3	3

d.	<p>1. Copper(II) sulphate solution is a positive catalyst in experiment II Larutan kuprum(II) sulfat adalah mangkin positif di dalam eksperimen II</p> <p>2. No catalyst is used in experiment 1 Tiada mangkin digunakan di dalam eksperimen</p> <p>3. Copper(II) sulphate enables the reaction between zinc and hydrogen ion through alternative path Larutan kuprum(II) sulfat menyediakan jaluan alternatif bagi tindak balas antara zink dengan ion hidrogen.</p> <p>4. Which requires a lower activation energy Memerlukan tenaga pengaktifan yang rendah</p> <p>5. More collision between the zinc atom and hydrogen ion at the surface of granulated zinc lebih banyak pelanggaran di antara atom zink dengan ion hidrogen pada permukaan ketulan zink</p> <p>6. able to overcome the lower activation energy Boleh mengatasi tengah pengaktifan yang rendah</p> <p>7. the frequency of effective collision increases Maka frekuensi pelanggaran berkesan bertambah</p>	1 1 1 1 1 1 1	7	
e.	<p>1. Number of mole of hydrochloric acid Bilangan mol asid hidroklorik</p> $1 \text{ mol dm}^{-3} \times 25 \times 10^{-3} \text{ dm}^3 \\ = 0.025 \text{ mol}$ <p>2. Number of mole of hydrogen gas Bilangan mol gas hidrogen</p> $2 \text{ mol HCl produced } 1 \text{ mol H}_2 \\ 0.025 \text{ mol HCl produced } 0.025 / 2 = 0.0125 \text{ mol} \\ 0.025 \text{ mol HCl menghasilkan } 1 \text{ mol H}_2 \\ 0.025 \text{ mol HCl menghasilkan } 0.025 / 2 = 0.0125 \text{ mol}$ <p>3. Volume of hydrogen gas Isipadu gas hidrogen</p> $0.0125 \times 24 \text{ dm}^3 = 0.3 \text{ dm}^3 = 300 \text{ cm}^3$	1 1 1	3	3

<p>Melting point</p> <p><u>Takat lebur</u></p> <p>(b)</p>	<ol style="list-style-type: none"> Compound QR/ionic compound has higher melting point. Compound PR₄/covalent compound has low melting point. Sebastian PR₄/kovalen mempunyai takat lebur rendah. In compound QR, ions are held together by strong electrostatic forces. Dalam sebatian QR, ion-ion dipegang bersama oleh daya elektrostatik yang kuat. In compound PR₄, molecules are held together by weak intermolecular forces/Van der Waals forces. Dalam sebatian PR₄, molekul-molekul dipegang bersama oleh daya antara molekul yang lemah/daya Van der Waals
<p>Electrical Conductivity</p> <p><u>Kekonduksian elektrik</u></p>	<ol style="list-style-type: none"> Compound QR can conduct electricity in molten or aqueous solution. Sebatian QR boleh mengconduski elektrik dalam keadaan lebur atau larutan akues. Compound PR₄, does not conduct electricity. Sebastian PR₄, tidak boleh mengconduski elektrik. For compound QR, in molten or aqueous solution, ions can move freely. Bagi sebatian QR, dalam keadaan lebur atau larutan akues, ion-ion boleh bergerak bebas. Compound PR₄, consist of neutral molecules. Sebatian PR₄, hanya mengandungi molekul-molekul neutral.

No.	Mark Scheme	MARK	
		SUB	TOTAL
9 (a)	<p>1. Atom Q and atom R form ionic bond. Atom Q dan atom R membentuk sebatian ion. 1</p> <p>2. The electron arrangement of atom R is 2.8.1. Susunan elektron bagi atom R ialah 2.8.1. 1</p> <p>3. To achieve a stable (octet) electron arrangement, Untuk mencapai susunan elektron stabil (oktet), 1</p> <p>4. atom Q donates 1 valence electron to form Q^+ ion/equation atom Q memberikan 1 elektron valens untuk membentuk ion Q^+ $/persamaan$ 1</p> $Q \rightarrow Q^+ + e^-$ <p>5. The electron arrangement of atom R is 2.8.7. Susunan elektron bagi atom R ialah 2.8.7. 1</p> <p>6. Atom R receives an electron to form R^- ion/equation atom R menerima satu elektron untuk membentuk ion R^- //persamaan $R + e^- \rightarrow R^-$ 1</p> <p>7. Ion Q^+ and ion R^- are pulled together by the strong electrostatic forces to form a compound with the formula QR Ion Q^+ dan R^- ditarik bersama oleh daya elektrostatik yang kuat untuk membentuk sebatian dengan formula QR 1</p> <p>8. Diagram</p>  <p>1</p> <p>9. Atoms P and R form covalent bond. Atom-atom P dan R membentuk ikatan kovalen. 1</p> <p>10. Electron arrangement of atom P is 2.4 while atom R is 2.8.7 Susunan elektron bagi atom P ialah 2.4 manakala atom R ialah 2.8.7 1</p> <p>11. Atom P needs 4 electrons while atom R needs one electron. Atom P perlukan 4 elektron manakala atom R perlukan satu elektron. 1</p> <p>12. Thus, atom P share 4 pairs of electrons with 4 atoms of R Jadi atom P berkongsi 4 pasang elektron dengan 4 atom R 1</p> <p>13. forming a molecule with the formula of PR_4 membentuk satu molekul dengan formula PR_4 1</p> <p>14. Diagram</p>  <p>1</p>		1

No	Mark Scheme	Marks																					
	sub	Total																					
10 (a)	(any 4) <table border="1"> <tr> <td style="text-align: center; vertical-align: top;"> Reaction I Tindakbalas eksotermik </td><td style="text-align: center; vertical-align: top;"> Reaction II Tindakbalas endotermik </td><td style="text-align: center; vertical-align: top;"> Reaction II Tindakbalas endotermik </td></tr> <tr> <td>1</td><td>1</td><td>1</td></tr> <tr> <td>1. Exothermic reaction Tindakbalas eksotermik</td><td>- Endothermic reaction Tindakbalas endotermik</td><td></td></tr> <tr> <td>2. The temperature of reaction mixture rise. Suhu campuran tindakbalas meningkat</td><td>- The temperature of reaction mixture drop Suhu campuran tindakbalas menurun</td><td></td></tr> <tr> <td>3. Heat is released to the surrounding Haba dibebaskan ke persekitaran</td><td>- Heat is absorbed from the surrounding Haba diserap dari persekitaran</td><td></td></tr> <tr> <td>4. Energy level of reactants is higher than products Aras tenaga dalam tindakbalas lebih tinggi daripada hasil tindakbalas</td><td>- Energy level of products is higher than reactants Aras tenaga hasil tindakbalas lebih tinggi dari bahan tindakbalas</td><td></td></tr> <tr> <td>5. Heat released during bond formation is higher than heat absorbed during breaking of bond Haba dibebaskan semasa pembentukan ikatan lebih tinggi dari haba yang diserap semasa pemecahan ikatan</td><td>- Heat released during bond formation is lower than heat absorbed during breaking of bond Haba dibebaskan semasa pembentukan ikatan lebih rendah dari haba yang diserap semasa pemecahan ikatan</td><td></td></tr> </table>	Reaction I Tindakbalas eksotermik	Reaction II Tindakbalas endotermik	Reaction II Tindakbalas endotermik	1	1	1	1. Exothermic reaction Tindakbalas eksotermik	- Endothermic reaction Tindakbalas endotermik		2. The temperature of reaction mixture rise. Suhu campuran tindakbalas meningkat	- The temperature of reaction mixture drop Suhu campuran tindakbalas menurun		3. Heat is released to the surrounding Haba dibebaskan ke persekitaran	- Heat is absorbed from the surrounding Haba diserap dari persekitaran		4. Energy level of reactants is higher than products Aras tenaga dalam tindakbalas lebih tinggi daripada hasil tindakbalas	- Energy level of products is higher than reactants Aras tenaga hasil tindakbalas lebih tinggi dari bahan tindakbalas		5. Heat released during bond formation is higher than heat absorbed during breaking of bond Haba dibebaskan semasa pembentukan ikatan lebih tinggi dari haba yang diserap semasa pemecahan ikatan	- Heat released during bond formation is lower than heat absorbed during breaking of bond Haba dibebaskan semasa pembentukan ikatan lebih rendah dari haba yang diserap semasa pemecahan ikatan		Max=4
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10 (b)	<ol style="list-style-type: none"> The heat of combustion of propanol is higher than ethanol. Haba pembakaran propanol lebih tinggi dari etanol. The number of carbon atoms / molecular size of propanol is higher than ethanol. Bilangan atom carbon / saiz molekul propanol lebih tinggi dari etanol. The intermolecular / Van der Waals forces increases. Daya antara molekul-molekul // daya van der waals semakin bertambah. More heat is needed to overcome these forces. Lebih haba diperlukan untuk mengatasi daya ini. 	4																					

<p>(c)</p>	<p>1. Labelled Berlabel</p> <p>2. Functional apparatus set-up Susunan peralatan berfungsi</p>	<p>1</p> <p>1</p>
		<p>Procedure: <u>Kaedah:</u></p> <p>3. [100 – 250 cm³] of water is measured and poured into a copper can and the copper can is placed on a tripod stand.</p> <p>[100 – 250 cm³] air disukarkan dan dituang ke dalam bekas kuprum dan bekas kuprum dilepaskan di atas tungku kaki tiga.</p> <p>4. The initial temperature of the water is measured and recorded.</p> <p>5. A spirit lamp with ethanol is weighed and its mass is recorded.</p> <p>6. The lamp is then placed under the copper can and the wick of the lamp is lighted up immediately</p> <p>Lampu spirit bersifit etanol ditimbang dan jisinya direkodkan. Lampu kemudian dilentarkan di bawah bekas kuprum dan sumbu lampu dinyalakan dengan segera.</p> <p>7. The water in the can is stirred continuously until the temperature of the water increases by about 30°C.</p> <p>Air di dalam bekas di kacau berterusan sehingga suhu air meningkat sekitar 30°C.</p> <p>8. The flame is put off and the highest temperature reached by the water is recorded.</p> <p>Nyalaan dipadamkan dan suhu tertinggi yang dicapai oleh air direkodkan.</p> <p>9. The lamp and its content are weighed and the mass is recorded.</p> <p>Lampu beserta kandungannya ditimbang dan jisimnya direkodkan.</p>
		<p>Precautionary steps (any 3) <u>Langkah beragae-agae (mana-mana 3)</u></p> <ul style="list-style-type: none"> - Flame must touch the bottom of copper can - Nyalaan mestil menyentuh bahagian bawah bekas kuprum - Use wind shield - Gunakan pengadang angin - No wire gauze used - Tidak menggunakan kasa dawai - Lamp must be weighed immediately after the flame is put off - Lampu mestil ditimbang serta merta selepas nyalaan dipadamkan
		<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
		<p>Max=3</p>

Paper 3

Question	Mark Scheme	Score
1(a)	Able to state two observations correctly Sample answer: Bulb lights up in experiment using molten lead(II) bromide. Bulb does not lights up in experiment using molten naphthalene Mental/menala dalam eksperimen yang menggunakan <i>plumbum(II) bromida</i> Mental/tidak menyala dalam eksperimen yang menggunakan <i>naffalene</i>	3
	Able to state one observation correctly	2
	Able to give an idea	1
	No response or wrong response	0

Question	Mark Scheme	Score
1(b)	Able to state the inference for both experiment correctly Sample answer: Molten lead(II) bromide can conduct electricity Solid and molten naphthalene cannot conduct electricity <i>Leburan plumbum(II) bromida boleh mengkonduksi elektrik</i> <i>Pepejal plumbum(II) bromida tidak boleh mengkonduksi elektrik</i>	3
	Able to state any one inference above	2
	Able to give idea on electrical conductivity	1
	No response or wrong response	0

Question	Mark Scheme	Score
1(c)	Able to classify ionic compounds and covalent compound into their group correctly Sample answer: Ionic compounds: magnesium oxide, sodium chloride Covalent compounds: Acetamide, sulphur <i>Sebatian ionik: magnesium oksida, natrium klorida</i> <i>Sebatian kovalen: Asetamida, sulphur</i>	3
	Able to state an incomplete operational definition	2

Question	Mark Scheme	Score
	Able to classify the compounds correctly but in opposite group Ionic compounds: Acetamide, sulphur Covalent compounds: magnesium oxide, sodium chloride Sebatian ion: Asetamida, sulfur Sebatian kovalen: magnesium oksida, natrium klorida	2
	Able to classify at least one compound into each correct group	1
	No response given / wrong response	0
1(d)	Able to predict type of compound correctly Answer: Ionic compound Sebatian ionik	3
	Able to state name of compound only Sample answer: magnesium oxide/ sodium chloride magnesium oksida/natrium chloride	2
	Able to state any other ionic compounds correctly Sample answer: lead(II) iodide Plumbum(II) iodide	1
	No response or wrong response	0
1(e)	Able to state the operational definition of an ionic compound correctly Sample answer A compound that can conduct electricity in molten state but not in solid state. Sebatian yang boleh mengkonduksi elektrik dalam keadaan leburan tetapi tidak dalam keadaan pepejal	3
	Able to state an incomplete operational definition Sample answer A compound that can conduct electricity in molten state. Sebatian yang boleh mengkonduksi elektrik dalam keadaan leburan	2

	Able to give an idea	1
	Sample answer Compounds consist of ions <i>Sebastien terdiri dari ion-ion</i>	
	No response or wrong response	0

	Able to record the burette reading for Experiment 1 and Experiment 2 correctly with 2 decimal point correctly.	3
	Answer:	
	Burette reading/ cm ³ Bacaan buret/ cm ³	50.00 43.00 38.00 34.00 30.00 27.00 25.00

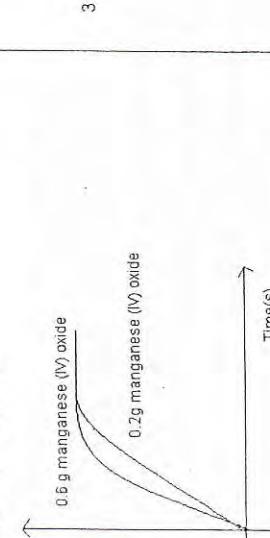
	Able to record the burette reading for Experiment 1 and Experiment 2 correctly with 1 decimal point correctly.	2
	No response or wrong response	0
		1

Question	Mark Scheme	Score
2(b)	Able to construct a table and record the burette reading and the volume of oxygen gas collected for Experiment 1 and Experiment 2 correctly. <u>Sample Answer:</u>	3
	Experiment 1	
	Time(s)	0 30 60 90 120 150 180
	Burette reading/ cm ³ Bacaan buret/ cm ³	50.00 43.00 38.00 34.00 30.00 27.00 25.00
	Volume of O ₂ gas/ cm ³ /Sipadu gas O ₂ / cm ³	0.00 7.00 12.00 16.00 20.00 23.00 25.00
	Experiment 2	
	Time(s)	0 30 60 90 120 150 180
	Burette reading/cm ³ Bacaan buret/cm ³	50.00 37.00 29.00 23.00 19.00 16.00 14.00
	Volume of O ₂ gas/ cm ³ /Sipadu gas O ₂ / cm ³	0.00 13.00 21.00 27.00 31.00 34.00 36.00
	Able to construct a table with the following aspects correctly.	
	1. Column consists of title: Time (without appropriate unit) 2. Row consists of title: Burette reading or Volume of oxygen gas (with or without appropriate unit) 3. Tables show result for Experiment 1 and Experiment 2	2
	Able to construct a table with the following aspects.	
	1. Column consists of title: Time (without appropriate unit) 2. Row consists of title: Burette reading or Volume of oxygen gas (with or without appropriate unit) 3. Tables show results for Experiment 1 or Experiment 2	1
	No response or wrong response	0

Question	Mark Scheme	Score
2(c)	Able to state the operational definition for rate of reaction correctly. Sample answer: The change in volume of oxygen gas released per second. Perubahan isipadu gas oksigen yang terbebas setiap saat	3
	The change in the volume of oxygen gas released against time. Perubahan isipadu gas oksigen terhadap masa.	2
	The change of the amount of reactant or product against time. Perubahan kuantiti bahan dan hasil tindak balas terhadap masa.	1
	No response or wrong response	0
2(d)	Mark Scheme Able to plot a graph of volume of oxygen gas collected against time for Experiment 1 and 2 with the following aspects correctly. Answer: 1. X and Y axis with correct label and unit. 2. correct and smooth graph 3. suitable scale	3
	Able to plot a graph of volume of oxygen gas collected against time with the following aspects. Answer: 1. X and Y axis with correct label without unit. 2. correct and smooth graph 3. suitable scale	2
	Able to plot a graph of volume of oxygen gas collected against time with the following aspects. 1. X and Y axis with correct label 2. correct and smooth graph	1
	No response or wrong response.	0

Question	Mark Scheme	Score
2(e)	Able to state the relationship between the amount of catalyst used and the rate of reaction correctly. Answer: An increase in the amount of manganese (IV) oxide will increase the rate of reaction. Apabila kuantiti mangkin bertambah, kadar tindak balas akan meningkat.	3
	An increase in the amount of catalyst will increase the rate of reaction. Apabila kuantiti mangkin bertambah, kadar tindak balas bertambah.	2
	The rate of reaction is higher when the amount of catalyst increases. Kadar tindak balas meningkat apabila kuantiti mangkin bertambah.	1
	No response or wrong response	0

Question	Mark Scheme	Score
2(f)	Able to state all the variables for this experiment correctly. Answer: Manipulated variable: Mass of catalyst Jisim mangkin Responding variable: Rate of reaction Kadar tindak balas Fixed variable: Concentration of hydrogen peroxide solution. Kepekatan larutan hidrogen perokida	3
	Able to state any two of the variables correctly	2
	Able to state any one of the variables correctly	1
	No response or wrong response	0

Question	Mark Scheme	Score
2(g) Able to sketch the graph obtained correctly if both of the experiments are continued until the reaction is complete. Answer:	 <p>0.6 g manganese (IV) oxide 0.2 g manganese (IV) oxide</p>	3

Question	Mark Scheme	Score
3(b) Able to state all the variables correctly.	Able to state all the variables correctly.	
Answer:		
	Manipulated variable: <u>Type of substance/ solution</u> <u>Jenis bahan/ larutan</u>	
	Responding variable: <u>Coagulation of latex</u> <u>Penggumpalan latex</u> .	3
	Fixed variables: <u>Latex</u> <u>Lateks</u>	
	Able to state any two variables correctly	2
	Able to state any one variable correctly	1
	No response or wrong response	0

Question	Mark Scheme	Score
3(c) Able to relate the manipulated variable to responding variable correctly.	Able to relate the manipulated variable to responding variable correctly.	
Answer:		
	Asid will coagulate latex while alkali prevent coagulation of latex. <u>Asid akan menggumpal latex manakala alkali menghalang penggumpalan latex.</u>	3
	Able to relate the manipulated variable to responding variable correctly but incomplete.	
	Sample answer:	
	Asid will coagulate latex // alkali prevent coagulation of latex. <u>Asid akan menggumpal latex// alkali menghalang penggumpalan latex.</u>	2
	Able to give an idea to relate the manipulated variable to responding variable.	
	Sample answer	
	Alkali will coagulate latex while asid prevent coagulation of latex.	1

Question	Mark Scheme	Score
3(a) Able to state the aim of the experiment correctly.	Able to state the aim of the experiment correctly.	
Answer:		
	To investigate the effect on coagulation of latex when adding ethanoic acid and ammonia solution into the solution. <u>Mengkaji kesan penggumpalan latex apabila larutan asid etanoik dan larutan ammonia ditambah kepada larutan.</u>	3
	To investigate the effect on latex when adding different type of solution.	
	Sample answer:	
	Asid will coagulate latex // alkali prevent coagulation of latex. <u>Asid akan menggumpal latex// alkali menghalang penggumpalan latex.</u>	2
	To investigate the effect on latex	
	Sample answer	
	No response or wrong response	1
		0

	Alkali akan menggumpal lateks manakala asid menghalang penggumpalan lateks.
	No response or wrong response.

Question	Mark Scheme	Score
3(d)	Able to list of substances and apparatus correctly. Answer: Material: Latex, 1.0 mol dm ⁻³ ethanoic acid solution, 1.0 mol dm ⁻³ ammonia solution, red and blue litmus paper. Lateks, larutan asid etanoik 1.0 mol dm ⁻³ , larutan ammonia 1.0 mol dm ⁻³ , kertas litmus biru dan merah. Apparatus: Beakers, glass rod and dropper. Bikar, rod kaca dan penitiis.	3
	Able to state any one of the substances and latex with two of the apparatus correctly.	2
	Able to state any one of the substances and latex correctly and test tube.	1
	No response or wrong response.	0

	is stopped when blue litmus paper turns red. Kertas litmus biru dicelup ke dalam larutan untuk mengujii keasidan larutan itu. Penambahan asid etanoik dihentikan apabila kertas litmus biru bertukar kepada merah. 5. The beakers are left for overnight and the observations are recorded. Bikar dibiarakan semalam dan perhatian direkodkan.
	6. Repeat the experiment by using ammonia solution to replace ethanoic acid. Eksperimen diulangi dengan menggunakan larutan ammonia menggantikan larutan asid etanoik.

Able to state steps 2,3,4 and 5 correctly.

Able to state steps 2 and 3 correctly.

No response or wrong response.

Question	Mark Scheme	Score
3(f)	Able to construct a table to record the observations correctly. Sample answer: Beaker Observation P Q	2
	Able to construct a table with two columns and two rows without titles.	1

Question	Mark Scheme	Score
3(e)	Able to state the procedure to conduct the experiment correctly. Sample answer: 1. Two small beakers are labelled as P and Q. Dua buah bikar kecil dilabel sebagai P dan Q. 2. About 20 cm ³ of latex is poured into beaker P. 20 cm ³ lateks dituang ke dalam bikar P. 3. Add drop by drop of ethanoic acid into beaker P while stirring with a glass rod. Tambah titis demi titis larutan asid etanoik ke dalam bikar P sambil mengacau larutan dengan rod kaca. 4. A blue litmus paper is dipped into the solution to test the acidity of the solution. The addition of ethanoic acid	17 marks
	No response or wrong response.	0
	Total	17