

CONFIDENTIAL

4541/1

Chemistry

Paper 1

September

2011

1½ hours



4541/1

MAKTAB RENDAH SAINS MARA

SIJIL PELAJARAN MALAYSIA
TRIAL EXAMINATION 2011

CHEMISTRY

Paper 1

One hour and fifteen minutes

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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 buku soalan.*

This booklet consists of 34 printed pages and 2 unprinted pages

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[Turn page over
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- 1 Diagram 1 shows the structure of an atom.
Rajah 1 menunjukkan struktur suatu atom.



Diagram 1
Rajah 1

What are the subatomic particles in the nucleus?
Apakah zarah-zarah sub atom di dalam nukleus?

- A Neutron only
Neutron sahaja
- B Proton and neutron
Proton dan neutron
- C Electron and proton
Elektron dan proton
- D Electron and neutron
Elektron dan neutron
- 2 Carbon-14 is an isotope of carbon. What is the use of carbon-14?
Karbon-14 adalah isotop bagi karbon. Apakah kegunaan karbon-14?
- A Estimate the age of fossils and artefacts
Menganggarkan umur fosil dan artefak
- B Radiotherapy for the treatment of cancer
Radioterapi untuk merawat kanser
- C Regulate the heartbeats of patients with heart problems
Mengawal denyutan jantung pesakit jantung
- D Destroy bacteria in food without changing the quality of food
Memusnahkan bakteria dalam makanan tanpa mengubah kualiti makanan

- 3 Diagram 2 shows the chemical formula of a substance.
Rajah 2 menunjukkan formula kimia bagi suatu bahan.



Diagram 2
Rajah 2

What is the name of the substance?

Apakah nama bahan tersebut?

- A Phosphorus pentachloride
Fosforus pentaklorida
- B Phosphorus trichloride
Fosforus triklorida
- C Phosphorus chlorate
Fosforus klorat
- D Phosphorus chloride
Fosforus klorida
- 4 What is the meaning of empirical formula?
Apakah maksud formula empiri?
- A Formula that shows the actual number of atoms of each element in the compound
Formula yang menunjukkan bilangan sebenar atom setiap unsur di dalam sebatian
- B Formula that shows the simplest ratio of atoms of each element in the compound
Formula yang menunjukkan nisbah tersempit atom setiap unsur di dalam sebatian
- C Formula that shows how the atoms of elements are bonded together
Formula yang menunjukkan bagaimana atom setiap unsur terikat
- D Formula that shows the type of element in the compound
Formula yang menunjukkan jenis unsur di dalam sebatian

- 5 What are the changes that occur as we go across Period 3 in the Periodic Table?
Apakah perubahan yang berlaku apabila merentasi Kala 3 di dalam Jadual Berkala Unsur?

- I The proton number increases
Nombor proton bertambah
II The atomic radius increases
Jari-jari atom bertambah
III The electronegativity increases
Keelektronegatifan bertambah
IV The metallic properties of the element decreases
Sifat ketalagasan unsur berkurang
- A I and II
I dan II
B II and IV
II dan IV
C I and III
I dan III
D I, III and IV
I, III dan IV

- 6 Which of the following properties are true about an ionic compound?
Sifat-sifat manakah benar mengenai sebatian ionik?

	Melting point Titik lebur	Solubility in water Keterlarutan dalam air
A	Low Rendah	Soluble Larut
B	Low Rendah	Insoluble Tidak larut
C	High Tinggi	Soluble Larut
D	High Tinggi	Insoluble Tidak larut

- 7 Which substance is a covalent compound?
Bahan manakah adalah sebatian kovalen?

- A Sodium carbonate
Natrium karbonat
B Copper(II) nitrate
Kuprum(II) nitrat
C Hydrogen chloride
Hidrogen klorida
D Tin(II) oxide
Stannum(II) oksida

- 8 Which of the following ions exist in aluminium nitrate solution?
Ion-ion manakah hadir di dalam larutan aluminium nitrat?

- A Al^{3+} , NO_3^-
B Al^{3+} , NO_3^- , OH^- , H^+
C Al^{3+} , NH_4^+ , NO_3^- , OH^-
D Al^{3+} , NO_3^- , OH^- , H^+

- 9 Which of the following is **not** an application of electrolysis in industries?
Antara yang berikut, yang manakah **bukan** kegunaan elektrolisis dalam industri?

- A Purification of metals
Pencelakan logam
B Melting of metals
Peleburan logam
C Electroplating of metals
Pempadanan logam
D Extraction of metals
Pengekstrakan logam

- 10 Which of the following solutions has the lowest pH value?
Larutan manakah mempunyai nilai pH yang paling rendah?

- A 0.1 mol dm^{-3} ethanoic acid
Asid etanoik 0.1 mol dm^{-3}
B 0.1 mol dm^{-3} sulphuric acid
Asid sulfurik 0.1 mol dm^{-3}
C 0.1 mol dm^{-3} aqueous ammonia
Amoniak akuatik 0.1 mol dm^{-3}
D 0.1 mol dm^{-3} sodium chloride
Natrium klorida 0.1 mol dm^{-3}

- 11 A few drops of phenolphthalein are added into nitric acid and sodium hydroxide solution respectively.

What is the colour of the solutions after phenolphthalein is added?

Beberapa titis fenolftalein ditambah kepada asid nitrik dan larutan natrium hidroksida secara berasingan.

Apakah warna larutan-larutan selepas ditambah fenolftalein?

	Nitric acid Asid nitrik	Sodium hydroxide solution Larutan natrium hidroksida
A	Pink Merah jambu	Colourless Tanpa warna
B	Colourless Tanpa warna	Purple Ungu
C	Colourless Tanpa warna	Pink Merah jambu
D	Purple Ungu	Colourless Tanpa warna

- 12 Which of the following is a soluble salt?

Garam manakah adalah garam terlarut?

- A Silver chloride
Argentum klorida
B Barium sulphate
Barium sulfat
C Potassium nitrate
Kalium nitrat
D Copper(II) carbonate
Kuprum(II) karbonat

- 13 Diagram 3 shows The National Monument which is made of bronze.
Rajah 3 menunjukkan Tugu Peringatan Negara yang diperbuat daripada gangsa.



Diagram 3
Rajah 3

What is the main metal in bronze?

Apakah logam utama dalam gangsa?

- A Magnesium
Magnesium
B Copper
Kuprum
C Iron
Fero
D Tin
Stannum

- 14 Which of the following substances is a hydrocarbon?

Antara bahan berikut, yang manakah adalah hidrokarbon?

- A Pentanol
Pentanol
B 2 methylbutane
2 metilbutana
C Methanoic acid
Asid metanoik
D Ethyl ethanoate
Etil etanoat

- 15 Diagram 4 shows a graph of volume of hydrogen gas liberated against time when magnesium ribbon is placed in dilute sulphuric acid.

Rajah 4 menunjukkan graf isipadu gas hidrogen yang dibebaskan melawan masa apabila pita magnesium diletakkan ke dalam larutan asid sulfurik cair.

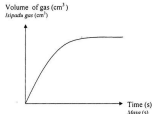


Diagram 4
Rajah 4

Which of the following statements explains the change in the gradient of the curve?

Pernyataan manakah menerangkan perubahan kecerunan lengkung?

- A Total surface area of magnesium ribbon increases
Jumlah luas permukaan pita magnesium bertambah
- B Temperature of the reacting mixture decreases
Suhu campuran bahan tidak kekal bertambah
- C Mass of magnesium sulphate formed increases
Jumlah magnesium sulfat yang terbentuk bertambah
- D Concentration of sulphuric acid decreases
Kekonsentrasi asid sulfurik berkurang
- 16 Which of the following substances is a reducing agent?

Bahan manakah adalah agen penurunan?

- A Acidified potassium manganate(VII)
Kalium manganat(VII) berasid
- B Potassium iodide
Kalium iodida
- C Iron(III) sulphate
Fero(III) sulfat
- D Chlorine
Klorin

- 17 Diagram 5 shows the apparatus used to determine the position of metals in the Reactivity Series.

Rajah 5 menunjukkan radas yang digunakan untuk menentukan kedudukan logam dalam Siri Kereaktifan.

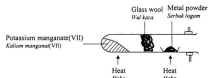


Diagram 5
Rajah 5

What is the function of potassium manganate(VII) powder in this reaction?

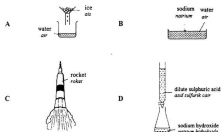
Apakah fungsi serbuk kalium manganat(VII) dalam tindak balas ini?

- A To increase the amount of heat
Untuk meningkatkan haba
- B To catalyse the reaction
Untuk mempercepatkan tindak balas
- C To react with metal
Untuk bertindak balas dengan logam
- D To supply oxygen
Untuk membekalkan oksigen
- 18 Which of the following statements is true about streptomycin?

Pernyataan manakah benar mengenai streptomisin?

- A Can kill viruses
Boleh membunuh virus
- B Obtained from animal cells
Diperolehi dari sel haiwan
- C A type of analgesic
Sejenis analgesik
- D Treats patients with diseases caused by bacteria
Merawat pesakit yang berpenyakit disebabkan oleh bakteria

- 19 Which diagram shows an endothermic reaction?
 Rajah 6 menunjukkan manakah satu tindak balas endotermik?



- 20 Diagram 6 shows the label on a box of sugar free banana cake.
 Rajah 6 menunjukkan label pada kotak yang bertulis kek pisang tanpa gula.



Diagram 6
 Rajah 6

- Which of the following ingredients ensures the cake does not turn rancid?
 Apakah bahan dalam label yang memastikan kek tidak tengik?

- A Aspartame
 Aspartam
- B Sunset yellow
 'Sunset Yellow'
- C Ascorbic acid
 Asid askorbik
- D Pentyl ethanoate
 Pentil etanoat

- 21 Diagram 7 shows the symbol of X atom.
 Rajah 7 menunjukkan simbol bagi atom X.



Diagram 7
 Rajah 7

- What is the electron arrangement for ion of X?
 Apakah susunan elektron bagi ion X?

- A 2.8
 B 2.8.1
 C 2.8.2
 D 2.8.8.5

- 22 The chemical formula for tetrachloromethane is CCl_4 .
 What is the relative molecular mass of tetrachloromethane?
 [Relative atomic mass: C, 12; Cl, 35.5]
 Formula kimia bagi tetraoklorometana adalah CCl_4 .
 Apakah jisim molekul relatif bagi tetraoklorometana?
 [Atom atom relatif: C, 12; Cl, 35.5]

- A 154.0
 B 118.5
 C 83.0
 D 47.5

- 23 Table 1 shows the boiling points of three elements in Group 17.
 Jadual 1 menunjukkan titik didih bagi tiga unsur dalam Kumpulan 17.

Halogen Halogen	Boiling point (°C) Titik didih (°C)
Fluorine Fluorin	-188
Chlorine Klorin	-35
Bromine Bromin	59

Table 1
Jadual 1

Which of the following best explain why the boiling point increases down the group?
 Pernyataan manakah yang menerangkan mengapa titik didih bertambah apabila menurun kumpulan?

- A Increase in proton number.
 Peningkatan nombor proton
- B Increase in strength of the intermolecular forces
 Peningkatan kekuatan daya tarikan antara molekul
- C Increase in number of occupied shells of the atom
 Peningkatan bilangan cangkuk bertut elektron dalam atom
- D Increase in strength of the covalent bond between the atoms
 Peningkatan kekuatan ikatan kovalen antara atom-atom

- 24 Diagram 8 shows the electron arrangement of a compound.
 Rajah 8 menunjukkan susunan elektron suatu sebatian.

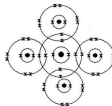
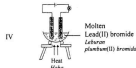
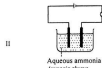


Diagram 8
Rajah 8

Which of the following characteristics is true for the compound?
 Pernyataan manakah benar bagi sebatian tersebut?

- A Can conduct electricity in molten and aqueous solution
 Boleh mengkonduksikan elektrik dalam leburan dan larutan air
- B Solid at room temperature
 Pepejal dalam keadaan bilik
- C Low melting point
 Takat lebur rendah
- D Soluble in water
 Larut dalam air

- 25 Which of the following circuits will the bulb lights up?
 Litar manakah yang menyalakan akan menyala?



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

- 26 Diagram 9 shows the reaction between calcium carbonate and glacial ethanoic acid.
 Rajah 9 menunjukkan tindak balas antara kalsium karbonat dengan asid etanoik glasial

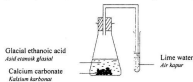
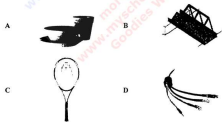


Diagram 9
Rajah 9

No changes are observed after the reaction.
 What should be done in order to make the lime water cloudy?
 Tiada perubahan diperhatikan selepas tindak balas berlaku.
 Apakah yang patut dilakukan untuk menjadikan air kapur keruh?

- A Change calcium carbonate chips to calcium carbonate powder
Menakarkan kepingan kalsium karbonat kepada serbuk kalsium karbonat
B Substitute calcium carbonate with zinc powder
Menakarkan kalsium karbonat dengan serbuk zink
C Shake vigorously the mixture
Campuran digoncang dengan kuat
D Add water to the mixture
Menamabhi air kepada campuran

- 27 The following diagrams show some uses of composite material in daily life.
 Which of the following uses requires a light and stronger composite material?
 Rajah menunjukkan beberapa kegunaan bahan komposit dalam kehidupan seharian.
 Antara kegunaan berikut yang manakah memerlukan bahan komposit yang ringan dan lebih kuat?



- 28 Diagram 10 shows a word equation for the reaction between R and Q.
Rajah 10 menunjukkan persamaan perkataan bagi tindak balas antara R dan Q.

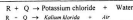


Diagram 10
Rajah 10

R reacts with Q to form potassium chloride and water.

Which of the following are the possible substances for R and Q?

R bertindak balas dengan Q untuk menghasilkan kalium klorida dan air.
Bahan manakah mungkin R dan Q?

	R	Q
A	Potassium hydroxide Kalium hidroksida	Hydrochloric acid Asid hidroklorik
B	Potassium carbonate Kalium karbonat	Hydrochloric acid Asid hidroklorik
C	Potassium nitrate Kalium nitrat	Ammonium chloride Ammonium klorida
D	Potassium Kalium	Chlorine gas Gas klorin

- 29 Diagram 11 shows the apparatus set-up for the reaction between excess dilute hydrochloric acid and marble chips.

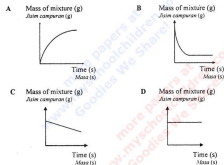
Rajah 11 menunjukkan susunan radas bagi tindak balas antara asid hidroklorik cair berlebihan dengan cebisan marmar.



Diagram 11
Rajah 11

Which of the following graphs best represents the changes in the mass of mixture against time?

Graf manakah paling sesuai mewakili perubahan jisim campuran melawan masa?



- 30 Table 2 shows three sets of experiments using sulphuric acid and magnesium.
 Jadual 2 menunjukkan tiga set eksperimen menggunakan asid sulfurik dan magnesium.

Set	Reactants Bahan-bahan tindak balas	Initial rate of reaction Kadar tindak balas awal
I	3.0 g magnesium powder with 15 cm ³ of 1 mol dm ⁻³ sulphuric acid. 3.0 g serbuk magnesium dengan 15 cm ³ asid sulfurik 1 mol dm ⁻³	t
II	3.0 g magnesium strip with 15 cm ³ of 1 mol dm ⁻³ sulphuric acid. 3.0 g pita magnesium dengan 15 cm ³ asid sulfurik 1 mol dm ⁻³	u
III	3.0 g magnesium powder with 15 cm ³ of 2 mol dm ⁻³ sulphuric acid. 3.0 g serbuk magnesium dengan 15 cm ³ asid sulfurik 2 mol dm ⁻³	v

Table 2
Jadual 2

Which of the following shows the initial rate of reaction between magnesium and sulphuric acid for the three experiments in ascending order?

Antara yang berikut, yang manakah menunjukkan kadar tindak balas awal antara magnesium dan asid sulfurik bagi ketiga-tiga eksperimen dalam tertib menaik?

- A u, t, v
 B t, u, v
 C v, t, u
 D u, v, t
- 31 Diagram 12 shows the structural formula of a carbon compound.
 Rajah 12 menunjukkan formula struktur bagi suatu sebatian karbon.



Diagram 12
Rajah 12

What is the name of the compound?

Apakah nama sebatian tersebut?

- A Ethyl butanoate
Etil butanoat
 B Butyl ethanoate
Butil etanoat
 C Propyl butanoate
Propil butanoat
 D Butyl propanoate
Butil propanoat

- 32 Diagram 13 shows the structural formula for two hydrocarbons M and N.
 Rajah 13 menunjukkan formula struktur bagi dua hidrokarbon M dan N.

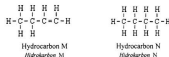


Diagram 13
Rajah 13

Which of the following substances can be used to distinguish M and N?

Salah manakah berikut memberikan M dan N?

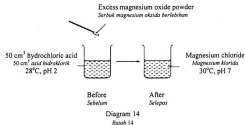
- A Water
Air
 B Sulphuric acid
Asid sulfurik
 C Bromine water
Air bromin
 D Potassium nitrate solution
Larutan kalium nitrat

- 33 Which of the following reactions is a redox reaction?
 Tindak balas manakah adalah tindak balas redoks?

- I $\text{CuO} + \text{Zn} \rightarrow \text{ZnO} + \text{Cu}$
 II $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
 III $\text{Pb}(\text{NO}_3)_2 + 2\text{KI} \rightarrow \text{PbI}_2 + 2\text{KNO}_3$
 IV $\text{Mg} + 2\text{AgNO}_3 \rightarrow \text{Mg}(\text{NO}_3)_2 + 2\text{Ag}$

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

- 34 Diagram 14 shows an experiment where excess magnesium oxide powder is added to 50 cm³ dilute hydrochloric acid.
[Specific heat capacity of water 4.2 Jg⁻¹°C⁻¹]
Rajah 14 menunjukkan eksperimen di mana serbuk magnesium oksida berlebihan ditambahkan kepada 50 cm³ asid hidroklorik cair.
[Masa jenis air = 4.2 Jg⁻¹°C⁻¹]



Which of the combination describes the experiment?
Gabungkan manakah menerangkan eksperimen tersebut?

	Exothermic Eksotermik	Neutralization Peneutralan	Heat given out (J) Haba dibebaskan (J)
A	✓	×	400
B	✓	✓	420
C	×	✓	400
D	×	×	420

- 35 Table 3 shows the energy released by the complete combustion of some carbon compounds.

Jadual 3 menunjukkan tenaga yang dibebaskan dari pembakaran lengkap beberapa sebatian karbon.

Compound Sebatian	Relative molecular mass Jumlah molekul relatif	ΔH (kJ/mol)
Methane Metana	16	-880
Ethanol Etanol	46	-1380
Pentanol Pentanol	88	-3332
Heptane Heptana	100	-4800

Table 3
Jadual 3

Which compound produces the most energy when 1 g is completely burnt?
Sebatian manakah membebaskan tenaga yang paling tinggi apabila 1 g terbakar lengkap?

- A Ethanol
Etanol
B Heptane
Heptana
C Methane
Metana
D Pentanol
Pentanol

- 36 Table 4 shows the melting point and boiling point of substances W, X, Y and Z.

Jadual 4 menunjukkan titik lebur dan titik didih bagi bahan-bahan W, X, Y dan Z.

Substance Bahan	Melting point (°C) Titik lebur (°C)	Boiling point (°C) Titik didih (°C)
W	-187	-126
X	-78	70
Y	75	130
Z	114	444

Table 4
Jadual 4

Which substance is a liquid at room temperature?

Bahan manakah dalam keadaan cecair pada suhu bilik?

- A W
B X
C Y
D Z

- 37 Aluminium carbonate decomposes when heated strongly to produce aluminium oxide and carbon dioxide.
Alumunium karbonat terurai apabila dipanaskan dengan kuat untuk menghasilkan alumunium oksida dan karbon dioksida.



What is the maximum volume of the gas that can be obtained at room temperature when 23.4 g of aluminium carbonate is heated?

[Molar mass of $\text{Al}_2(\text{CO}_3)_3 = 234 \text{ g mol}^{-1}$; Molar volume of gas at room temperature = $24 \text{ dm}^3 \text{ mol}^{-1}$]

Berapakah isipadu maksimum gas yang boleh diperolehi pada suhu bilik apabila 23.4 g aluminium karbonat dipanaskan?

[*Isipit molar $\text{Al}_2(\text{CO}_3)_3 = 234 \text{ g mol}^{-1}$; isipadu molar gas pada suhu bilik = $24 \text{ dm}^3 \text{ mol}^{-1}$*]

- A 2.4 dm^3
 B 4.8 dm^3
 C 7.2 dm^3
 D 8.0 dm^3
- 38 Table 5 shows an atom E with its proton number and nucleon number.
Jadual 5 menunjukkan nombor proton dan nombor nukleon bagi atom E.

Proton number <i>Nombor proton</i>	14
Nucleon number <i>Nombor nukleon</i>	28

Table 5
Jadual 5

Which group and period is E located in the Periodic Table?
Kumpulan dan kala manakah E terletak dalam Jadual Berkala?

	Group <i>Kumpulan</i>	Period <i>Kala</i>
A	1	3
B	3	4
C	4	3
D	14	3

- 39 Table 6 shows the electron arrangement of elements J, K, L, M and N.
Jadual 6 menunjukkan susunan elektron bagi unsur-unsur J, K, L, M dan N.

Element <i>Unsur</i>	Electron arrangement <i>Susunan elektron</i>
J	2.8
K	2.8.2
L	2.8.4
M	2.8.7
N	2.8.8.1

Table 6
Jadual 6

Which of the following shows the correct chemical formula and type of bond for the compounds formed?

Manakah yang berikut, yang manakah menunjukkan formula kimia dan jenis ikatan yang betul bagi setiap pasangan unsur?

	Pair of elements <i>Pasangan unsur</i>	Chemical formula <i>Formula kimia</i>	Type of bond <i>Jenis ikatan</i>
A	K and N <i>K dan N</i>	KN_2	Ionic <i>Ionik</i>
B	K and J <i>K dan J</i>	JK	Ionic <i>Ionik</i>
C	L and J <i>L dan J</i>	LJ	Covalent <i>Kovalen</i>
D	L and M <i>L dan M</i>	LM_4	Covalent <i>Kovalen</i>

- 40 Table 7 shows information about three voltaic cells.

Jadual 7 menunjukkan maklumat berkenaan tiga sel voltaik.

Pair of metals Pasangan logam	Potential difference (V) Beza potensi (V)	Negative terminal Terminal negatif
R and copper R dan kuprum	0.44	R
S and copper S dan kuprum	1.70	S
T and copper T dan kuprum	0.53	Cu

Table 7

Jadual 7

What is the potential difference for the pair of metal S and T?

Apakah beza potensi bagi pasangan logam S dan T?

- 41 Diagram 15 shows the apparatus set-up to study the corrosion of an iron nail.

Rajah 15 menunjukkan susunan peralatan untuk mengkaji korosi paku besi.

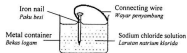


Diagram 15

Rajah 15

Which metal container causes the iron nail to corrode the fastest?

Bekas logam manakah menyebabkan paku besi paling cepat teroksidasi?

- A Magnesium
Magnesium
- B Silver
Argentum
- C Lead
Plumbum
- D Tin
Stannum

- 42 Diagram 16 shows the reaction between sulphuric acid and potassium hydroxide solution.

Rajah 16 menunjukkan tindak balas antara asid sulfurik dan larutan kalium hidroksida.

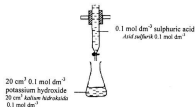
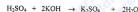


Diagram 16

Rajah 16

The chemical equation for the reaction is:

Persamaan kimia bagi tindak balas adalah:



What is the volume of 0.1 mol dm^{-3} sulphuric acid needed to exactly neutralise 20 cm^3 0.1 mol dm^{-3} potassium hydroxide?

Berapakah isipadu asid sulfurik 0.1 mol dm^{-3} yang diperlukan untuk menetralkan dengan lengkap 20 cm^3 larutan hidroksida 0.1 mol dm^{-3} ?

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

- 43 Table 8 shows the result of a series of tests carried out on a solution of salt G.

Jadual 8 menunjukkan keputusan satu siri ujian yang telah dijalankan pada larutan garam G.

Test Ujian	Observation Pemerhatian
Add dilute sulphuric acid Tambah asid sulfurik cair	No changes Tiada perubahan
Add lead(II) nitrate solution, then heat it Tambah larutan plumbum(II) nitrat, kemudian panaskan	White precipitate dissolves when heated. Mendakan putih yang terbentuk dalam air-bila dipanaskan
Add sodium hydroxide solution until in excess Tambah larutan natrium hidroksida sehingga berlebihan	White precipitate is formed. It is insoluble in excess sodium hydroxide solution Mendakan putih terbentuk. Tidak terlarut dalam larutan natrium hidroksida berlebihan
Add ammonia solution until in excess Tambah larutan ammonia sehingga berlebihan	White precipitate is formed. It is insoluble in excess ammonia solution Mendakan putih terbentuk. Tidak terlarut dalam larutan ammonia berlebihan

Table 8
Jadual 8

Based on the results of the experiment, what is salt G?

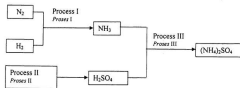
Berdasarkan keputusan eksperimen, apakah garam G?

- A Zinc chloride
Zink klorida
- B Magnesium sulphate
Magnesium sulfat
- C Aluminium sulphate
Alumina sulfat
- D Magnesium chloride
Magnesium klorida

[Lihat halaman sebelah
SULIT

- 44 Diagram 17 shows the flow chart of processes in industry.

Rajah 17 menunjukkan carta alir proses-proses dalam industri.

Diagram 17
Rajah 17

Identify the processes involved.

Kenalpasti proses-proses yang terlibat.

	Process I Proses I	Process II Proses II	Process III Proses III
A	Haber Haber	Contact Sentak	Ostwald Ostwald
B	Hydrogenation Penghidrogenan	Haber Haber	Ostwald Ostwald
C	Haber Haber	Contact Sentak	Neutralisation Peneutralan
D	Contact Sentak	Ostwald Ostwald	Haber Haber

- 45 Diagram 18 shows an apparatus set-up for a redox reaction.
 Rajah 18 menunjukkan susunan radas bagi tindak balas redoks.

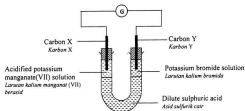


Diagram 18
 Rajah 18

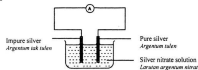
Which of these statements is correct?

Manakah pernyataan berikut yang manakah benar?

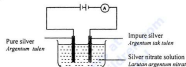
- A The colour of solution at electrode Y does not change
 Warna larutan di elektrod Y tidak berubah
- B Electron flows from electrode X to electrode Y
 Elektron mengalir dari elektrod X ke elektrod Y
- C The purple solution at electrode X decolourises
 Larutan ungu di elektrod X dibenarkan
- D Sulphuric acid acts as the reducing agent
 Asid sulfurik bertindak sebagai agen pemalaran

- 46 Which of the following shows the correct apparatus set-up for the purification of silver metal?
 Susunan radas manakah digunakan untuk penulenan logam argenium?

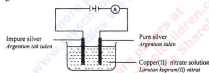
A



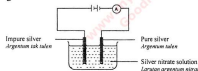
B



C



D



- 47 Diagram 19 shows the symbol for two elements. The letters used are not the actual symbol of the elements.

Rajah 19 menunjukkan simbol bagi dua unsur. Huruf-huruf yang digunakan bukan simbol sebenar unsur-unsur itu.



Diagram 19
Rajah 19

Which of the following represents the electron arrangement for a compound formed between elements Q and Y?

Antara yang berikut, yang manakah menunjukkan susunan elektron bagi sebatian yang terbentuk antara unsur Q dan Y?

- A
- B
- C
- D

- 48 Diagram 20 shows the apparatus set-up for the reaction between acid V and alkali W. Rajah 20 menunjukkan susunan radas bagi tindak balas antara asid V dan alkali W.

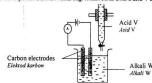


Diagram 20
Rajah 20

The graph of ammeter reading against volume of acid V added is shown in Diagram 21. Graf bacaan ammeter melawan isipadu asid V yang ditambah ditunjukkan dalam Rajah 21.

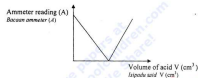


Diagram 21
Rajah 21

Based on the graph in Diagram 21, which of the following pairs of substances represent acid V and alkali W?

Berdasarkan graf dalam Rajah 21, pasangan bahan yang manakah mewakili asid V dan alkali W?

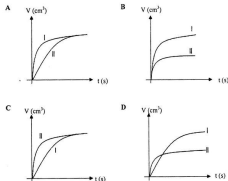
	Acid V Asid V	Alkali W Alkali W
A	Sulphuric acid Asid sulfurik	Barium hydroxide Barium hidroksida
B	Hydrochloric acid Asid hidroklorik	Sodium hydroxide Natrium hidroksida
C	Nitric acid Asid nitrik	Potassium hydroxide Kalium hidroksida
D	Ethanoic acid Asid etanoik	Ammonium hydroxide Amonium hidroksida

- 49 Two sets of experiments are carried out as follows:
 Dua set eksperimen telah dijalankan seperti berikut:

Set	Reactant 1 Bahan tindak balas 1	Reactant 2 Bahan tindak balas 2	Temperature Suhu
I	100 cm ³ 1.0 mol dm ⁻³ hydrochloric acid 100 cm ³ asid hidroklorik 1.0 mol dm ⁻³	10 g of marble chips 10 g cebisan marmar	30 °C
II	50 cm ³ 1.0 mol dm ⁻³ hydrochloric acid 50 cm ³ asid hidroklorik 1.0 mol dm ⁻³	10 g of marble chips 10 g cebisan marmar	50 °C

Which graphs of volume of carbon dioxide collected against time in both sets is correct?

Graf manakah menunjukkan isipadu karbon dioksida yang dikumpul melawan masa bagi kedua-dua set adalah betul?



- 50 Diagram 22 shows the energy level diagram for neutralisation reaction.
 Rajah 22 menunjukkan rajah aras tenaga bagi tindak balas penamiran.

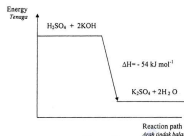


Diagram 22
Rajah 22

What is the amount of heat released when 50 cm³ 2 mol dm⁻³ sulphuric acid reacts with 50 cm³ 2 mol dm⁻³ potassium hydroxide solution?

Berapakah kuantiti haba yang dibebaskan apabila 50 cm³ asid sulfurik 2 mol dm⁻³ bertindak balas dengan 50 cm³ larutan kalium hidroksida 2 mol dm⁻³?

- A 5.4 kJ
 B 10.8 kJ
 C 27.0 kJ
 D 54.0 kJ

END OF QUESTION PAPER
 KERTAS SOALAN TAMAT

CONFIDENTIAL

4541/2
Chemistry
Paper 2
September
2011

2½ hours



MAKTAB RENDAH SAINS MARA

SIJIL PELAJARAN MALAYSIA
TRIAL EXAMINATION 2011

CHEMISTRY

Paper 2

Two hours and thirty minutes

4
5
4
1
2

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1. Tuliskan *nama* dan *angka* giliran anda pada ruang yang disediakan.
2. Kertas soalan ini adalah dalam dua bahasa.
3. Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.
4. Calon dikehendaki membaca maklumat di halaman belakang buku soalan ini.

For Examiner's Use			
Section	Question	Full Mark	Mark Obtained
A	1	9	
	2	9	
	3	10	
	4	10	
	5	11	
B	6	11	
	1	20	
	2	20	
C	3	20	
	4	20	
Total		100	

This booklet consists 28 printed pages

[See next page
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For
Examiner's
UseSection A
Bahagian A[60 marks]
[60 markah]Answer all questions in this section.
Jawab semua soalan dalam bahagian ini.

- 1 Table 1 shows the proton number and nucleon number for atoms P, Q, R and S. The letters used do not represent the actual symbols of the atoms.
Jadual 1 menunjukkan nombor proton dan nombor nukleon bagi atom P, Q, R dan S. Huruf yang digunakan tidak mewakili simbol sebenar atom-atom tersebut.

Atom	Proton number Nombor proton	Nucleon number Nombor nukleon
P	6	12
Q	6	14
R	11	24
S	12	24

Table 1
Jadual 1

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

[1 mark]
[1 markah]

- (b) Determine the number of neutrons in these atoms.
Tentukan bilangan neutron bagi atom-atom.

(i) P :

(ii) R :
[2 marks]
[2 markah]

- (c) Write the symbol for atom Q in the form of A_ZX .
Tuliskan simbol bagi atom Q dalam bentuk A_ZX .

[1 mark]
[1 markah]For
Examiner's
Use

- (a) For the atom S,
Bagi atom S,

- (i) Write the electron arrangement.
Tuliskan susunan elektron.

[1 mark]
[1 markah]

- (ii) State the number of valence electron.
Nyatakan bilangan elektron valens.

[1 mark]
[1 markah]

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

[1 mark]
[1 markah]

- (ii) Explain your answer in (e)(i).
Terangkan jawapan anda di (e)(i).

[1 mark]
[1 markah]

- (iii) State one use of the isotope in (e)(i) which is radioactive.
Nyatakan satu kegunaan isotop di (e)(i) yang bersifat radioaktif.

[1 mark]
[1 markah]I(a)(i)
1I(a)(ii)
1I(e)(i)
1I(e)(ii)
1I(e)(iii)
1Total A1
9

For
Examiner's
Use

- 2 Table 2 shows the pH values of solutions V, W, X, Y and Z with a concentration of 0.1 mol dm^{-3} .
 Jadual 2 menunjukkan nilai-nilai pH bagi larutan-larutan V, W, X, Y dan Z yang mempunyai kepekatan 0.1 mol dm^{-3} .

Solution Larutan	V	W	X	Y	Z
pH value Nilai pH	1	4	7	10	13

Table 2
Jadual 2

- (a) Based on Table 2, state which solution is
 Berdasarkan Jadual 2, nyatakan larutan

(i) neutral:
 neutral :

(ii) alkaline:
 beralkali :
 [2 marks]
 [2 markah]

- (b) State which solution contains
 Nyatakan larutan yang mana mengandungi

(i) the highest concentration of hydrogen ion:
 kepekatan ion hidrogen yang paling tinggi :

(ii) the highest concentration of hydroxide ion:
 kepekatan ion hidroksida yang paling tinggi :
 [2 marks]
 [2 markah]

- (c) (i) Give an example of solution V.
 Berikan satu contoh larutan V.

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

- (ii) Give one chemical property of solution V.
 Berikan satu sifat kimia bagi larutan V.

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

- (d) (i) Give one example of solution Z.
 Berikan satu contoh larutan Z.

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

- (ii) Distilled water is added to 20.0 cm^3 of solution Z to make 100.0 cm^3 of solution.
 Calculate the new concentration of solution Z.
 Air suling telah dicampurkan kepada 20.0 cm^3 larutan Z untuk dijadikan 100.0 cm^3 larutan. Hitung kepekatan yang baru bagi larutan Z.

2(d)(i)

1

2(d)(ii)

2

Total A2

9

For
Examiner's
Use

- 3 Table 3 shows the apparatus set-up, description and observation for experiment I and II.
Jadual 3 menunjukkan susunan radas, penerangan dan pemerhatian bagi eksperimen I dan II.

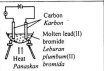

Experiment Eksperimen	I	II
Apparatus set-up Susunan Radas		
Description Huraian	Electrolysis of molten lead(II) bromide using carbon electrodes Elektrolisis leburan plumbum(II) bromida menggunakan elektrod-elektrod karbon	Electrolysis of 1 mol dm ⁻³ sodium sulphate solution using carbon electrodes Elektrolisis 1 mol dm ⁻³ larutan natrium sulfat menggunakan elektrod-elektrod karbon
Observation Pemerhatian	Grey solid is formed at the cathode Pepejal kelabu terbentuk di katod	Gas bubbles are released at the anode and cathode Gelembung-gelembung gas dibebaskan di anod dan katod

Table 3
Jadual 3

- (a) State all the ions present in
Nyatakan semua ion yang hadir dalam

- (i) molten lead(II) bromide :
leburan plumbum(II) bromida :
- (ii) sodium sulphate solution :
larutan natrium sulfat : [2 marks]
[2 markah]

- (b) Based on experiment I:
Berdasarkan eksperimen I :

- (i) Name the grey solid produced.
Namakan pepejal kelabu yang terhasil.

[1 mark]
[1 markah]

- (ii) Write the half equation for the formation of grey solid.
Tuliskan setengah persamaan bagi pembentukan pepejal kelabu.

[2 marks]
[2 markah]

- (iii) State the observation at anode.
Nyatakan pemerhatian di anod.

[1 mark]
[1 markah]

- (c) Based on experiment II:
Berdasarkan eksperimen II:

- (i) Name the ion that is discharged at anode.
Namakan ion yang dinyahcasikan di anod.

[1 mark]
[1 markah]

- (ii) State the product of electrolysis at
Nyatakan hasil tindak balas yang terbentuk di

anode:

cathode:

katod : [2 marks]
[2 markah]

- (iii) Name another solution that will give the same products of electrolysis as in experiment II.
Nama satu larutan lain yang akan memberikan hasil elektrolisis yang sama seperti di eksperimen II.

[1 mark]
[1 markah]

For
Examiner's
Use

3(b)(ii)
2

3(b)(iii)
1

3(c)(i)
1

3(c)(ii)
2

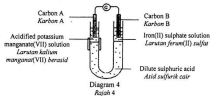
3(c)(iii)
1

Total A3
10

4

Diagram 4 shows the apparatus set-up of an experiment to investigate the redox reaction between acidified potassium manganate(VII) solution and iron(II) sulphate solution.

Rajah 4 menunjukkan susunan radas eksperimen bagi menyiasat tindak balas redoks antara larutan kalium manganat(VII) beracid dan larutan ferum(II) sulfat.



- (a) What is meant by redox reaction?
Apakah yang dimaksudkan dengan tindak balas redoks?

[1 mark]
[1 markah]

- (b) Show the direction of the flow of electrons in Diagram 4.
Tunjukkan arah pengaliran elektron pada Rajah 4.

[1 mark]
[1 markah]

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

[2 marks]
[2 markah]

- (d) State the type of reaction that occurs at carbon A.
Nyatakan jenis tindak balas yang berlaku di karbon A.

[1 mark]
[1 markah]

- (e) Based on the reaction that takes place at carbon B:
Merujuk kepada tindak balas yang berlaku di karbon B:

- (i) Write the chemical formula of iron(II) sulphate.
Tuliskan formula kimia bagi ferum(II) sulfat.

[1 mark]
[1 markah]

- (ii) State the colour change of the solution after 30 minutes.
Nyatakan perubahan warna larutan selepas 30 minit.

[1 mark]
[1 markah]

- (iii) Write the half equation for the reaction.
Tuliskan setengah persamaan bagi tindak balas.

[1 mark]
[1 markah]

- (iv) Describe a chemical test to confirm the product formed at carbon B.
Huraikan ujian kimia bagi mengesahkan hasil yang terbentuk di karbon B.

[2 marks]
[2 markah]

4(a)

4(e)(i)

4(e)(ii)

4(e)(iii)

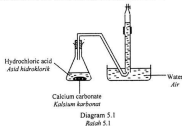
4(e)(iv)

Total A4

10

For
Examiner's
Use

- 5 Diagram 5.1 shows the apparatus set up for the reaction between 40.0 cm^3 of 0.1 mol dm^{-3} hydrochloric acid and excess small calcium carbonate chips.
Rajah 5.1 menunjukkan susunan radas untuk tindak balas di antara 40.0 cm^3 asid hidroklorik 0.1 mol dm^{-3} dan ketulan kecil kalsium karbonat berlebihan.



The volume of gas produced is measured at 30 second intervals. Table 5.2 shows the results obtained.

Jipadu gas yang terhasil telah diukur pada masa-masa 30 saat. Jadual 5.2 menunjukkan keputusan yang diperolehi.

Time (s) Masa (s)	0	30	60	90	120	150	180	210	240	270
Volume of gas produced (jipadu gas terhasil) (cm^3)	0.00	13.00	22.00	28.50	34.00	39.00	42.50	45.00	45.00	45.00

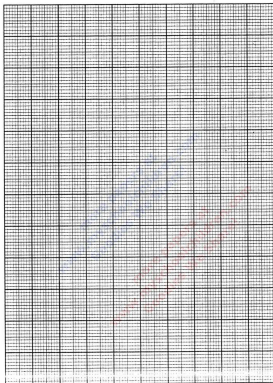
Table 5.2
Jadual 5.2

- (a) Write the chemical equation for the reaction.
Tuliskan persamaan kimia bagi tindak balas.

[2 marks]
[2 markah]

- (b) Draw the graph of volume of gas produced against time.
Lukiskan graf jipadu gas yang terhasil melawan masa.

Volume of gas produced against time



[3 marks]
[3 markah]

5(a)

2

8(a)

3

- (c) From the graph, determine the rate of reaction at 60 seconds.
Dari graf, tentukan kadar tindak balas pada masa 60 saat.

5(c)

[2 marks]

[2 markah]

- (d) On the graph that you have drawn in 5(b) sketch a curve that you would get if the experiment is repeated using excess large calcium carbonate chips.

Pada graf yang sama di 5(b) lakarkan lengkung yang diperolehi apabila eksperimen diulangi menggunakan keping besar kalsium karbonat berlebihan.

[1 mark]

[1 markah]

- (e) Based on collision theory, explain how the size of calcium carbonate affects the rate of reaction.
Berdasarkan teori perlanggaran, nyatakan bagaimana saiz kalsium karbonat mempengaruhi kadar tindak balas.

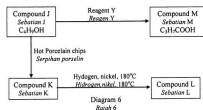
5(e)

[3 marks]

[3 markah]

- 6 Diagram 6 shows a series of chemical reaction starting from compound J, C_4H_9OH .

Rajah 6 menunjukkan satu siri tindak balas kimia bermula dengan sebatian J, C_4H_9OH .



- (a) (i) Name the homologous series of compound J.
Namakan siri homolog bagi sebatian J.

[1 mark]

[1 markah]

- (ii) Compound J has four isomers.
Draw the structural formula of one isomer of J.
Sebatian J mempunyai empat isomer.
Lakiskan formula struktur bagi satu isomer J.

[1 mark]

[1 markah]

- (b) Draw an apparatus set-up that can be used in the laboratory to carry out the conversion of compound J to compound K.
Lakiskan susunan radas yang boleh digunakan di dalam makmal bagi penukaran sebatian J kepada sebatian K.

[2 marks]

[2 markah]

- (c) The empirical formula of compound L is C_3H_5 . Determine its molecular formula given that the relative molecular mass is 58.
 Sebatian L mempunyai formula empirik C_3H_5 . Tentukan formula molekul, jika jisim molekul relatifnya ialah 58.
 [Relative atomic mass: $C=12$; $H=1$]
 [Aloim atom relatif: $C=12$; $H=1$]

6(c)

3

[3 marks]
[3 markah]

- (d) Compound K is an unsaturated hydrocarbon while compound L is a saturated hydrocarbon.
 Describe a chemical test to differentiate compound K and L.
 Sebatian K adalah hidrokarbon tak tepu manakala sebatian L hidrokarbon tepu.
 Huraikan ujian kimia bagi membezakan sebatian K dan L.

6(d)

3

[3 marks]
[3 markah]

- (e) Name the reagent Y which is used to convert compound J, C_6H_5OH to compound M, C_6H_5COOH .
 Namakan reagen Y yang digunakan untuk memakanan sebatian J, C_6H_5OH kepada sebatian M, C_6H_5COOH .

6(e)

1

[1 mark]
[1 markah]

Total Aka

11

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

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

- 7 (a) Diagram 7.1 shows the atomic structure of element X.
 Rajah 7.1 menunjukkan struktur atom bagi unsur X.



Diagram 7.1
 Rajah 7.1

- (i) Describe the atomic structure shown in Diagram 7.1.
 Huraikan struktur atom yang ditunjukkan dalam Rajah 7.1.
- (ii) State the position of element X in the Periodic Table.
 Explain your answer.
 Nyatakan kedudukan unsur X dalam Jadual Berkala unsur.
 Terangkan jawapan anda.

[6 marks]
[6 markah][4 marks]
[4 markah]

- (b) Diagram 7.2 shows the standard representation for three elements, P, Q and R.

Rajah 7.2 menunjukkan perwakilan piawai bagi tiga unsur, P, Q dan R.

$\begin{array}{ c } \hline 39 \\ \hline P \\ \hline 19 \\ \hline \end{array}$	$\begin{array}{ c } \hline 16 \\ \hline Q \\ \hline 8 \\ \hline \end{array}$	$\begin{array}{ c } \hline 12 \\ \hline R \\ \hline 6 \\ \hline \end{array}$
---	--	--

Diagram 7.2
Rajah 7.2

Elements P, Q and R react to form two compounds that have different type of bonds.

Using the information in Diagram 7.2, suggest and explain how the two compounds can be formed.

Unsur P, Q dan R bertindak balas membentuk dua sebatian yang mempunyai jenis ikatan yang berbeza.

Menggunakan maklumat dalam Rajah 7.2, cadangkan dan terangkan bagaimana dua sebatian tersebut terbentuk.

[10 marks]

[10 marks]

- 8 (a) The major component of glass is silica while in ceramic is silicate. Compare and contrast the properties of glass and ceramic.
Komponen utama kaca ialah silika manakala dalam seramik adalah silikat. Bandingkan dan bezakan ciri-ciri kaca dan seramik.

[4 marks]

[4 marks]

- (b) Modern medicine is used to treat various diseases and symptoms. Table 8.1 shows the medicine used to treat various diseases and symptoms.

Perubatan moden digunakan untuk merawat pelbagai simptom dan penyakit.

Jadual 8.1 menunjukkan pelbagai ubatan yang digunakan untuk merawat simptom dan penyakit.

Medicine Ubatan	A	B	C
Diseases / symptoms Penyakit /simptom	Headache, muscle and joint pain, backache Sakit kepala, sakit sendi dan otot, sakit belching	Tuberculosis, Pneumonia Tuberkulosis, Radang paru- paru	Depressed, anxious and lack of interest in his surrounding Marung, cemas dan kurang berminat dengan keadaan sekitarling

Table 8.1

Jadual 8.1

Based on Table 8.1, suggest types of medicine A, B, C and their function.
Berdasarkan Jadual 8.1, cadangkan jenis ubat A, B, C dan fungsi-fungsinya.

[6 marks]

[6 marks]

- (c) (i) A student carried out an experiment to investigate the effectiveness of soap and detergent in hard water. Soap and detergent is added separately to hard water in Experiment I and Experiment II. Table 8.2 shows the apparatus set-up and observation for the experiment.
- Seorang pelajar menjalankan satu eksperimen untuk mengkaji keberkesanan sabun dan detergen dalam air liat. Sabun dan detergen ditambah secara berasingan ke dalam air liat pada Eksperimen I dan Eksperimen II. Jadual 8.2 menunjukkan peralatan radas dan pemerhatian bagi eksperimen ini.*





	Experiment I	Experiment II
Initial Pernulaan	Glass rod Rod kaca  Detergent + hard water Detergen + air liat	Glass rod Rod kaca  Soap + hard water Sabun + air liat
After stirring Selepas di kacau	Clear mixture of detergent + hard water Campuran detergen dalam air liat yang jernih 	Thin layer of solid on surface of water Lapisan nipis pepejal di permukaan air 

Table 8.2
Jadual 8.2

Based on Table 8.2, compare the effect of soap and detergent on hard water.
Which is a better cleaning agent? Explain.
*Berdasarkan Jadual 8.2, bandingkan kesan sabun dan detergen ke atas air liat.
Agen pembersihan yang manakah lebih baik?
Terangkan jawapan anda.*

[4 marks]
[4 markah]

- (iii) A mechanic found that his cloth has oily stain. He washed them with detergent. Describe briefly the cleansing mechanism of detergent during washing.
Seorang mekanik mendapati bajunya mempunyai kotoran berminyak. Dia mencuci pakaiannya itu menggunakan detergen. Huraikan secara ringkas tindakan pembersihan detergen ketika mencuci pakaiannya itu.

[6 marks]
[6 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 (a) Diagram 9.1 shows the preparation of lead(II) sulphate from lead(II) oxide. Rajah 9.1 menunjukkan penyediaan plumbum(II) sulfat daripada plumbum(II) oksida.

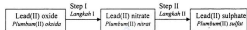


Diagram 9.1
Rajah 9.1

- (i) Explain why lead(II) sulphate cannot be prepared directly from lead(II) oxide.
Terangkan mengapa plumbum(II) sulfat tidak boleh disediakan secara terus daripada plumbum(II) oksida.
- (ii) Based on Diagram 9.1, describe Step I and Step II used in the preparation of lead(II) sulphate.
Berdasarkan Rajah 9.1, huraikan Langkah I dan Langkah II yang digunakan dalam penyediaan plumbum(II) sulfat.

[2 marks]
[2 markah]

[8 marks]
[8 markah]

- (b) Diagram 9.2 shows the steps involved to confirm the presence of anion and cation in solid lead(II) carbonate.
Rajah 9.2 menunjukkan langkah-langkah terlibat untuk mengesahkan kehadiran anion dan kation dalam plumbum(II) karbonat.

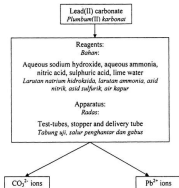


Diagram 9.2
Rajah 9.2

Using all reagents provided, describe the methods used to confirm the presence of ions and observation involved.
Menggunakan reagen yang dibekalkan, huraikan kaedah yang digunakan untuk mengesahkan kehadiran ion-ion dan pemerhatian yang terlibat.

[10 marks]
[10 markah]

- 10 (a)

210 kJ heat is released when 1 mole of copper is displaced by zinc from copper(II) sulphate solution.
210 kJ haba dibebaskan apabila 1 mol kuprum disesarkan oleh zink daripada larutan kuprum(II) sulfat.

Excess zinc powder is added to 50 cm³ of 1.0 mol dm⁻³ copper(II) sulphate solution and stirred.

Calculate the change of temperature in this experiment.

[Specific heat capacity of solution, $c = 4.2 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$;

Density of solution = 1 g cm^{-3}]

Sesbuk zink berlebihan ditambah kepada 50 cm³ larutan kuprum(II) sulfat 1.0 mol dm⁻³ dan dikacau. Hitunglah perubahan suhu dalam eksperimen ini.

[Masa haba tentu bagi larutan, $c = 4.2 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$

Ketumpatan larutan = 1 g cm^{-3}]

[4 marks]

[4 markah]

- (b) Hydrogen and chlorine gas can react to form an acidic gas.
Gas hidrogen dan klorin berindak balas menghasilkan reagent gas beracid.

- (i) H - H bonds and Cl - Cl bonds are weak but H - Cl bonds are strong. State whether the reaction is exothermic or endothermic. Explain your answer.

Batan H - H dan ikatan Cl - Cl adalah lemah tetapi ikatan H - Cl adalah kuat. Nyatakan samaada tindak balas adalah eksothermik atau endothermik.

Terangkan jawapan anda.

[4 marks]

[4 markah]

- (ii) Draw the energy level diagram for the reaction.
Lukiskan gambarajah aras tenaga bagi tindak balas ini.

[2 marks]

[2 markah]

- (c) Plan an experiment to determine the heat of displacement for the reaction between zinc and copper(II) sulphate solution.

Your description must include the following:

- Procedure of the experiment
- The method to calculate the heat of displacement.

Rancang satu eksperimen untuk menentukan haba pergesaran bagi tindak balas zink dengan larutan kuprum(II) sulfat.

Huraian anda mesti mengandungi maklumat berikut:

- Prosedur eksperimen
- Langkah untuk menghitung haba pergesaran.

[10 marks]

[10 markah]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

Nama :

Kelas :

Angka Giliran :

CONFIDENTIAL

4541/3

Chemistry

Paper 3

September

2011

1½ hours



MAKTAB RENDAH SAINS MARA

**SIJIL PELAJARAN MALAYSIA
TRIAL EXAMINATION 2011**
CHEMISTRY

Paper 3

One hour and thirty minutes

DO NOT OPEN THIS QUESTION BOOKLET UNTIL BEING TOLD TO DO SO

1. Tuliskan nama dan angka giliran anda pada ruang yang disediakan.
2. Kertas soalan ini adalah dalam dwibahasa.
3. Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.
4. Calon dikehendaki membaca maklumat di halaman belakang buku soalan ini.

For Examiner's Use		
Question	Full Mark	Mark obtained
1	21	
2	12	
3	17	
Total	50	

This booklet consists 14 printed pages and 2 unprinted pages

[Turn page over
CONFIDENTIAL]

- 1 Diagram 1.1 shows the apparatus set-up for three sets of experiment to investigate the effect of copper and magnesium on the rusting of iron, Fe.

Rajah 1.1 menunjukkan susunan radas untuk tiga set eksperimen untuk mengkaji kesan logam kuprum dan magnesium ke atas pengoksidaan besi, Fe.







Set	Apparatus set-up Susunan radas	
	Day 1 Hari pertama	Day 5 Hari ke-5
I	 <p>Gel containing potassium hexacyanoferrate (III) solution Gel mengandungi larutan kalium heksasianoferat(III)</p> <p>Iron nail Paku besi</p>	 <p>Gel containing potassium hexacyanoferrate (III) solution Gel mengandungi larutan kalium heksasianoferat(III)</p> <p>Iron nail Paku besi</p> <p>A few blue spots Sebilah simpok-simpok biru</p>
II	 <p>Gel containing potassium hexacyanoferrate (III) solution Gel mengandungi larutan kalium heksasianoferat(III)</p> <p>Iron nail coiled with copper Paku besi dililit dengan kuprum</p>	 <p>Gel containing potassium hexacyanoferrate (III) solution Gel mengandungi larutan kalium heksasianoferat(III)</p> <p>Iron nail coiled with copper Paku besi dililit dengan kuprum</p> <p>A lot of blue spots Banyak simpok-simpok biru</p>
III	 <p>Gel containing potassium hexacyanoferrate (III) solution Gel mengandungi larutan kalium heksasianoferat(III)</p> <p>Iron nail coiled with magnesium Paku besi dililit dengan magnesium</p>	 <p>Gel containing potassium hexacyanoferrate (III) solution Gel mengandungi larutan kalium heksasianoferat(III)</p> <p>Iron nail coiled with magnesium Paku besi dililit dengan magnesium</p> <p>No blue spots Tiada simpok-simpok biru</p>

Diagram 1.1
Rajah 1.1

- (a) State one observation that can be obtained from each set of the experiment in Table 1.2.

Nyatakan pemerhatian yang dapat diperolehi daripada setiap set eksperimen di dalam Jadual 1.2.

Set	Observation Pemerhatian
I	
II	
III	

Table 1.2
Jadual 1.2

[3 marks]
[3 markah]

- (b)(i) State the inference for each set of the experiment in Table 1.3.
Nyatakan inferens bagi setiap set eksperimen di dalam Jadual 1.3.

Set	Inference Inferens
I	
II	
III	

Table 1.3
Jadual 1.3

[3 marks]
[3 markah]

I(b)(ii)

- (b) (ii) Based on the experiment, arrange the three metals in ascending order of electropositivity.
Berdasarkan eksperimen, susun ketiga-tiga logam mengikut tertib keelektropositifan menaik.

[3 marks]
[3 markah]

- (c) For the experiment, state:
Bagi eksperimen ini, nyatakan:

- (i) The manipulated variable
Pembolehubah dimanipulasi

- (ii) The responding variable
Pembolehubah bergerak balas

- (iii) The constant variable
Pembolehubah dimalarkan

[3 marks]
[3 markah]

- (d) State the hypothesis for the experiment.
Nyatakan hipotesis untuk eksperimen ini.

[3 marks]
[3 markah]

I(d)

- (e) Another experiment is conducted by coiling the iron nail with silver. Predict the observation for this experiment compared to the experiments in Table 1.1.
Satu eksperimen lain dijalankan dengan melilitan paku besi dengan logam argenium.
Ramalkan pemerhatian bagi eksperimen ini berbanding dengan eksperimen di dalam Jadual 1.1.

[3 marks]
[3 markah]

- (f) State the operational definition for the rusting of iron in the experiment.
Nyatakan definisi secara operasi bagi pengoksidaan besi dalam tindak balas.

[3 marks]
[3 markah]

I(f)

Total

1

21

- 2 Diagram 2.1 shows the apparatus set-up used to investigate the electrical conductivity of sodium chloride solution.
 Rajah 2.1 menunjukkan susunan radas untuk mengkaji kekonduksian elektrik oleh larutan natrium klorida.

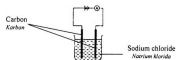


Diagram 2.1
Rajah 2.1

The experiment is repeated by replacing sodium chloride solution with ethanol, glucose solution and lead(II) nitrate solution.
 Eksperimen diulangi dengan menggantikan larutan natrium klorida dengan etanol, larutan glukosa dan larutan plumbus(II) nitrat.

- (a) Diagram 2.2 shows the ammeter readings for all solutions.
 Record the ammeter readings in the spaces provided.
 Rajah 2.2 menunjukkan bacaan ammeter untuk semua larutan.
 Catat bacaan ammeter pada ruang yang disediakan.

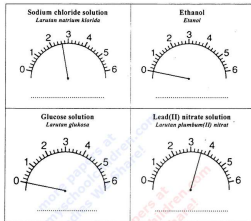


Diagram 2.2
Rajah 2.2

[3 marks]
[3 markah]

- (b) Classify the substances used in the experiment into electrolytes and non-electrolytes.
 Kelaskan bahan-bahan yang digunakan di dalam eksperimen kepada elektrolit dan bukan elektrolit.

[3 marks]
[3 markah]

- (c) (i) What will happen to the ammeter reading in the experiment shown in Diagram 2.1 after 10 minutes?
 Apakah yang akan berlaku kepada bacaan ammeter bagi eksperimen yang ditunjukkan di dalam Rajah 2.1 selepas 10 minit?

.....

[3 marks]
 [3 markah]

- (ii) Explain the answer in 2(c)(i).
 Terangkan jawapan di 2(c)(i).

.....

[3 marks]
 [3 markah]

For
 Examiner's
 Use

2(c)(i)

2(c)(ii)

Total

12

- 3 Diagram 3 shows a situation faced by Mr. Ahmad at a rest area.
 Rajah 3 menunjukkan situasi yang dialami oleh En. Ahmad di satu kawasan rehat.



Diagram 3
 Rajah 3

The above situation shows an application of a type of voltaic cell in daily lives. Plan a laboratory experiment to construct the Electrochemical Series using a voltaic cell. You are required to use the following metals; copper, iron, magnesium and zinc.

Situasi di atas menunjukkan salah satu aplikasi sel voltan di dalam kehidupan seharian. Rancang satu eksperimen untuk membina Siri Elektrokimia menggunakan sel voltan. Anda hendaklah menggunakan logam-logam berikut; kuprum, besi, magnesium dan zink.

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

- Aim of experiment
Tujuan eksperimen
- All the variables
Semua pembolehubah
- Statement of the hypothesis
Pernyataan hipotesis
- List of substances and apparatus
Senarai bahan dan radas
- Procedure for the experiment
Prosedur eksperimen
- Tabulation of data
Penjajadian data

[17 marks]
 [17 markah]

END OF QUESTION PAPER
 KERTAS SOALAN TAMAT