SULIT
4541/1
CHEMISTRY
Paper 1
2012
1 ¼ Jam

PEPERIKSAAN PERCUBAAN BERSAMA SIJIL PELAJARAN MALAYSIA 2012

ANJURAN
MAJLIS PENGETUA SEKOLAH MALAYSIA (MPSM)
CAWANGAN PERLIS

CHEMISTRY

KERTAS 1

Satu jam dan lima belas minit

JANGAN BUKA KERTAS SOALAN INI 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 26 halaman bercetak

1. The information of an element X is as follows:
Maklumat berikut adalah berkaitan dengan unsur *X :*

- Able to form complex ion
  Boleh membentuk ion kompleks
- Can be used as catalyst
  Boleh digunakan sebagai mangkin
- Has a various oxidation number
  Mempunyai pelbagai nombor pengoksidaan

Which of the following is element X?
Antara berikut yang manakah X?

A Argon
Argon
B Nickel
Nikel
C Chlorine
Klorin
D Potassium
Kalium

2. The mass of one atom X is four times heavier than one iron atom.
What is the relative atomic mass of X?
[Relative atomic mass: Fe = 56]

Jisim satu atom X empat kali lebih berat daripada satu atom besi.
Berapakah jisim atom relatif X?
[Jisim atom relatif : Fe = 56]

A 8
B 14
C 28
D 224

3. The following information is about the contribution of ascientist in the development of idea about atomic structure.
Maklumat berikut adalah mengenai sumbangan seorang ahli sains dalam perkembangan idea tentang struktur atom.

- Discovered the electrons
  Menemui elektron
- The atom was a sphere of positive charge embedded with electrons
  Atom adalah sfera bercas positif yang bertaburan dengan elektron.

Who was the scientist?
Siapakah ahli sains itu?

A Neils Bohr
B John Dalton
C J.J. Thompson
D Ernest Rutherford

4. What are the major components used in the making of lead crystal glass?
Apakah komponen utama untuk pembuatan kaca Kristal plumbum?

A Copper(II) oxide and lead(II) oxide
Kuprum(II)oksida dan plumbum(II)oksida
B Aluminium silicate and silicon dioxide
Aluminium silikat dan silicon dioksida
C Silicon dioxide and lead(II) oxide
Silikon dioksida dan plumbum(II)oksida
D Iron(III) oxide and boron oxide
Ferum(III)oksida dan boron oksida

5. Which process has the lowest rate of reaction?
Proses manakah yang mempunyai kadar tindak balas yang paling rendah?

A Combustion
Pembakaran

B Fermentation
Penapaian

C Neutralisation
Peneutralan

D Photosynthesis
Fotosintesis

6. Food flavouring substance contains ester.
Which of the following is a property of an ester?
Bahan perisa makanan mengandungi ester.
Antara berikut yang manakah sifat ester?

A Dissolves in water
Larut dalam air
B Low boiling point
Takat didih yang rendah
C More dense than water
Lebih tumpat daripada air
D Can conduct electricity
Boleh mengkonduksikan aras elektrik

7. Which of the following pH values is for strong acid solution?
Antara berikut yang manakah nilai pH bagi larutan asid kuat ?

A pH 14
B pH 11
C pH 5
D pH 1

8. Which of the following is insoluble salt?
Antara berikut yang *manakah garam terlarut*?

A Zinc chloride
Zink klorida
B Silver nitrate
Argentum nitrat
C Barium sulphate
Barium *sulfat*
D Potassium carbonate
Kalium karbonat

9. Which equation represents a redox reaction?
Persamaan manakah mewakili tindak balas redoks?

A $2Cu + O_2 \rightarrow 2CuO$
B $2H^+ + 2e \rightarrow H_2$
C $Zn \rightarrow Zn^{2+} + 2e$
D $NaOH + HCl \rightarrow NaOH + H_2O$

10. Diagram 1 shows an electrochemical cell.
Rajah 1 menunjukkan satu sel elektrokimia.

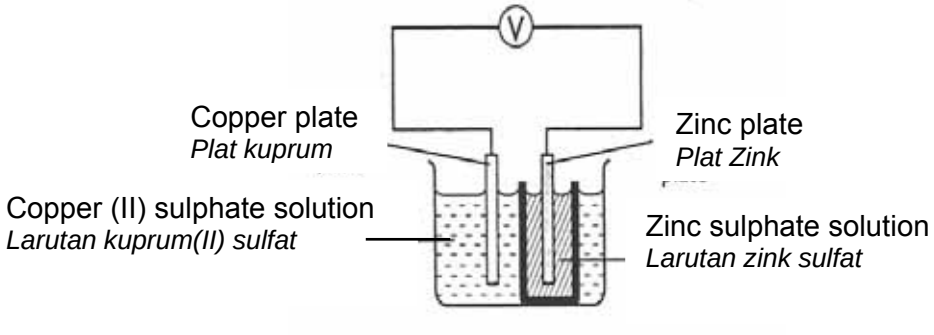


Diagram 1
Rajah1

What is the energy conversion involved?
Apakah perubahan tenaga yang terlibat?

A. Chemical energy → Heat energy
Tenaga kimia → Tenaga haba
B. Chemical energy → Electrical energy
Tenaga kimia → Tenaga elektrik
C Electrical energy → Heat energy
Tenaga elektrik → Tenaga haba
D. Electrical energy → Chemical energy
Tenaga elektrik → Tenaga kimia

11 Table 1 shows the electron arrangements of four elements, P, Q, R and S .
Jadual 1 menunjukkan susunan electron bagi empat unsur P, Q, R, dan S.

Element ***Unsur***	**Electron arrangement** ***Susunan elektron***
P	2.3
Q	2.4
R	2.6
S	2.8.1

Table 1
Jadual 1

Which pair of elements will react to form a covalent compound?
Pasangan unsur manakah akan menghasilkan sebatian kovalen?

A R and S
R dan S
B P and R
P dan R
C P and Q
P dan Q
D R and Q
R dan Q

12. Which substance is used as flavourings?
Bahan manakah yang digunakan sebagai perisa?

A Sodium nitrite
Natrium nitrit
B Azo compounds
Sebatian azo
C Ascorbic asid
Asid askorbik
D Monosodium glutamate
Mononatrium glutamate

13 The following chemical equation represents a reaction between magnesium oxide and sulphuric acid.
Persamaan kimia berikut mewakili tindak balas antara magnesium oksida dan asid sulfurik.

$$\mathbf{MgO + H_2SO_4 \rightarrow MgSO_4 + H_2O}$$

What is the mass of magnesium sulphate formed when 4.0 g of magnesium oxide is reacted with excess sulphuric acid?

Apakah jisim magnesium sulfat yang terbentuk apabila 4.0 g magnesium oksida bertindak balas dengan asid sulfurik berlebihan?

(Relative atomic mass: Mg, 24; O, 16; H,1; S, 32)
(*Jisim atom relatif*: Mg, 24; O, 16; H,1; S, 32)

A 7.2 g
B 12.0 g
C 19.2 g
D 24.0 g

14 The boiling point of substance X is 78°C and its melting point is -5°C. What is the physical state of substance X at -8°C and 80°C?

Takat didih bahan X ialah 78^{0}C dan takat leburnya ialah -5^{0}C. Apakah keadaan fizikal bahan X pada suhu -8^{0}C dan 80^{0}C?

	At -8°C	At 80°C
A	Solid *Pepejal*	Gas *Gas*
B	Solid *Pepejal*	Liquid *Cecair*
C	Liquid *Cecair*	Gas *Gas*
D	Liquid *Cecair*	Liquid *Cecair*

15 Table 2 shows elements M, Q and R placed in Period 3 of the Periodic Table.
Jadual 2 menunjukkan unsur P,Q dan R yang berada dalam kala 3 Jadual berkala.

Elements *Unsur*	**Properties of oxide** *Sifat oksida*
M	Amphoteric *Amfoterik*
Q	Base *Bes*
R	Acidic *Asid*

Table 2
Jadual 2

Choose the correct sequence based on the increase in the atomic size.
Pilih susunan yang betul berdasarkan pertambahan saiz atom.

A R,M,Q
B M,Q,R
C Q,M,R
D R,Q,M

16. Which of the following statements is true about weak acid?
Antara pernyaataan berikut, yang manakah benar tentang asid lemah?

I Has a lower pH value
Mempunyai nilai pH yang rendah

II Exist as molecules in water
Wujud sebagai molekul dalam air

III Ionizes partialy in water
Mengion separa lengkap dalam air

IV Has a low concentration of hydrogen ions
Mempunyai kepekatan ion hydrogen yang tinggi

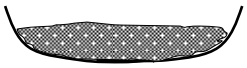
A I and II only
I dan II sahaja

B II and III only
I dan III sahaja

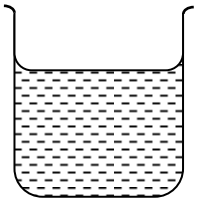
C I and IV
I dan IV sahaja

D III and I V only
III dan IV sahaja

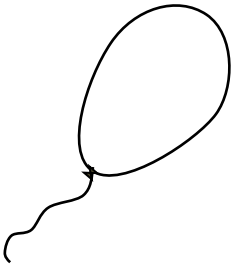
17 . Diagram 2 shows three types of substances
Rajah 2 menunjukkan tiga jenis bahan.



1 mole of copper(II) carbonate
1 mol kuprum(II) karbonat



2 mole of water
2 mol air



3 mole of hydrogen gas
3 mol gas hidrogen

Diagram 2
Rajah 2

Which of the following is true about the substances in Diagram 2?
Antara berikut, yang manakah benar tentang bahan-bahan pada Rajah 2 ?

A. The number of atoms in hydrogen gas is 3 x 6.02 x 10^{23}
Bilangan atom dalam gas hydrogen adalah sebanyak 3 x 6.02 x 10^{23}

B. All the substances have only 6.02 x 10^{23} particles.
Semua bahan itu hanya mempunyai sebanyak 6.02 x 10 23 zarah.

C. The number of molecules in water is more than in hydrogen gas molecules.
Billangan molekul dalam air adalah lebih daripada bilangan molekul dalam gas hidrogen.

D. The number of atoms in water is the same as in the hydrogen gas.
Bilangan atom dalam air adalah sama seperti dalam gas hydrogen

18. Which property is true about covalent compound?
Sifat manakah yang benar tentang sebatian ion?

A Can conduct electricity
Boleh mengkonduksi elektrik

B Soluble in organic solvent
Larut dalam pelarut organik

C Exists as solid at room temperature
Wujud sebagai pepejal pada suhu bilik

D Particles held together by strong electrostatic forces
Zarah-zarah ditarik bersama oleh daya tarikan elektrostatik

19 Diagram 3 shows a helmet that is made of substance X.
Rajah 3 menunjukkan topi keledar yang diperbuat daripada bahan X

Diagram 3
Rajah 3

Which of the following is substance X?
Antara berikut yang manakah bahan X?

A Fibre glass
Gentian kaca
B Fibre optic
Gentian optik
C Superconductor
Superkonduktor
D Photochromic glass
Kaca fotokromik

20. Which of the following is the composition of bronze?
Antara berikut manakah komposisi bagi gangsa ?

A. Copper and tin
Kuprum dan timah

B Copper and zinc
Kuprum dan zink

C Iron and carbon
Ferum dan karbon

D Aluminium and magnesium
Aluminium dan magnesium

21. Which halogens exist as gas at room temperature and pressure?
Halogen manakah yang wujud sebagai gas pada suhu dan tekanan bilik?

A Chlorine and bromine
Klorin dan bromin
B Chlorine and iodine
Klorin dan iodin
C Fluorine and chlorine
Florin dan Klorin
D Bromine and iodine
Bromin dan iodin

22. Which cation is present in molten lead(II) iodide?
Kation manakah yang terdapat dalam leburan plumbum(II) iodida?

A H^+
B I^-
C Pb^{2+}
D OH^-

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

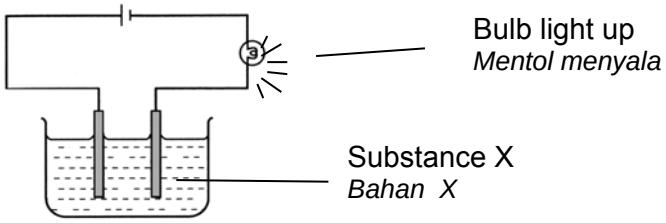


Diagram 4
Rajah 4

Which of the following is substance X?
Manakah berikut merupakan bahan X?

A Ethene, C_2H_4
Etena, C_2H_4
B Chloromethane, CH_3Cl
Klorometana, CH_3Cl
C Sodium chloride solution, NaCl
Natrium klorida, NaCl
D Ethyl ethanoate, $CH_3COOC_2H_5$
Etil etanoat, $CH_3COOC_2H_5$

24 Which of the following food additives is an antioxidant?
Antara bahan tambah makanan berikut yang manakah adalah pengantioksida?

A Benzoic acid
Asid benzoik
B Ascorbic acid
Asid askorbik
C Sodium nitrate
Natrium nitrat
D Ethyl ethanoate
Etil etanoat

25 Phosphorus is placed in Group 15 in the periodic table of elements.
Which of the following element has the same chemical properties as phosphorus?

Fosforus berada di dalam Kumpulan 15 jadual berkala unsur.
Antara unsur berikut yang manakah mempunyai sifat kimia fosforus?

A Sulphur which has electron arrangement of 2.8.6
Sulfur yang mempunyai susunan elektron 2.8.6

B Nitrogen which has the proton number of 7
Nitrogen yang mempunyai nombor proton 7

C Boron which has the electron arrangement of 2.3.
Boron yang mempunyai susunan elektron 2.3

D Fluorine which has proton number of 9.
Flourin yang mempunyai nombor proton 9

26 The following equation represents neutralisation reaction.

Acid + Base ⟶ Salt + Water

Persamaan berikut mewakili tindak balas peneutralan.

Asid + Bes ⟶ Garam + Air

Which pairs of reactants produce neutralization reaction?
Antara pasangan bahan tindak balas berikut, yang manakah merupakan tindak balas peneutralan?

A Sulphuric acid and calcium nitrate
Acid sulfurik dan kalsium nitrat

B Sulphuric acid and calcium oxide
Asid sulfurik dan kalsium oksida

C Hydrochloric acid and sodium chloride
Asid hidroklorik dan natrium klorida

D Hydrochloric acid and sodium sulphate
Asid hidroklorik dan natrium sulfat

27. Diagram 5 shows the energy level diagram.
Rajah 5 menunjukkan gambar rajah aras tenaga.

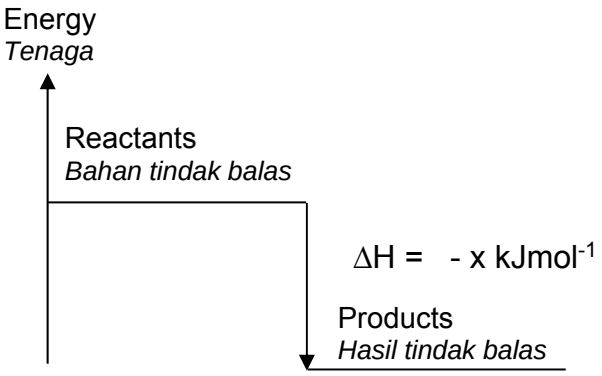


Diagram 5
Rajah 5

Which of the following is true?
Antara berikut yang manakah benar?

A The reaction is exothermic.
Tindak balas adalah eksotermik.

B The reaction is endothermic.
Tindak balas adalah endotermik.

C The temperature of the mixture decreases.
Suhu campuran menurun.

D The heat energy is absorbed from surrounding.
Tenaga haba diserap dari persekitaran.

28. The symbol of boron atom can be written as $^{11}_{5}B$.
The nucleus of this boron atom contains

Simbol bagi atom boron boleh ditulis sebagai $^{11}_{5}B$.
Nukleus bagi atom boron mengandungi

A 5 protons and 6 neutrons
5 proton dan 6 neutron

B 5 neutrons and 6 protons
5 neutron dan 6 proton

C 5 protons and 6 electrons
5 proton dan 6 elektron

D 6 neutrons and 5 electrons
6 neutron dan 5 elektron

29. The following chemical equation represents a redox reaction.
Persamaan kimia berikut mewakili satu tindak balas redoks.

$$4Na + \longrightarrow O_2 \qquad 2Na_2O$$

Which statements is true?
Pernyataan manakah yang benar?

A Oxygen is oxidized
Oksigen teroksida

B Oxygen loses electron
Oksigen kehilangan elektron

C Sodium is an oxidising agent
Natrium menjadi agen pengoksidaan

D The oxidation number of sodium increases
Nombor pengoksidaan natrium bertambah

30. The formula for a carbonate ion is CO_3^{2-} and for a chloride ion is Cl^-
If the formula of the carbonate salt of X is XCO_3,
What is the formula of the chloride salt of X ?

Formula bagi ion karbonat ialah CO_3^{2-} dan ion klorida adalah Cl^- .
Jika formula garam karbonat bagi X ialah XCO_3, apakah formula garam klorida bagi X ?

A XCl

B X_2Cl

C XCl_2

D $X(Cl_2)_3$

31. Diagram 6 shows the electron arrangement of two atoms X and Z respectively.
Rajah 6 menunjukkan susunan electron bagi dua atom X dan Z masing-masing.

Which of the following diagrams show the electron arrangement of the compound formed when atom X reacts with atom Z?
Antara rajah berikut , yang manakah menunjukkan susunan elektron bagi sebatian yang terhasil apabila atom X bertindak balas dengan atom Z?

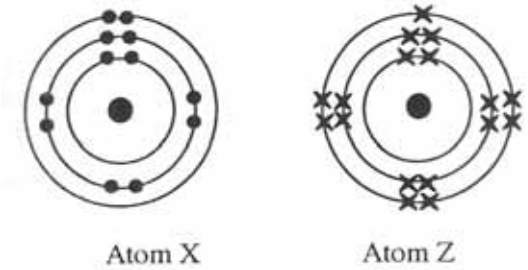
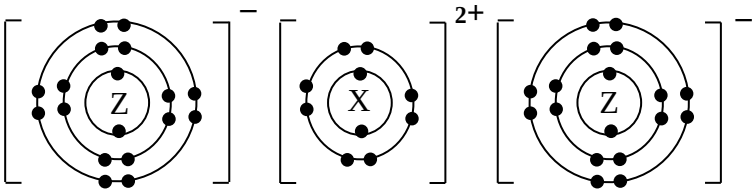
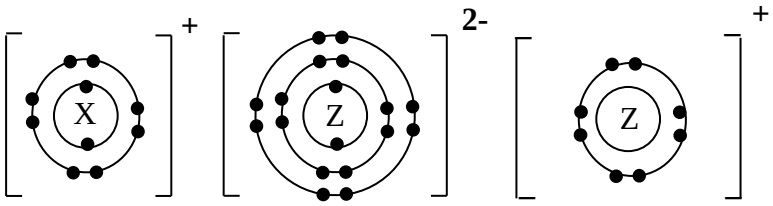
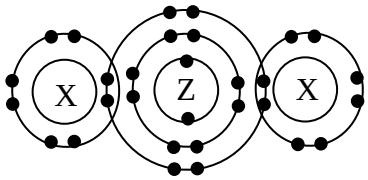
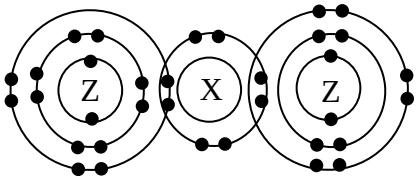


Diagram 6
Rajah 6

A 

B 

C 

D 

32. Diagram 7 shows the apparatus set-up involves in the preparation of a soluble salt.
Rajah 7 menunjukkan susunan radas dalam penyedian suatu garam larut.

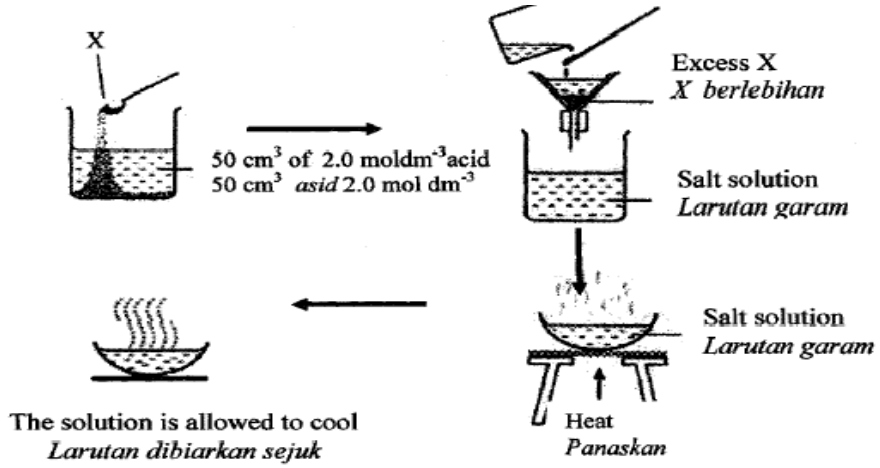


Diagram 7
Rajah 7

Which of the following could be X ?
Antara berikut yang manakah mungkin X ?

A Sodium carbonate
Natrium karbonat

B Potassium carbonate
Kalium karbonat

C Magnesium carbonate
Magnesium karbonat

D Ammonium carbonate
Ammonium karbonat

33. Which of the following is an endothermic reaction?
Antara berikut yang manakah merupakan satu tindak balas endotermik?

A Reaction between sodium hydrogen carbonate and dilute acid.
Tindak balas antara natrium hydrogen karbonat dengan asid cair.

B Reaction between reactive metal with dilute acid.
Tindak balas antara logam reaktif dengan asid cair.

C Reaction between Group 1 element with water.
Tindak balas antara ahli Kumpulan 1 dengan air.

D Reaction between acid and alkali.
Tindak balas antara asid dan alkali.

34 Diagram 8 shows the set-up of apparatus of a redox reaction.
Rajah 8 menunjukkan susunan radas bagi tindak balas redoks.

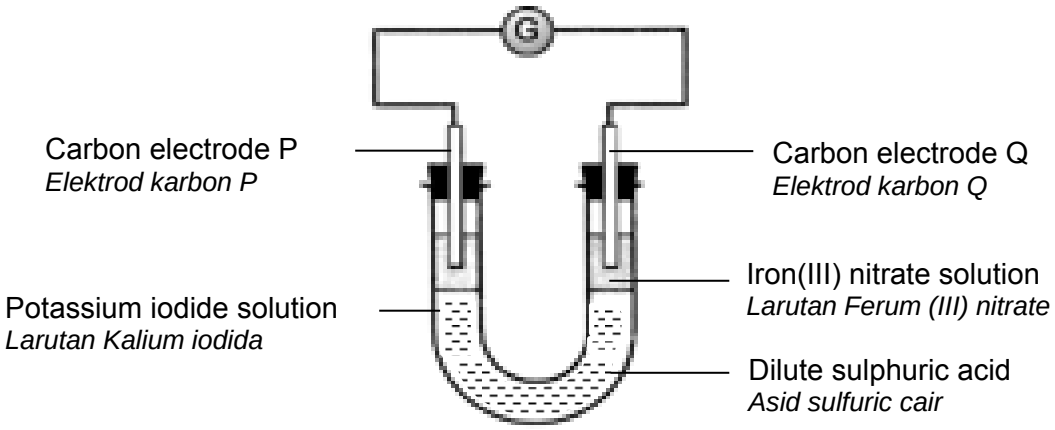


Diagram 8
Rajah 8

The colour of iron(III) nitrate solution changes from brown to green.
Warna larutan ferum(III) nitrat didapati berubah daripada perang ke hijau.

Which of the following is true about the reaction?
Antara berikut manakah benar tentang tindak balas itu?

A Iodide ions act as a reducing agent
Ion iodida menjadi agen penurunan

B Iron(III) nitrate solution donate electrons
Larutan ferum(III) nitrat menderma electron

C Electrons flow from electrode Q to P
Elektron bergerak dari elektrod Q ke P

D Sulphuric acid enables the flowing of electrons
Asid sulfurik membenarkan pergerakan elaetron

35. The following information shows the properties of organic compound X.
Maklumat berikut menunjukkan sifat-sifat bahan organik X.

- Release a gas which turns lime water chalky when it is added with calcium carbonate.
Membebaskan gas yang mengeruhkan air kapur apabila dicampurkan dengan kalsium karbonat.
- Produces a substance which has sweet smell when it is reacted with an alcohol.
Menghasilkan bahan yang berbau wangi apabila ditindakbalaskan dengan suatu alkohol.

Which substance is X?
Bahan yang manakah adalah X?

A Ethene
Etena
B Ethanol
Etanol
C Ethanoic acid
Asid etanoik
D Ethyl ethanoate
Etil etanoat

36 The Information shows the properties of organic compound R.
Maklumat berikut menunjukkan sifat-sifat bahan organik R.

- Decolourised reddish brown bromine
Menyahwarnakan warna perang air bromin
- 3 mole of carbon dioxide is produced when 1 mole of R is completely burnt in excess oxygen
Pembakaran 1 mol sebatian R dalam gas oksigen berlebihan menghasilkan 3 mol gas karbon dioksida

Which of the following is the formula of R?
Antara berikut, yang manakah formula molekul bagi R?

A C_2H_4
B C_2H_6
C C_3H_6
D C_3H_8

37. Diagram 9 shows a factory which produces sulphuric acid. Gas X released from factory causes air pollution.
Rajah 9 menunjukkan sebuah kilang yang menghasilkan asid sulfurik. Gas X yang terbebas daripada kilang ini menyebabkan pencemaran udara.

Which of the following gases is the waste product from the production of sulphuric acid?
Antara gas berikut yang namakah bahan buangan dari pembuatan asid sulfurik.

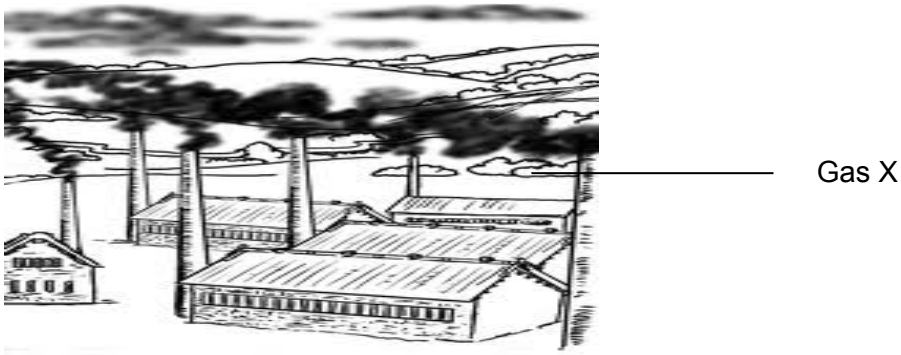


Diagram 9
Rajah 9

Which of the following is X?
Antara gas berikut yang manakah X?

A Sulphur dioxide
Sulfur dioksida

B Carbon monoxide
Karbon monoksida

C Nitrogen dioxide
Nitrogen dioksida

D Chloroflourocarbon
kloroflorokarbon

38. 25 cm^3 of 1.0 $moldm^{-3}$ potassium hydroxide solution is reacted with 25 cm^3 of 1.0 $moldm^{-3}$ hydrochloric acid solution.
25 cm^3 larutan kalium hidroksida, 1.0 $moldm^{-3}$ ditindakbalaskan dengan 25 cm^3 larutan asid hidroklorik, 1.0 $moldm^{-3}$.

Average initial temperature reading *Purata suhu awal*	= =	30.0 ^0C *30.0 ^0C*
Highest temperature reading *Suhu tertinggi campuran*	= =	36.5 ^0C *36.5 ^0C*

What is the heat of neutralization?
Berapakah haba peneutralan yang terhasil?

[Specific heat capacity of solution = 4.2 J g^{-1} $^0C^{-1}$, density of solution = 1 g cm^{-3}]
[Muatan haba tentu larutan = 4.2 J g^{-1} $^0C^{-1}$, ketumpatan larutan = 1 g cm^{-3}]

A - 27.3 kJ mol^{-1}
B +27.3 kJ mol^{-1}
C - 54.6 kJ mol^{-1}
D +54.6 kJ mol^{-1}

39. Which medicine is used to relief toothache?
Antara ubat berikut yang manakah dapat mengurangkan sakit gigi?

A Paracetamol
Parasetamol

B Streptomycin
Streptomisin

C Barbiturate
Barbiturat

D Quinine
Kuinin

40. Table 3 shows the total volume of carbon dioxide gas collected from the reaction between hydrochloric acid and excess marble chips.
Jadual 3 menunjukkan jumlah isipadu gas karbon dioksida yang terkumpul dalam tindak balas antara asid hidroklorik dengan ketulan marmar berlebihan.

Time(s) *Masa(s)*	0	30	60	90	120	150	180	210
Volume of carbon dioxide gas(cm^3) *Isipadu gas karbon dioksida(cm^3)*	0.00	15.00	27.50	35.00	40.50	44.00	44.00	44.00

Table 3
Jadual 3

What is the average rate of reaction in the second minute?
Berapakah kadar tindak balas purata dalam minit kedua?

A $0.17\ cm^3\ s^{-1}$
B $0.22\ cm^3\ s^{-1}$
C $0.34\ cm^3\ s^{-1}$
D $0.45\ cm^3\ s^{-1}$

41. The chemical formula of potassium hexacyanoferrate (III) is $K_3Fe(CN)_6$.
What is the percentage of carbon atom in the molecule?

Formula molekul kalium heksasianoferrate(III) ialah $K_3Fe(CN)_6$.
Berapakah peratus karbon di dalam molekulnya?

[Relative atomic mass : C;12,N;14,K;39,Fe;56]
[Jisim atom relatif : C;12,N;14,K;39,Fe;56]

A. 5.47%

B. 10.94%

C. 16.41%

D. 21.88%

42. The chemical equation shows the decomposition of a copper(II) nitrate salt.
Persamaan kimia berikut menunjukkan penguraian garam kuprum(II) nitrat.

$$2Cu(NO_3)_2 \longrightarrow 2CuO + 4NO_2 + O_2$$

What is the volume of nitrogen dioxide, NO_2 gas at room condition if 0.2 mol of $Cu(NO_3)_2$ salt is heated.
[Molar volume = 24 dm^3 mol^{-1} at room conditions]

Hitung isipadu gas nitrogen dioksida, NO_2 pada keadaan bilik jika 0.2 mol garam $Cu(NO_3)_2$ dipanaskan?
[Isipadu molar = 24 dm^3 mol^{-1} pada suhu bilik]

A 1.2 dm^3
B 2.4 dm^3
C 4.8 dm^3
D 9.6 dm^3

43. Diagram 10 shows curve X which obtained when 4 g of granulated zinc (in excess) is reacted with 50 cm^3 of 1.0 mol dm^{-3} hydrochloric acid.

Rajah 10 menunjukkan lengkung X yang diperolehi apabila 4g ketulan zinc (berlebihan) bertindak balas dengan 50 cm^3 asid hidroklorik 1.0 mol dm^{-3}.

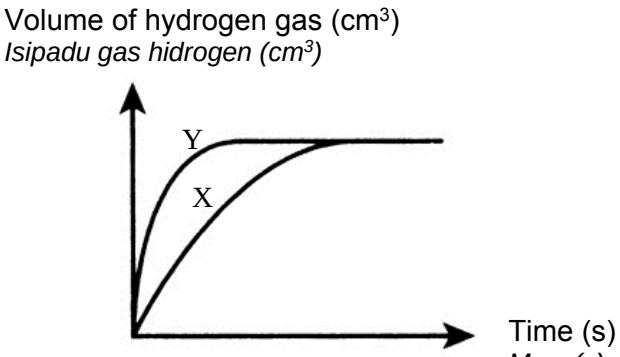
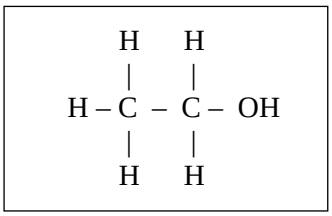


Diagram 10
Rajah 10

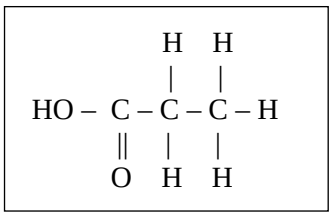
Which of the following reactions produces curve Y?
Antara tindak balas berikut yang manakah menghasilkan lengkung Y?

A 4 g zinc powder + 50 cm^3 of 2 mol dm^{-3} hydrochloric acid
4 g serbuk zink + 50 cm^3 of 2 mol dm^{-3} hidroklorik asid
B 4 g zinc powder + 50 cm^3 of 1 mol dm^{-3} of hydrochloric acid
4 g serbuk zink + 50 cm^3 of 1 mol dm^{-3} hidroklorik asid
C 4 g granulated zinc + 100 cm^3 of 1 mol dm^{-3} of hydrochloric acid
4 g ketulan zink + 100 cm^3 of 1 mol dm^{-3} hidroklorik asid
D 4 g granulated zinc + 50 cm^3 of 2 mol dm^{-3} of hydrochloric acid
4 g ketulan zink + 50 cm^3 of 2 mol dm^{-3} hidroklorik asid

44. Diagram 11 shows the structural formulae which represent organic compounds P and Q.
Rajah 11 menunjukkan formula struktur yang mewakili sebatian organik P dan Q.



P



Q

Diagram 11
Rajah 11

What is the name of the compound formed when P reacts with Q using concentrated sulphuric acid as a catalyst?
Apakah nama sebatian yang terhasil apabila P bertindak balas dengan Q dengan menggunakan acid sulfurik sebagai mangkin ?

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

45. Diagram 12 shows the structure of polymer.
Rajah 12 menunjukkan struktur suatu polimer.

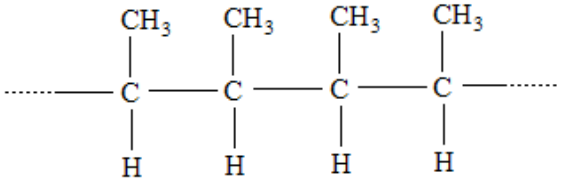


Diagram 12
Rajah 12

Which of the following is the correct monomer?
Antara berikut yang manakah monomer yang betul?

A $CH_2 = CH_2$
B $CH_3 = CH_3$
C $CH_2=CHCH_3$
D $CH_3CH=CHCH_3$

46. Which of the following is a redox reaction?
Antara tindak balas berikut yang manakah merupakan tindak balas redoks?

A Displacement reaction
Tindak balas penyesaran

B Neutralisation reaction
Tindak balas peneutralan

C Precipitation reaction
Tindak balas pemendakan

D Substitution reaction
Tindak balas penukargantian

47. Table 4 shows information about three chemical cells.
Jadual 4 menunjukkan maklumat tentang tiga sel kimia.

Pair of metal ***Pasangan logam***	**Potential difference/V** ***Beza upaya/V***	**Positive terminal** ***Terminal positif***
R and copper *R dan kuprum*	0.45	Cu
S and copper *S dan kuprum*	1.30	Cu
T and copper *T dan kuprum*	0.56	T

Table 4
Jadual 4

Based on the information in Table 4,
Berdasarkan maklumat dalam Jadual 4,

What is the potential difference of the pair of metals S and R?
Apakah beza upaya antara pasangan logam S dan R?

A 0.74 V
B 0.85 V
C 1.01 V
D 0.86 V

48. Which solution shows the lowest pH value?
Larutan manakah menunjukkan nilai pH terendah?

A 0.5 mol dm^{-3} nitric acid
0.5 mol dm^{-3} asid nitric

B 0.5 mol dm^{-3} ethanoic acid .
0.5 mol dm^{-3} asid etanoik .

C 0.5 mol dm^{-3} sulphuric acid
0.5 mol dm^{-3} acid sulfurik

D 0.5 mol dm^{-3} hydrocloric acid
0.5 mol dm^{-3} asid hidroklorik

49. What is the meaning of '*heat of displacement*' ?
Apakah yang dimaksudkan dengan 'haba penyesaran'?

A. Heat change when metal is displaced from its solution by a more electropositive metal.
Perubahan haba apabila logam disingkirkan dari larutannya oleh suatu logam yang lebih elektropositif.

B. Heat change when metal is displaced from its solution by a less electropositive metal.
Perubahan haba apabila logam disingkirkan dari larutannya oleh suatu logam yang kurang elektropositif.

C. Heat change when 1 mol of metal is displaced from its solution by a more electropositive metal.
Perubahan haba apabila 1 mol logam disingkirkan dari larutannya oleh suatu logam yang lebih elektropositif.

D. Heat change when 1 mol of metal is displaced from its solution by a less electropositive metal.
Perubahan haba apabila1 mol logam disingkirkan dari larutannya oleh suatu logam yang kurang elektropositif.

50 Diagram 13 shows the structural formula for a cleaning agent.
Rajah 13 menunjukkan formula stuktur bagi sejenis agen pencuci.

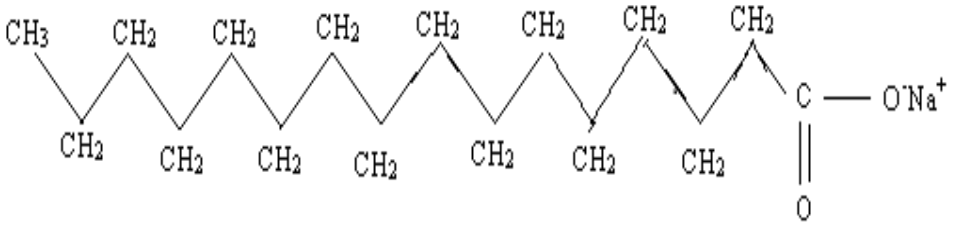


Diagram 13
Rajah 13

Which of the following will occur when this cleaning agent reacts with hard water?
Antara berikut yang manakah akan berlaku apabila agen pencuci ini bertindak balas dengan air liat?

A. The water becomes soft
Air menjadi lembut

B. Scum will form
Kekat terbentuk

C. More bubbles will produced
Lebih banyak buih dihasilkan

D. Grease will removed easily
Gris mudah ditanggalkan

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of **50** questions.
*Kertas soalan ini mengandungi **50** soalan.*

2. Answer **all** questions.
*Jawab **semua** soalan.*

3. Each question is followed by four alternative answers, **A, B, C** or **D**. For each question, choose **one** answer only. Blacken your answer on the objective answer sheet provided.
*Tiap-tiap soalan diikuti oleh empat pilihan jawapan, iaitu **A, B, C** dan **D**. Bagi setiap soalan, pilih **satu** jawapan sahaja. Hitamkan jawapan anda pada kertas jawapan objektif yang disediakan.*

4. If you wish to change your answer, erase the blackened mark that you have made. Then blacken the new answer.
Jika anda hendak menukar jawapan, padamkan tanda yang telah dibuat. Kemudian hitamkan jawapan yang baru.

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

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

4541/2
Chemistry
Kertas 2
2012
2 $\frac{1}{2}$ jam

NAMA : .....

NO. KAD PENGENALAN :

PEPERIKSAAN PERCUBAAN BERSAMA SIJIL PELAJARAN MALAYSIA 2012

ANJURAN
MAJLIS PENGETUA SEKOLAH-SEKOLAH MALAYSIA (MPSM) CAWANGAN NEGERI PERLIS

CHEMISTRY

Kertas 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan* **nombor kad pengenalan** *dan* **nama** *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 dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Melayu atau bahasa Inggeris.*
5. *Calon dikehendaki membaca maklumat di halaman 25*

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

Kertas soalan ini mengandungi 28 halaman bercetak

Section A
Bahagian A
[60 Marks]
[60 Markah]
Answer all questions in this section.
Jawab semua soalan dalam bahagian ini.

1 Diagram 1 shows the apparatus set-up for preparing soap.
Rajah 1 menunjukkan susunan radas untuk menyediakan sabun.

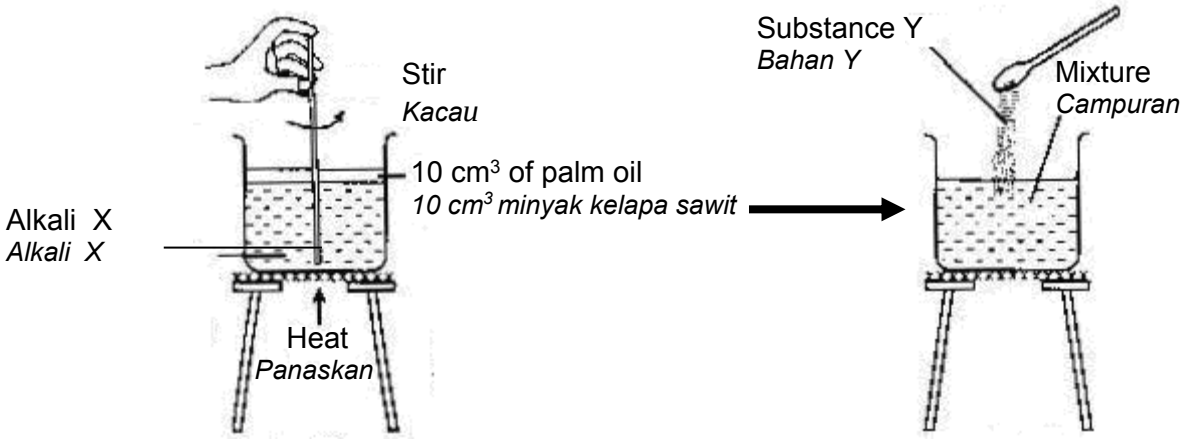


Diagram 1.1
Rajah 1.1

(a) Name the process.
Namakan proses itu.

……
[1 mark]
[1 markah]

(b) A student wants to prepare sodium palmitate soap.
Name alkali X used in step 1
Seorang pelajar ingin menyediakan sabun kalium palmitat.
Namakan alkali X yang digunakan dalam langkah 1.

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

(c) (i) Substance Y is added in the mixture in step 2.
Name substance Y
Bahan Y dimasukkan kedalam campuran dalam langkah 2
Namakan bahan Y.

……
[1 mark]
[1 markah]

(ii) State why substance Y is added to the mixture.
Nyatakan mengapa bahan Y ditambah kepada campuran itu.

……..

[1 mark]
[1 markah]

(d) Diagram 1.2 shows the structure of the anion of a soap molecule.
Rajah 1.2 menunjukkan struktur anion molekul sabun.

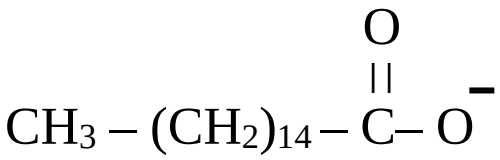


Diagram 1.2
Rajah 1.2

(i) Circle the hydrophilic part, in Diagram 1.2
Bulatkan bahagian hidrofilik, dalam Rajah 1.2.

[1 mark]
[1 markah]

(ii) Which part is soluble in grease?
Bahagian manakah boleh larut dalam gris?

……

[1 mark]
[1 markah]

(iii) Clothes becomes clean and does not form scum when wash with soap. Mark (√) in the box in Table 1.3 to the correct type of water used.
Pakaian menjadi bersih dan tidak membentuk kekat apabila dicuci dengan sabun. Tandakan (√) dalam kotak dalam Jadual 1.3 untuk menunjukkan jenis air yang digunakan.

Hard water *Air liat*	Soft water *Air lembut*

Table 1.3
Jadual 1.3

[1 mark]
[1 markah

(e) Table 1.4 shows the functions of two types of food additives
Jadual 1.4 menunjukkan fungsi bagi dua jenis bahan tambah makanan.

Function ***Fungsi***	**Type of Food Additives** ***Jenis Bahan Tambah Makanan***
To prevent growth of microorganism. *Menghalang pertumbuhan mikroorganisma.*	P: .....
To prevent oxidation that causes rancid fats and brown food. *Menghalang pengoksidaan yang menyebabkan lemak tengik dan makanan berwarna perang.*	Q: .....

Table 1.4
Jadual 1.4

Complete the Table 1.4
Lengkapkan Jadual 1.4

[2 marks]
[2 markah]

2.

(a) Diagram 2 shows the standard representation of two isotopes of chlorine atoms.
Rajah 2 menunjukkan perwakilan atom bagi dua isotop atom klorin.

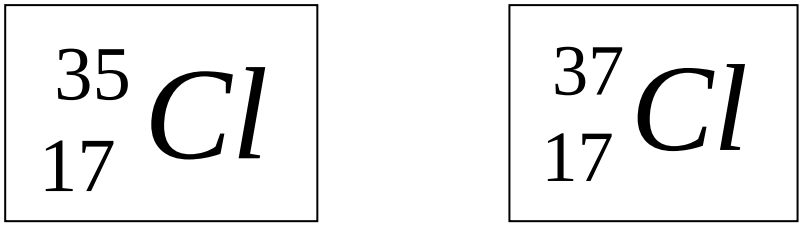


Diagram 2
Rajah 2

(i) Based on Diagram 2, state the meaning of isotope.
Berdasarkan Rajah 2, nyatakan maksud isotop.

.....

.....

[2 marks]
[2 markah]

(ii) Determine the number of neutrons in
Tentukan bilangan neutron dalam

$^{35}_{17}Cl$:.....

$^{37}_{17}Cl$:.....

[2 marks]
[2 markah]

(iii) State one of the uses of chlorine in our daily lives.
Nyatakan satu kegunaan klorin dalam kehidupan seharian.

.....

[1 mark]
[1 markah]

(b) X is a substance that has melting point of 43°C and boiling point of 89°C.
X adalah satu bahan yang mempunyai takat lebur 43 ^{0}C dan takat didih 89 ^{0}C.

(i) Sketch a graph of temperature against time when substance X is heated from 30 ^{0}C to 80 ^{0}C.
Lakarkan graf suhu melawan masa apabila bahan X dipanaskan daripada 30 ^{0}C hingga 80 ^{0}C.

[2 marks]
[2 markah]

(ii) Explain the arrangement of particles in substance X at :
Terangkan susunan zarah dalam bahan X pada :

30 ^{0}C :
……

……

80 ^{0}C :
……

……
[2 marks]
[2 markah]

3 Nitric acid is a strong acid and ethanoic acid is a weak acid. Table 3 shows the concentration of each acid solution.
Asid nitrik adalah asid kuat dan asid etanoik adalah asid lemah. Jadual 3 menunjukkan kepekatan setiap larutan asid..

Acid *Asid*	Concentration (mol dm^{-3}) *Kepekatan (mol dm^{-3})*
Nitric acid solution *Larutan asid nitrik*	0.10
Ethanoic acid solution *Larutan asid etanoik*	0.10

Table 3
Jadual 3

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

.....

[1 mark]
[1 markah]

(b) Give a name of another strong acid.
Berikan satu nama asid kuat yang lain.

.....

[1 mark]
[1 markah]

(c) Nitric acid solution and ethanoic acid solution in Table 3 have different pH values.
Larutan asid nitrik dan larutan asid etanoik dalam Jadual 3 mempunyai nilai pH yang berbeza.

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

.....

[1 mark]
[1 markah]

(ii) Give one reason for the answer in 3(c)(i).
Beri satu sebab bagi jawapan di 3(c)(i).

.....

[1 mark]
[1 markah]

(d) 30 cm^3 of 0.1 mol dm^{-3} potassium hydroxide solution is poured in a conical flask. Then a few drops of phenolphthalein indicator solution are added. The solution is titrated with nitric acid solution in Table 3.
30 cm^3 larutan kalium hidroksida 0.1 mol dm^{-3} dimasukkan ke dalam kelalang kon. Kemudian beberapa titis larutan penunjuk fenolftalein ditambah. Larutan ini dititratkan dengan larutan asid nitrik dalam Jadual 3.

(i) State the type of reaction between potassium hydroxide solution and nitric acid solution.
Nyatakan jenis tindak balas antara larutan kalium hidroksida dengan larutan asid nitrik.

.....

[1 mark]
[1 markah]

(ii) What is the colour change of the mixture at the end point?
Apakah perubahan warna campuran itu pada takat akhir?

.....

[1 mark]
[1 markah]

(iii) Write the chemical equation for the reaction.
Tulis persamaan kimia bagi tindak balas itu.

.....

[2 marks]
[2 markah]

(iv) Calculate the volume of the nitric acid used.
Hitung isipadu asid hidroklorik yang digunakan.

[2 marks]
[2 markah]

4 A student carried out two experiments to investigate the effect of concentration of hydrochloric on the rate of reaction.. Table 4 shows the results of the experiments.

Seorang pelajar telah menjalankan dua eksperimen untuk menyiasat kesan kepekatan asid hidroklorik ke atas kadar sesuatu tindak balas. Jadual 4 menunjukkan keputusan eksperimen.

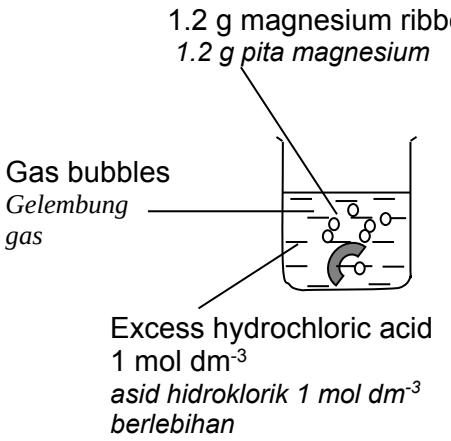
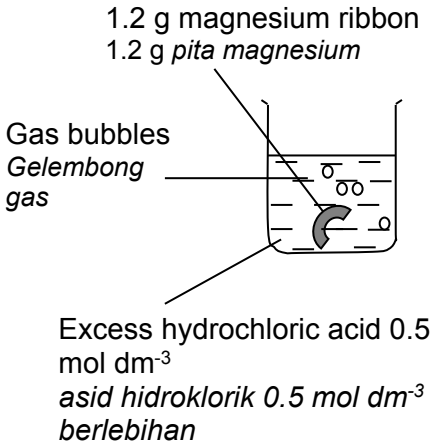
Experiment	**Diagram**	Time taken for all magnesium dissolve/s *Masa yang diambil untuk semua magnesium melarut/s*
I		**30**
II		**60**

Table 4
Jadual 4

(a) (i) Name the gas released in the experiment
Namakan gas yang terbebas dalam eksperimen ini

……

[1 *mark*]
[1 markah]

(ii) Write a chemical equation for the reaction between magnesium and hydrochloric acid.
Tulis persamaan kimia bagi tindak balas antara magnesium dengan asid hidroklorik.

……

[2 *marks*]
[2 markah]

(iii) Calculate the maximum volume of the gas released at room temperature in this experiment.
[Relative atomic mass : Mg,24;
Volume of 1 mole of gas at room temperature = 24 dm^3]
Hitung isipadu maksimum gas yang terbebas pada suhu bilik dalam eksperimen ini.
[Jisim atom relatif : Mg,24*;*
Isipadu 1mol gas pada suhu bilik = 24 dm^3 *]*

[3 *marks*]
[3 markah]

(b) Compare the rate of reaction between experiment I and experiment II.Explain.
Bandingkan kadar tindak balas antara eksperimen I dan eksperimen II. Terangkan

……

……

[2 marks]
[2 markah]

(c) State two other factors that can affect the rate of reaction in this eksperiment.
Nyatakan dua faktor lain yang boleh mempengaruhi kadar tindak balas dalam eksperimen ini.

……

……

[2 marks]
[2 markah]

5. Diagram 5 shows two types of electrochemical cells.
Rajah 5 menunjukkan dua jenis sel elektrokimia.

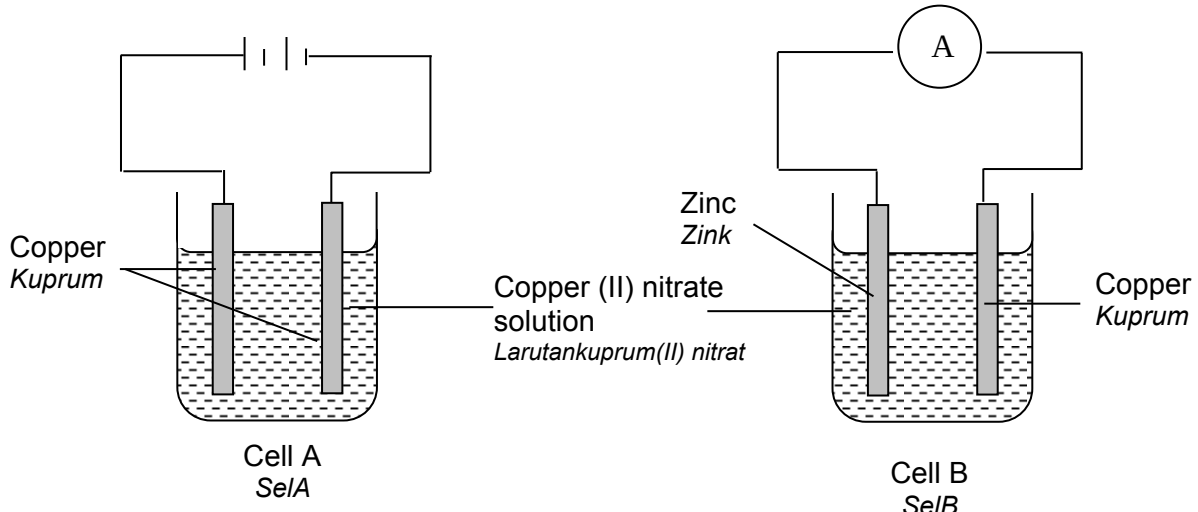


Diagram 5
Rajah 5

(a) State all the anion present in the copper(II) nitrate solution.
Nyatakan semua anion yang terdapat dalam larutan kuprum(II) nitrat.

……

[1 mark]
[1 markah]

(b) (i) Name the type of Cell A.
Namakan jenis Sel A.

……

[1 mark]
[1 markah]

(ii) State one use of Cell A in industry.
Nyatakan satu kegunaan Sel A di dalam industri.

……

[1mark]
[1 markah]

(c) (i) State the observation at the anode in Cell A.
Nyatakan pemerhatian pada anod dalam Sel A.

……

[1 mark]
[1 markah]

(ii) Based on the answer at (c)(i) write the half equation for the reaction occurs at anode in Cell A.
Berdasarkan jawapan pada(c)(i) tuliskan setengah persamaan bagi tindak balas yang berlaku di anode dalam Sel A.

……

[1 mark]
[1 markah]

(d) Name the product formed at the cathode if copper electrodes in Cell A are replaced by carbon electrodes.
Namakan hasil yang terbentuk di katod jika elektrod kuprum dalam Sel A diganti oleh elektrod karbon.

……

[1 mark]
[1 markah]

(e) Based on Cell B,
Berdasarkan Sel B,

(i) show the flow of electrons direction in Cell B.
tunjukkan arah pergerakan elektron dalam Sel B.

[1 mark]
[1 markah]

(ii) State the negative terminal and positive terminal.
Nyatakan terminal negatif dan terminal positif.

Negative terminal:
Terminal negatif :

.....

Positive terminal:
Terminal positif :

……

[2 marks]
[2 markah]

(f) State the colour change of copper(II) nitrate solution in Cell B.
Explain your answer.
Nyatakan perubahan warna larutan kuprum(II) nitrate dalam Sel B.
Terangkan jawapan anda.

.....

.....

.....

.....

[2 marks]
[2 markah]

6. The following information is about compound C_2H_4 .
Maklumat berikut adalah mengenai sebatian C_2H_4.

- Gas at room temperature
  Gas pada suhu bilik
- Undergoes combustion
  Menjalani pembakaran
- Member of a homologous series
  Ahli suatu siri homolog

(a) What is the name of this compound?
Apakah nama bagi sebatian ini?

.....

[1 mark]
[1 mark]

(b) State the general formula and the functional group for the homologous series of this compound.
Nyatakan formula am dan kumpulan berfungsi bagi siri homologous sebatian ini?

.....

[2 marks]
[2 mark]

(c) Compound C_2H_4 burns in excess oxygen. Write the chemical equation for this reaction. *Sebatian C_2H_4 terbakar dalam oksigen berlebihan.Tuliskan persamaan kimia bagi tindak balas ini.*

.....

[2 marks]
[2 mark]

(d) Ethanol undergoes dehydration to produce compound C_2H_4.
Etanol mengalami pendehidratan untuk menghasilkan sebatian C_2H_4.

(i) Name one dehydrating agent for this reaction.
Namakan satu agen pendehidartan bagi tindak balas ini.

.....

[1 mark]
[1 mark]

(ii) Draw the apparatus set-up diagram for thedehydration reaction that can be used to collect compound C_2H_4.
Lukiskan gambar rajah susunan radas untuk tindak balas pendehidratan yang boleh digunakan untuk mengumpul sebatian C_2H_4

[2 marks]
[2 mark]

(e) Table 6 shows the results of a test to differentiate between compound C_2H_4 and ethane.
Jadual 6 menunjukkan keputusan ujian untuk membezakan antara sebatian C_2H_4 dan etana.

Procedure *Prosedur*	Observations *Pemerhatian*
Compound C_2H_4 flow into bromine water *Sebatian C_2H_4 dialirkan kedalam air bromin*	Brown gas is decolourised *Warna perang dinyahwarnakan*
Ethane flow into bromine water *Etana dialirkan ke dalam air bromin*	Brown colour remains *Warna perang tidak berubah*

Table 6
Jadual 6

(i) Explain why there is a difference in this observations.
Terangkan mengapa terdapat perbezaan dalam pemerhatian

.....

[1 mark]
[1 mark]

(ii) Draw the structural formula of the compound formed when compound C_2H_4 is added into bromine water.
Lukis formula struktur bagi sebatian yang terbentuk apabila sebatian C_2H_4 dialirkan *ke dalam air bromin*

[1 mark]
[1 mark]

Section B
Bahagian B
[20 marks]
[20 markah]
Answer any **one** question.
*Jawab mana-mana **satu** soalan.*

7

(a) Table 7.1 shows the electron arrangements of atoms W, X and Y. These letters are not the actual symbols of the elements.
Jadual 7.1 *menunjukkan susunan elektron bagi atom* W, X *dan* Y. *Huruf-huruf ini bukanlah simbol sebenar bagi unsur-unsur tersebut.*

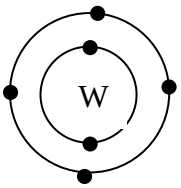
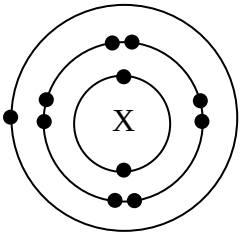
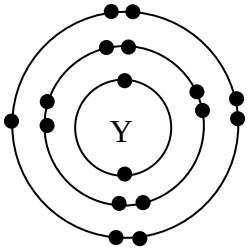
Element ***unsur***	**Electron arrangement** ***Susunan elektron***
W	
X	
Y	

Table 7.1
Jadual 7.1

Based on the table,

(i) State one element that is metal and one element that is non-metal.
Nyatakan satu unsur logam dan satu logam unsur bukan logam.

[2 marks]
[2 markah]

(ii) State the position of element W in the Periodic table of Element. Explain your answer.
Nyatakan kedudukan unsur W dalam Jadual Berkala Unsur. Jelaskan jawapan anda.

[3 marks]
[3 markah]

(ii) Compare the atomic size of element X and element Y. Explain your answer.
Bandingkan saiz atom unsur X dan unsur Y. Terangkan jawapan anda.

[4 marks]
[4 markah]

(b) A,D and E are placed in Period 3 of the Periodic Table of Elements.The oxides of these elements show different properties when react with nitric acid and sodium hydroxide solution. Table 7.2 shows the properties of the oxides of the elements.
Unsur-unsur A, D dan E berada dalam Kala 3 Jadual Berkala Unsur.Oksida-oksida unsur tersebut menunjukkan sifat yang berbeza apabila bertindak balas dengan asid nitric dan larutan natrium hidroksida. Jadual 7.2 menunjukkan sifat-sifat oksida bagi unsur-unsur tersebut.

Oxide *Oksida*	Observation *Pemerhatian*	
	Reaction with nitric acid *Tindak balas dengan asid nitrik*	Reaction with sodium hydroxide solution *Tindak balas dengan larutan natrium hidroksida*
Oxide of Element A Oksida unsur A	White solid dissolves to form colourless solution *Pepejal putih larut dan membentuk larutan tidak berwarna*	No change .White solid does not dissolve. *Tiada perubahan.Pepejal putih tidak larut*
Oxide of Element D *Oksida unsur D*	White solid dissolves to form colourless solution. *Pepejal putih larut dan membentuk larutan tidak berwarna*	White solid dissolves to form colourless solution *Pepejal putih larut dan membentuk larutan tidak berwarna*
Oxide of Element E *Oksida unsur E*	No change. White solid does not dissolve. *Tiada perubahan.Pepejal putih tidak larut*	White solid dissolves to form colourless solution. *Pepejal putih larut dan membentuk larutan tidak berwarna*

Table 7.2
Jadual 7.2

Based on table 7.2,
Berdasarkan Jadual 7.2,

(i) State the acid-base properties of the oxide of A , oxide of D and oxide of E.
Nyatakan sifat-sifat asid-bes bagi oksida A, oksida D dan oksida E. Terangkan.

[6 marks]
[6 markah]

(ii) Suggest the name of element A, element D and element E.
Cadangkan nama bagi unsur A, unsur D dan unsur E.

[3 marks]
[3 markah]

(iii) Write the chemical equation for the reaction between oxide of A and nitric acid

Tuliskan persamaan kimia bagi tindak balas antara oksida A dan asid nitrik.

[2 marks]
[2 markah]

8. Table 8 shows thermochemical equations of Experiment 1 and Experiment 2.
Jadual 8 menunjukkan persamaan termikimia bagi Eksperimen 1 dan Eksperimen 2.

Experiment ***Eksperimen***	**Thermochemical Equation** ***Persamaan Termokimia***
1	$NaOH + HCl \rightarrow NaCl + H_2O \quad \Delta H = -57.3\ kJmol^{-1}$
2	$NaOH + CH_3COOH \rightarrow CH_3COONa + H_2O \quad \Delta H = -51.5\ kJmol^{-1}$

Table 8
Jadual 8

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

(i) state the type of reaction.
nyatakan jenis tindak balas

[1 mark]
[1 markah]

(ii) state the differences between the total energy content of the reactants and the total energy content of products.
nyatakan perbezaan di antara kandungan tenaga bahan tindak balas dan kandungan tenaga hasil tindak balas.

[1 mark]
[1 markah]

(iii) Explain the difference of the heat of neutralization for the reactions above.
Jelaskan perbezaan haba peneutralan bagi tindak balas–tindak balas di atas.

[5 marks]
[5 markah]

(b) In Experiment 1, 50 cm^3 of 1.0 $moldm^{-3}$ sodium hydroxide solution is reacted with 50 cm^3 of 1.0 $moldm^{-3}$ of hydrochloric acid solution.
Di dalam Eksperimen 1, 50 cm^3 larutan natrium hidroksida, 1.0 $moldm^{-3}$ ditindak balaskan dengan 50 cm^3 larutan asid hidroklorik, 1.0 $moldm^{-3}$.

(i) Calculate the heat released in the reaction.
Kirakan haba yang terbebas dari tindak balas.

[3 marks]
[3 markah]

(ii) What is the temperature change of the reaction mixture?
[Specific heat capacity = 4.2 J $g^{-1}\,{}^0C^{-1}$, density of solution = 1 g cm^{-3}]
Berapakah perubahan suhu campuran tindak balas?
[Muatan haba tentu larutan = 4.2 J $g^{-1}\,{}^0C^{-1}$, ketumpatan larutan = 1 g cm^{-3}]

[3 marks]
[3 markah]

(iii) The heat of neutralisation obtained in laboratory is less than the actual heat of neutralisation. Explain.
Nilai haba peneutralan yang diperolehi di makmal adalah lebih rendah dari nilai haba peneutralan yang sebenar. Jelaskan.

[2 marks]
[2 markah]

(c) Diagram 8.2 shows two energy level diagrams of different reactions.
Rajah 8.2 menunjukkan dua gambar rajah aras tenaga bagi tindak balas berlainan.

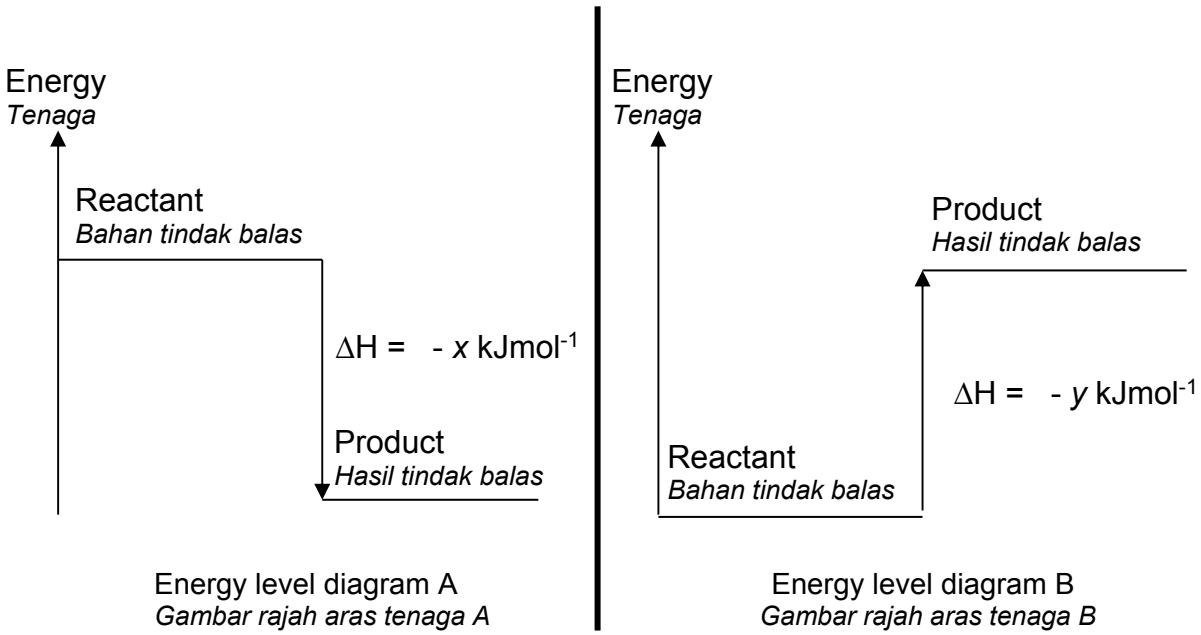


Diagram 8.2
Rajah 8.2

Based on Diagram 8.2, compare the energy level diagram A and energy level diagram B.
Berdasarkan Rajah 8.2, bandingkan gambar rajah aras tenaga A dan gambar rajah aras tenaga B.

[5 marks]
[5 markah]

Section C
Bahagian C
[20 marks]
[20 markah]
Answer any **one** question.
*Jawab mana-mana **satu** soalan.*

9

(a) Diagram 9 shows one of the stages involved in the Contact Process.
Rajah 9 menunjukkan salah satu peringkat dalam Proses Sentuh.

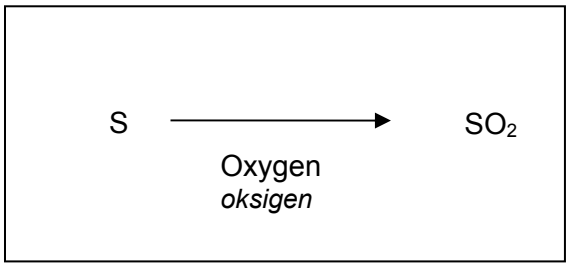


Diagram 9
Rajah 9

(i) Write the chemical equation for the reaction.
Tuliskan persamaan kimia bagi tindakbalas tersebut.

[2 marks]
[2 markah]

(ii)

Sulphur dioxide is the waste product from the Contact Process which affects the quality of the environment. *Sulfur dioksida adalah bahan buangan daripada Proses Sentuh yang menjejaskan kualiti alam sekitar.*

As a chemist, how do you advice the manager of the factory to reduce the release of sulphur dioxide gas. Explain.
Sebagai seorang ahli kimia, bagaimana anda menasihati pengurus kilang tersebut supaya pembebasan gas sulfur diksida dikurangkan. Terangkan.

[2 marks]
[2 markah]

(b) Table 9 shows three different manufactured substances in industry X, Y, and Z, and their uses.
Jadual 9 menunjukkan tiga bahan buatan industri X, Y, dan Z, yang berbeza dan kegunaanya.

Manufactured substances in industry *Bahan buatan industri*	Uses *Kegunaan*
X	To make internal wall of furnace *Untuk membuat lapisan dalam dinding relau*
Y	To make musical instruments *Umtuk membuat alat muzik*
Z	To make helmets and water storage tanks *Untuk membuat topi keledar dan tangki penyimpanan air*

Table 9
Jadual 9

Based on Table 9, state the name of X, Y and Z.
Give the specific properties of each of the substances to support your answers.
Berdasarkan Jadual 9, nyatakan nama bagi X, Y dan Z.
Berikan sifat khusus bagi setiap bahan tersebut untuk menyokong jawapan anda.

[6 marks]
[6 markah]

(c) The following information shows two properties of alloys.
Maklumat berikut menunjukkan dua sifat aloi.

- Alloy is harder than its pure metal
  Aloi lebih keras daripada logam tulennya
- Alloy is more corrosive resistant than its pure metal
  Aloi lebih tahan kakisan daripada logam tulennya

By choosing one of the properties of the alloy stated above, describe a laboratory experiment to compare alloy with its pure metal.

Your answer should include the following:

- Name of the alloy and its pure metal
- Materials and apparatus
- Procedure of the experiment
- Observation
- Conclusion

Dengan memilih satu daripada sifat aloi yang dinyatakan diatas, huraikan satu eksperimen makmal untuk membandingkan aloi dengan logam tulennya.

Jawapan anda perlu mengandungi perkara berikut:

- *Nama aloi dan logam tulennya*
- *Bahan dan radas*
- *Kaedah eksperimen*
- *Pemerhatian*
- *kesimpulan*

.

[10 marks]
[10 markah]

10

(a) 50 cm^3 of 0.2 mol dm^{-3} sulphuric acid reacts with excess copper(II) oxide to produce copper(II) sulphate and water..
50 cm^3 asid sulfurik 0.2 mol dm^{-3} bertindak balas dengan kuprum(II) oksida yang berlebihan menghasilkan kuprum(II) sulfat dan air.

(i) Write the chemical equation for the reaction that takes place.
Tuliskan persamaan kimia bagi tindak balas yang berlaku.

(ii) Calculate the mass of copper(II) sulphate that is produced
Hitungkan jisim kuprum(II) sulfat yang terhasil.
[Molar mass of copper(II) sulphate = 160 g mol^{-1}]
[Jisim molar kuprum(II) sulfat = 160 g mol^{-1}]

[4 *marks*]
[4 markah]

(b) The following are two examples of chloride salts that can be prepared in the laboratory.
Berikut adalah dua contoh garam klorida yang boleh disediakan di dalam makmal.

- Potassium Chloride, KCl
  Kalium klorida, KCl
- Silver chloride, AgCl
  Argentum klorida, AgCl

Compare and contrast between these two salts. Your comparison should include the following aspects:

- the solubility of each salt in water.
- the name of the chemical reaction for the preparation of each salt.
- the reactants for the preparation of each salt.
- the chemical equation for preparation of each salt.

Banding dan bezakan diantara dua garam ini. Perbandingan anda hendaklah mengandungi aspek-aspek berikut:

- keterlarutan setiap garam di dalam air.
- nama tindak balas kimia untuk penyediaan setiap garam.
- bahan tindak balas untuk penyediaan setiap garam.
- persamaan kimia untuk penyediaan setiap garam.

[6 marks]
[6 markah]

(c) Barium sulphate is insoluble in water. Describe the preparation of barium sulphate in the laboratory. In your description, include

- reactants
- procedure
- chemical equations involved

Barium sulfat adalah tak larut dalam air. Huraikan penyediaan barium sulfat dalam makmal. Dalam huraian anda, sertakan

- *bahan tindak balas*
- *prosedur*
- *persamaan kimia yang terlibat*

[10 *marks*]
[10 markah]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of three sections: **Section A**, **Section B** and **Section C.**

   Kertas soalan ini mengandungi tiga bahagian: ***Bahagian* A, *Bahagian* B** *dan* ***Bahagian* C.**

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

   Jawab **semua** *soalan dalam* ***Bahagian* A.** *Tuliskan jawapan bagi* ***Bahagian* A** *dalam ruang yang disediakan dalam kertas soalan*

3. Answer **one** question from **Section B** and **one** question from **Section C**.
   Write your answers for **Section B** and **Section C** on the `answer sheet' provided by the invigilators. Answer questions in **Section B** and **Section C** in detail. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answer.

   Jawab **satu** *soalan daripada* ***Bahagian* B** *dan* ***satu*** *soalan daripada* ***Bahagian* C**. *Tuliskan jawapan bagi* ***Bahagian* B** *dan* ***Bahagian* C** *pada kertas tulis yang dibekalkan oleh pengawas peperiksaan. Jawab* ***Bahagian* B** *dan* ***Bahagian* C** *dengan terperinci. Anda boleh menggunakan persamaan, gambar rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda*.

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

   Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan

5. Marks allocated for each question or sub-part of the question are shown in brackets.

   Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.

6. Show your working. It may help you to get marks.

   Tunjukkan kerja mengira.Ini membantu anda mendapatkan markah.

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

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

8. You may use a non-programmable scientific calculator.

   Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.

9. You are advised to spend 90 minutes to answer questions in **Section A**, 30 minutes for **Section B** and 30 minutes for **Section C**.

   Anda dicadangkan mengambil masa 90 minit untuk menjawab soalan dalam ***Bahagian* A**, 30 *minit untuk* ***Bahagian* B** *dan* 30 *minit untuk* ***Bahagian* C**.

10. Tie together your answer sheets at the end of the examination.
    *Ikat semua kertas jawapan anda di akhir peperiksaan***.**

THE PERIODIC TABLE OF ELEMENTS

1 H Hydrogen 1																	2 He Helium 4
3 Li Lithium 7	4 Be Beryllium 9											5 B Boron 11	6 C Carbon 12	7 N Nitrogen 14	8 O Oxygen 16	9 F Fluorine 19	10 Ne Neon 20
11 Na Sodium 23	12 Mg Magnesium 24											13 Al Aluminium 27	14 Si Silicon 28	15 P Phosphorus 31	16 S Sulphur 32	17 Cl Chlorine 35	18 Ar Argon 40
19 K Potassium 39	20 Ca Calcium 40	21 Sc Scandium 45	22 Ti Titanium 48	23 V Vanadium 51	24 Cr Chromium 52	25 Mn Manganese 55	26 Fe Iron 56	27 Co Cobalt 59	28 Ni Nickel 59	29 Cu Copper 64	30 Zn Zinc 65	31 Ga Gallium 70	32 Ge Germanium 73	33 As Arsenic 75	34 Se Selenium 79	35 Br Bromine 80	36 Kr Krypton 84
37 Rb Rubidium 86	38 Sr Strontium 88	39 Y Yttrium 89	40 Zr Zirconium 91	41 Nb Niobium 93	42 Mo Molybdenum 96	43 Tc Technetium 98	44 Ru Ruthenium 101	45 Rh Rhodium 103	46 Pd Palladium 106	47 Ag Silver 108	48 Cd Cadmium 112	49 In Indium 115	50 Sn Tin 119	51 Sb Antimony 122	52 Te Tellurium 128	53 I Iodine 127	54 Xe Xenon 131
55 Cs Cesium 133	56 Ba Barium 137	57 La Lanthanum 139	72 Hf Hafnium 179	73 Ta Tantalum 181	74 W Tungsten 184	75 Re Rhenium 186	76 Os Osmium 190	77 Ir Iridium 192	78 Pt Platinum 195	79 Au Gold 197	80 Hg Mercury 201	81 Tl Thallium 204	82 Pb Lead 207	83 Bi Bismuth 209	84 Po Polonium 210	85 At Astatine 210	86 Rn Radon 222
87 Fr Francium 223	88 Ra Radium 226	89 Ac Actinium 227	104 Unq Unnil-quadium 257	105 Unp Unnil-pentium 260	106 Unh Unnil-hexium 263	107 Uns Unilseptium 262	108 Uno Unniloctium 265	109 Une Unilennium 266									

Proton number
Symbol
Name of element
Relative atomic mass

10 Ne Neon 20

58 Ce Cerium 140	59 Pr Praseo-dymium 141	60 Nd Neodymium 144	61 Pm Promethium 147	62 Sm Samarium 150	63 Eu Europium 152	64 Gd Gadolinium 157	65 Tb Terbium 159	66 Dy Dysprosium 163	67 Ho Holmium 165	68 Er Erbium 167	69 Tm Thulium 169	70 Yb Ytterbium 173	71 Lu Lutetium 175
90 Th Thorium 232	91 Pa Proactinium 231	92 U Uranium 238	93 Np Neptunium 237	94 Pu Plutonium 244	95 Am Americium 243	96 Cm Curium 247	97 Bk Berkelium 247	98 Cf Californium 249	99 Es Ein-steinium 254	100 Fm Fermium 253	101 Md Mendele-vium 256	102 No Nobelium 254	103 Lr Lawrencium 257

Reference: Chang, Raymond (1991). Chemistry. McGraw-Hill, Inc.

4541/3
Chemistry
Kertas 3
2012
1 ½ jam

NAMA:.....

TINGKATAN:.....

PEPERIKSAAN PERCUBAAN BERSAMA
SIJIL PELAJARAN MALAYSIA 2012

ANJURAN
PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA
SEKOLAH MENENGAH CAWANGAN PERLIS

CHEMISTRY

Kertas 3

Satu jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan* **nama** *dan* **tingkatan** *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 dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Melayu atau bahasa Inggeris.*
5. *Calon dikehendaki membaca maklumat di halaman 10.*

Kod Pemeriksa		
Soalan	*Markah Penuh*	*Markah diperoleh*
1	*18*	
2	*15*	
3	*17*	
JUMLAH		

Kertas soalan ini mengandungi 10 halaman bercetak

Answer **all** *the questions.*
Jawab semua soalan.

1. Diagram 1.1 shows the apparatus set-up for an experiment to construct the electrochemical series based on the potential differences between two different metals.

Rajah 1.1 *menunjukkan susunan radas dalam satu eksperimen untuk membina siri elektrokimia berdasarkan beza keupayaan antara dua logam yang berlainan.*

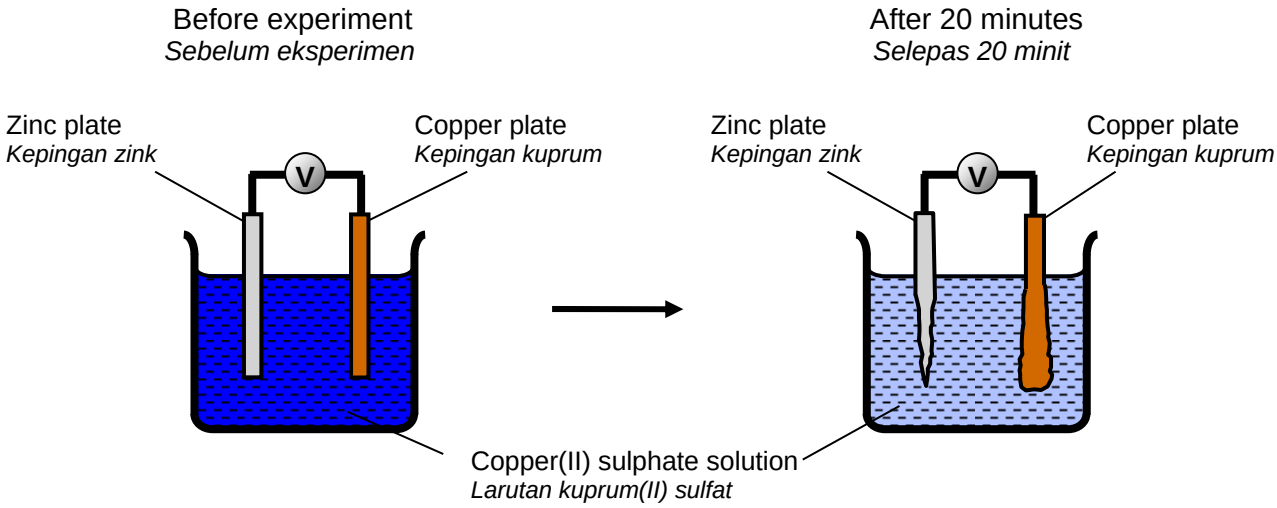


Diagram 1.1
Rajah 1.1

1(a)

(a) Based on Diagram 1.1, state **three** observations.
Berdasarkan Rajah 1.1*, nyatakan* ***tiga*** *pemerhatian*.

.....

.....

.....

[3 marks]

(b) Experiment is repeated by replacing zinc plate with metals P, Q and R while keeping the copper plate as the positive terminal. Fresh copper(II) sulphate solution is used in each experiment.

Eksperimen diulangi dengan menggantikan kepingan zink dengan logam P, Q dan R sementara mengekalkan kepingan kuprum sebagai terminal positif. Larutan kuprum(II) sulfat yang baru digunakan bagi setiap eksperimen.

Diagram 1.2 shows the potential differences of different pairs of metals in this experiment.
Rajah 1.2 *menunjukkan beza keupayaan bagi pasangan logam yang berlainan dalam eksperimen ini.*

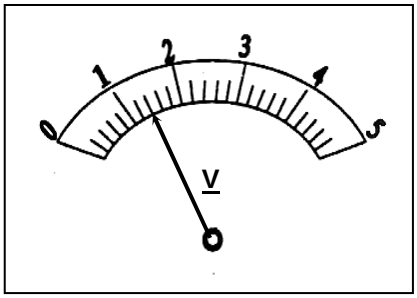
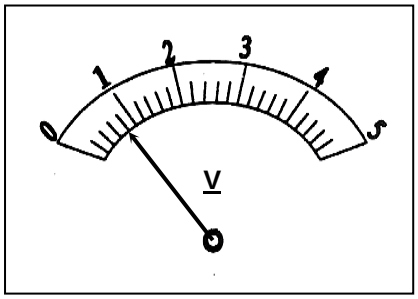
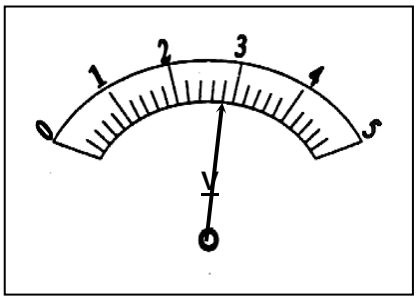
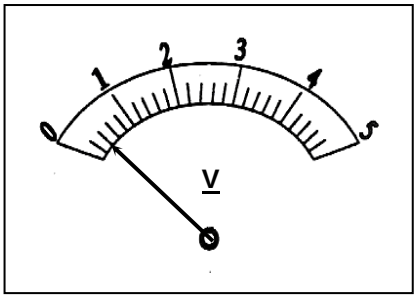
Zinc and Copper *Zink dan kuprum*  Reading: *Bacaan:* ……	P and Copper *P dan kuprum*  Reading: *Bacaan:* ……
Q and Copper *Q dan kuprum*  Reading: *Bacaan:* ……	R and Copper *R dan kuprum*  Reading: *Bacaan:* ……

Diagram 1.2
Rajah 1.2

1(b)

Record the voltmeter readings in the spaces provided in Diagram 1.2.
Catatkan bacaan voltmeter pada ruang yang disediakan dalam Rajah 1.2.

[3 marks]

(c) Construct a table to record the voltmeter readings of four pairs of metals.
Bina satu jadual untuk merekodkan bacaan voltmeter untuk empat pasangan logam.

1(c)

[3 marks]

(d) Based on the table constructed in 1(c), arrange the metals P, Q, R, zinc and copper in ascending order of the electropositivity of metals.
Berdasarkan jadual yang dibina dalam 1 (c)*, susunkan logam P, Q, R, zink dan kuprum mengikut keelektropositifan logam secara tertib menaik.*

1(d)

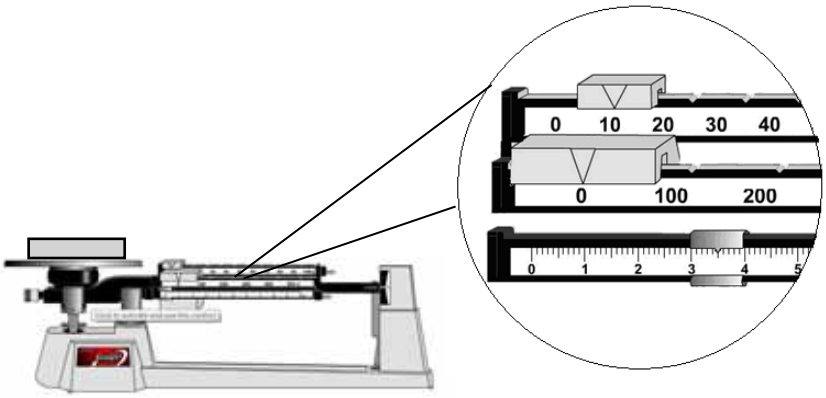
……
[3 marks]

(e) Predict the voltage produced if pair of metals P and Q is placed in copper(II) sulphate solution.
Ramalkan nilai voltan yang terhasil sekiranya pasangan logam P and logam Q diletakkan di dalam larutan kuprum(II) sulfat.

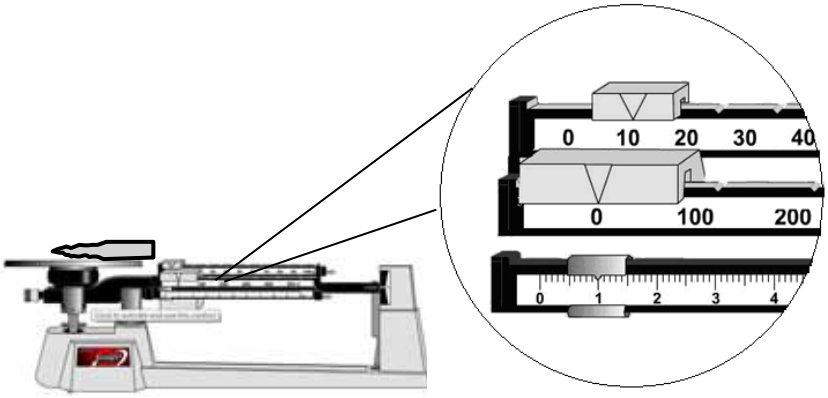
1(e)

……
[3 marks]

(f) Diagram 1.3 shows the change in the mass of zinc plate after 20 minutes.
Rajah 1.3 *menunjukkan perubahan jisim kepingan zink selepas 20 minit.*



Before experiment
Sebelum eksperimn



After 20 minutes
Selepas 20 minit

Diagram 1.3
Rajah 1.3

Based on Diagram 1.3, state the relationship between time taken and the mass of zinc plate remains.
Berdasarkan Rajah 1.3*, nyatakan hubungan antara masa yang diambil dengan jisim kepingan zink yang tertinggal.*

1(f)

……

……

……

[3 marks]

2. Diagram 2 shows the set-up apparatus of the experiment to investigate the effect of other metal on the rusting of iron.
Rajah 2 menunjukkan susunan radas bagi eksperimen untuk mengkaji kesan logam lain ke atas pengaratan besi.

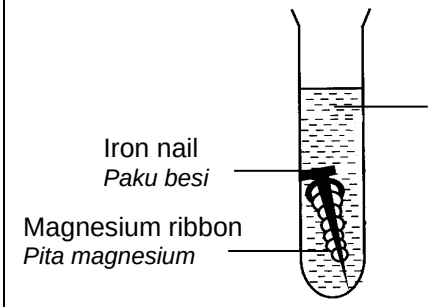
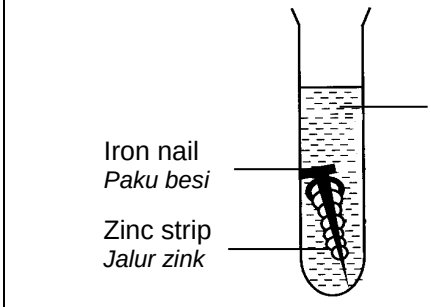
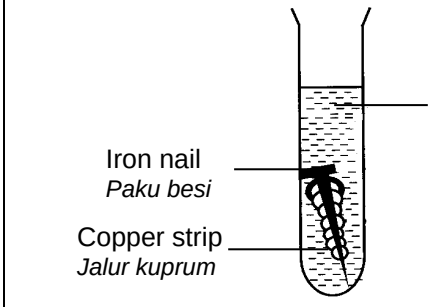
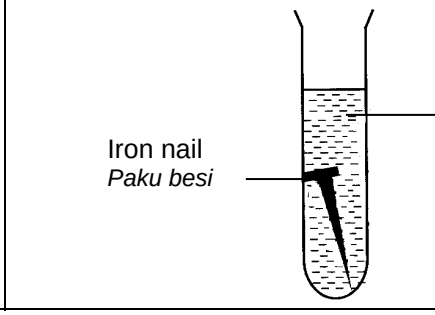
Test tube	Set-up of apparatus *Susunan radas*	Observation *Pemerhatian*
I		Pink colour is produced *Warna merah jambu terbentuk*
II		Pink colour is produced *Warna merah jambu terbentuk*
III		Blue colour is produced *Warna biru terbentuk*
IV		Blue colour is produced *Warna biru terbentuk*

Diagram 2
Rajah 2

(a) State the inference for each of the following test tubes.
Nyatakan inferens bagi setiap tabung uji berikut.

(i) Test tube I
Tabung uji I : .....

2(a)

(ii) Test tube II
Tabung uji II : .....

(iii) Test tube III
Tabung uji III : .....
[3 marks]

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

(i) The manipulated variable
Pembolehubah dimanipulasikan

.....

(ii) The responding variable
Pembolehubah bergerak balas

.....

2(b)

(iii) The fixed variable
Pembolehubah dimalarkan

.....
[3 marks]

2(c)

(c) State the hypothesis for the experiment.
Nyatakan hipotesis bagi eksperimen ini.

……

……
[3 marks]

2(d)

(d) State the operational definition for rusting of iron.
Nyatakan definisi secara operasi bagi pengaratan besi.

……
[3 marks]

(e) Based on this experiment, classify the metals which in contact with the iron nail into metal that is more electropositive than iron and metal that is less electropositive than iron.
Berdasarkan eksperimen ini, kelaskan logam yang bersentuhan dengan paku besi kepada logam yang lebih elektropositif daripada besi dan logam yang kurang elektropositif daripada besi.

Metal that is more electropositive than iron *Logam yang lebih elektropositif daripada besi*	Metal that is less electropositive than iron *Logam yang kurang elektropositif daripada besi*

2(e)

[3 marks]

3.

Ionic compound can conduct electricity in aqueous and molten states but covalent compound cannot conduct electricity in all states.

Sebatian ion boleh mengkonduksikan elektrik dalam keadaan leburan dan larutan akueus tetapi sebatian kovalen tidak boleh mengkonduksikan elektrik dalam semua keadaan.

Using lead(II) bromide as an example of ionic compound and naphthalene as an example of covalent compound, plan a laboratory experiment to compare the electrical conductivity of molten ionic and covalent compounds.

Dengan menggunakan plumbum(II) bromida sebagai contoh sebatian ion and naftalena sebagai contoh sebatian kovalen, rancangkan satu eksperimen untuk membandingkan kekonduksian elektrik leburan sebatian ion dan sebatian kovalen.

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

(a) Problem statement
Pernyataan masalah

(b) All the variables
Semua pemboleh ubah

(c) Hypothesis
Hipotesis

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

(e) Procedure
Prosedur

(f) Tabulation of data
Penjadualan data

[17 marks]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of three questions: **Question 1, 2** and **3**.
   *Kertas soalan ini mengandungi tiga soalan: **Soalan 1,2** dan **3**.*

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

3. Write your answers for **Question 3** on the extra paper provided by the invigilators. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answers.
   *Jawapan anda bagi **Soalan 3** hendaklah ditulis dalam helaian tambahan yang dibekalkan oleh pengawas peperiksaan. Anda boleh menggunakan persamaan, rajah, jadual, graf dan cara lain sesuai untuk menjelaskan jawapan anda.*

4. Show your working, it may help you to get marks.
   Tunjukkan kerja mengira, ini membantu anda mendapatkan markah.

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

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

7. If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.
   Jika anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.

8. You may use non-programmable scientific calculator.
   Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.

9. You are advised to spend 45 minutes to answer **Questions 1** and **2**, and 45 minutes for **Question 3**.
   *Anda dinasihati supaya mengambil masa 45 minit untuk menjawab **Soalan 1** dan **2**, dan 45 minit untuk **Soalan 3**.*

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

4541/1/2/3
PERATURAN PERMARKAHAN
CHEMISTRY
15 Ogos 2012

PERATURAN PERMARKAHAN
PEPERIKSAAN PERCUBAAN SPM
TAHUN 2012
NEGERI PERLIS

CHEMISTRY

JAWAPAN KERTAS 1
SKEMA KERTAS 2
SKEMA KERTAS 3

MAKLUMAT UNTUK PEMERIKSA KERTAS

1. Kertas skema ini mengandungi **50** jawapan untuk soalan objektif,Skema kertas 2 dan Skema kertas 3.

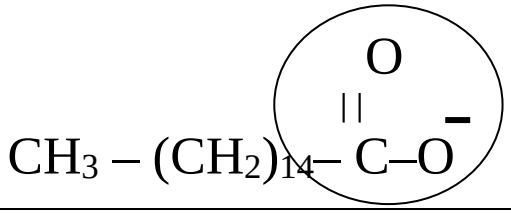
2. Kertas skema ini adalah **sulit** sehinggalah tamat peperiksaan percubaan tahun 2012.

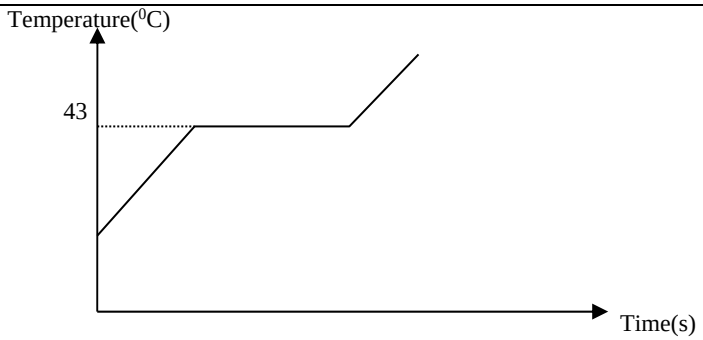
3. Terima kasih.

SUBJECT: CHEMISTRY TRIAL PERLIS 2012

No soalan	Jawapan
1	B
2	D
3	C
4	C
5	D
6	B
7	D
8	B
9	A
10	B
11	D
12	D
13	B
14	C
15	D
16	D
17	D
18	B
19	A
20	A
21	C
22	C
23	C
24	B
25	B

No soalan	Jawapan
26	B
27	A
28	A
29	D
30	C
31	A
32	C
33	A
34	A
35	C
36	C
37	A
38	C
39	A
40	B
41	D
42	D
43	B
44	D
45	D
46	A
47	B
48	C
49	C
50	B

1.	(a)	(i)	Saponification	1
	(b)		Sodium hydroxide	1
	(c)	(i)	Sodium chloride	1
		(ii)	To precipitate the soap/to reduce solubility of soap	1
	(d)	(i)		1
		(ii)	Hydrophobic part	1
	(iii)		<table><tr><td>Hard water *Air liat*</td><td>Soft water *Air lembut*</td></tr><tr><td></td><td>√</td></tr></table>	1
(e)	P : preservatives Q : antioxidants			1 1
			TOTAL	9

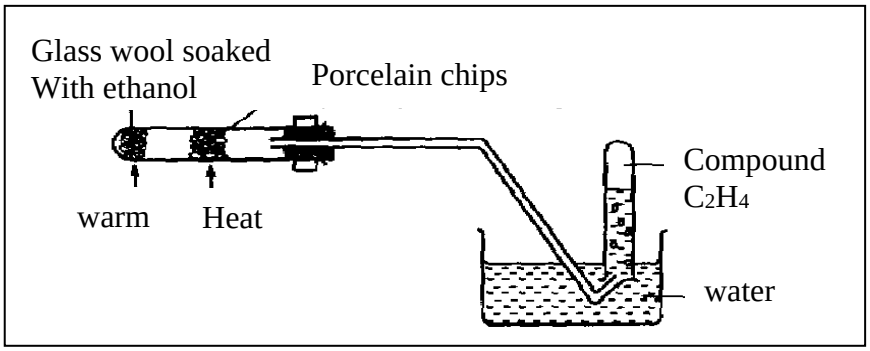
2	(a)	i)	Same element that have same proton number but different nucleon number	**1** **1**
		ii)	Cl-35:18 Cl-37:20	**1** **1**
		iii)	Used in water treatment to kill microorganisms/germs	**1**
	(b)	i)		**1**
		ii)	At 30 ^{0}C : the particles are arraged closely packed in orderly manner At 80 ^{0}C: the particles are arranged closely packed but not in orderly manner	**1** **1**
			TOTAL	**9**

3		(a)	The chemical substance that ionizes in water to produce hydrogen ion / H^+.	1
		(b)	Nitric acid	1
	(b)	i)	Hydrochloric acid	1
		ii)	Hydrochloric acid produce lower concentration of hydrogen ion / H^+.	1
		iii)	Neutralisation reaction	1
	(c)	i)	Pink to colourless	1
		ii)	$HNO_3 + KOH \longrightarrow KNO_3 + H_2O$	1+1
			$0.1 \times V_A / 0.1 \times 30 = 1 / 1$ $V_A = 30\ cm^3$	1 1
			Total	10

4	(a)	(i)Hydrogen (ii) $Mg + 2HCl \longrightarrow MgCl_2 + H_2$ - Reactants and products are correct - Equation is balanced (iii) No of mol Mg = 1.2/24 = 0.05 mol Mol of H_2 = 0.05 mol Volume of H_2 = 0.05 x 24 dm^3/1.2 dm^3/1200 cm^3	1 1 1 1 1 1
	(b)	- Experiment I is higher - Concentration of hydrochloric acid is higher/Time taken in experiment I is shorter ** Reject if not mentioned **EXP I**	1 1
	(c)	-Uses of catalyst - Temperature	1 1
		TOTAL	10

5	(a)		NO_3^-, OH^-	1
	(b)	(i)	Electrolytic cell	1
		(ii)	Electroplating/Purification	1
	(c)	(i)	Thinner	1
		(ii)	$Cu^{2+} + 2e \longrightarrow Cu$	1
	(d)		Copper//Copper atom/metal	1
	(e)	(i)	Students label the arrow of electron flow in the diagram (From zinc plate to copper plate terminal)	1
		(ii)	Negative terminal: Zinc	1

			Positive terminal: Copper	1
	(f)		Blue solution change to colourless//blue solution becomes paler//blue solution decolurised Because the concentration of Cu^{2+} ion in the solution decreases	1 1
			TOTAL	11

6	(a)		Ethene	1
	(b)		- Alkene -Carbon- carbon double bond/ -C=C-	1 1
	(c)	(i)	$C_2H_4 + 3H_2O \longrightarrow 3CO_2 + 2H_2O$ - correct reactants and products - balanced equation	1 1 1
	(d)	(i)	Porous pot/Concentrated sulfuric acid /Porcelain chips/Aluminium oxide	1
		(ii)	 -Functional diagram -Labelled diagram	1 1 1
	(e)	(i)	- C_2H_4 is an unsaturated hydrocarbon/ has double bond - Ethane is a saturated hydrocarbon/ has single bond	1 1
		(ii)	H H | | H-C-C- H | | Br Br	1
			TOTAL	11

SECTION B

7	(a)	(i) metal: X non-metal: W//Y	1 1
		(ii) Electron arrangement of W: 2.4 Period 2 because atom W has 2 shells filled/occupied with electrons Group 14 because atom W has 4 valence electron	1 1 1
		(iii) • Atomic size of atom Y is smaller • The positive charge /the number of proton in the nucleus of atom Y is bigger • Force of attraction between the nucleus and the electrons in atom Y is stronger • The electrons are pulled closer to the nucleus	 1 1 1 1
	(b)	(i) Oxide of A: Basic because oxide of A react with acid only to form salt and water Oxide of D: Amphoteric because oxide of D react with both acid and base to form salt and water. Oxide of E: Acidic because oxide of E react with base only to form salt and water. (ii) A: Sodium/Magnesium D: Aluminium E: Silicon/Sulphur/Chlorine/Phosphorus (iii) $Na_2O + 2HNO_3 \longrightarrow 2\ NaNO_3 + H_2O$ // $MgO + 2HNO_3 \longrightarrow Mg(NO_3)_2 + H_2O$	 1 +1 1+1 1+1 1 1 1 1+1
		Total	20

<table>
<tr><td>8</td><td>(a)
(i)</td><td>Neutralisation//Exothermic reaction</td><td>1</td></tr>
<tr><td></td><td>(ii)</td><td>Total energy content of reactant is higher than total energy content in product</td><td>1</td></tr>
<tr><td></td><td>(iii)</td><td>• The heat of neutralization of Expt 1 is higher than Expt 2
• HCl is strong acid while ethanoic acid is weak acid
• HCl ionizes completely in water to produce H^+ ion
• CH_3COOH ionizes partially in water to produce H^+ ion and most of ethanoic acid exist as molecules
• In Expt 2,Some of heat given out during neutralization reaction is used to dissociate the ethanoic acid completely in water//part of heat that is released is used to break the bonds in the molecules of ethanoic acid that has not been ionised</td><td>1
1
1
1
1</td></tr>
<tr><td></td><td>(b)
(i)</td><td>No of mol acid/alkali= 50 X 1 /1000= 0.05

Q = $\triangle$H X no of mol
= 57.3 X 0.05
= 2.865 kJ // 2865 J</td><td>1

1
1</td></tr>
<tr><td></td><td>(ii)</td><td>2865 = 100 X 4.2 X θ
θ = 2865 ÷ 420
= 6.8 ^{0}C (unit must correct)</td><td>1
1
1</td></tr>
<tr><td></td><td>(iii)</td><td>Some of heat is lost to the sorrounding
Heat is absorbed by polystyrene cup</td><td>1
1</td></tr>
<tr><td></td><td>(c)</td><td><table><tr><th>A</th><th>B</th></tr><tr><td>The reaction is exothermic// Heat releases to the sorrounding during the reaction</td><td>The reaction is endothermic// Heat absorbed from the sorrounding during the reaction</td></tr><tr><td>During the reaction, heat releases to the sorrounding is x kJ per mol</td><td>During the reaction, heat absorbed from the sorrounding is y kJ per mol</td></tr><tr><td>The energy content in reactant is higher than energy content in product</td><td>The energy content in reactant is lower than energy content in product</td></tr><tr><td>The temperature increases during the reaction</td><td>The temperature decreases during the reaaction</td></tr><tr><td>Heat released during the formastion of bond in product is higher than heat absorbed during the breaking of bond in reactant</td><td>Heat absorbed during the breaking of bond in reactant is higher than heat released during the formastion of bond in product</td></tr></table></td><td>1
1
1
1
1</td></tr>
<tr><td></td><td></td><td>TOTAL</td><td>20</td></tr>
</table>

SECTION C

<table>
<tr><td colspan="2">No</td><td>Essay Section C</td><td>Mark</td><td></td></tr>
<tr><td>9</td><td>a(i)</td><td>$S + O_2 \longrightarrow SO_2$</td><td>2</td><td>Subtotal 2</td></tr>
<tr><td></td><td>(ii)</td><td>Neutralised sulphur dioxide gas released with
calcium oxide/calcium hydroxide/slaked lime/ quick lime</td><td>1
1</td><td>Subtotal 2</td></tr>
<tr><td></td><td></td><td><table><tr><td>X: ceramics</td><td>High melting point/high heat resistant</td></tr><tr><td>Y: Bronze</td><td>Does not corrode easily/shiny</td></tr><tr><td>Z : Fibre glass</td><td>Light and strong</td></tr></table></td><td></td><td>Subtotal 6</td></tr>
<tr><td></td><td>b</td><td>Alloy is Bronze its pure metal is copper or
Alloy is Brass its pure metal is copper

Materials: steel ball, bronze block/brass block, copper block
Apparatus: 1 kg weight, ruler, retort stand with ruler

Procedure:
1. A steel ball bearing is taped on to the surface of the copper block
2. A 1 kg weight is hung at the retort stand 50cm above
3. The weight is dropped onto the steel ball
4. The diameter of the dent is measured
5. Step 1-4 are repeated using the bronze block/brass block

Observation: Diameter of the for bronze/brass is smaller than copper
(vice versa)
Conclusion: Bronze/brass is harder than copper</td><td>1

1
1

5

1

1</td><td>Subtotal 10</td></tr>
<tr><td colspan="3">TOTAL</td><td></td><td>20</td></tr>
</table>

<table>
<tr><th>No</th><th></th><th>Description</th><th>Mark</th></tr>
<tr><td rowspan="4">10</td><td>(a)</td><td>(i) Chemical equation:
H_2SO_4 + CuO → $CuSO_4$ + H_2O

(ii) No of Mol of H_2SO_4 : 0.2 X 50 / 1000 = 0.01

From the equation:
1 mol H_2SO_4 produce 1 mol $CuSO_4$
0.01 mol H_2SO_4 produce 0.01 mol $CuSO_4$

Mass of $CuSO_4$ produced: 0.01 X 160 = 1.6 g</td><td>1

1

1

1</td></tr>
<tr><td></td><td></td><td>4</td></tr>
<tr><td>(b)</td><td><table>
<tr><th>Aspect</th><th>NaCl</th><th>AgCl</th></tr>
<tr><td>Solubility in water</td><td>Soluble</td><td>Insoluble</td></tr>
<tr><td>Name of reaction</td><td>Neutralisation reaction</td><td>Precipitation / Double decomposition reaction</td></tr>
<tr><td>Reactants</td><td>HCl and NaOH</td><td>$AgNO_3$ and NaCl/ KCl/ NH_4Cl/ HCl</td></tr>
<tr><td>Chemical equation</td><td>HCl + NaOH → NaCl + H_2O</td><td>$AgNO_3$ + KCl → AgCl + KNO_3</td></tr>
</table></td><td>1

1

(1+1)

(1+1)</td></tr>
<tr><td></td><td></td><td>6</td></tr>
<tr><td></td><td>(c)</td><td>Reactants:
(0.1 – 2.0 mol dm^{-3}) barium nitrate solution, $Ba(NO_3)_2$,
(0.1 – 2.0 mol dm^{-3}) sodium sulphate, Na_2SO_4 solution or any soluble sulphates
or (0.1 – 2.0 mol dm^{-3}) sulphuric acid

Procedure:
1. (20 - 100 cm^3) of barium nitrate , $Ba(NO_3)_2$ is added to
(20 - 100 cm^3) of sodium sulphate, Na_2SO_4.
2. Stir the solution mixture.
3. A white precipitate barium sulphate, $BaSO_4$, is formed.
4. Filter the solution mixture.
5. Wash / rinse the residue/solid/salt with distilled water.
6. Press the residue with a few pieces of filter papers to dry them.

Chemical equation:
$Ba(NO_3)_2$ + Na_2SO_4 → $BaSO_4$ + $2NaNO_3$
or Ba^{2+} + SO_4^{2-} → $BaSO_4$</td><td>(1+1)

1
1
1
1
1
1

(1+1)</td></tr>
<tr><td></td><td></td><td></td><td>10</td></tr>
<tr><td colspan="3">Total</td><td>20</td></tr>
</table>

MARKING SCHEME FOR PAPER 3 2012 Trial Perlis

Question	Rubric	Score
1(a)	*Able to state all **three** observations correctly* Sample answers: 1. Zinc plate becomes thinner // 2. Brown solid is deposited // 3. Blue solution changes paler // 4. Pointer of voltmeter deflects	3
	Able to state any 2 observations correctly or three observations less correctly Sample answers: 1. Zinc plate **dissolves / corrodes** // 2. Copper plate **becomes thicker** // 3. **Copper(II) sulphate** solution changes paler // Solution changes paler //	2
	Able to state any 1 answer correctly or give the idea of the observations Sample answers: 1. some of the zinc disappear // 2. brown precipitate is produced // 3. Solution turns colourless // 4. voltmeter deflects	1
	No response or wrong response	0

Question	Rubric	Score
1(b)	*Able to state all the voltmeter readings accurately with correct unit* Sample answer: Zinc & copper : 1.4 V P & copper : 0.8 V Q & copper : 2.8 V R & copper : 0.4 V	3
	Able to state all the voltmeter readings less accurately /without unit Sample answer: Zinc & copper : 1.40 V // 1.4 P & copper : 0.80 V // 0.8 Q & copper : 2.80 V // 2.8 R & copper : 0.40 V //0.4	2
	Able to state the voltmeter readings Sample answer: Zinc & copper : 1.40 // 1.2 P & copper : 0.80 // 0.4 Q & copper : 2.80 // 2.4 R & copper : 0.40 // 0.2	1
	No response or wrong response	0

<table>
<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td>1(c)</td><td>Able to construct a table to record the voltmeter readings with one decimal place and with correct unit

<u>Sample answer:</u>

<table>
<tr><th>Pair of metals</th><th>Voltmeter reading (V)</th></tr>
<tr><td>Zinc & copper</td><td>1.4</td></tr>
<tr><td>P & copper</td><td>0.8</td></tr>
<tr><td>Q & copper</td><td>2.8</td></tr>
<tr><td>R & copper</td><td>0.4</td></tr>
</table></td><td>3</td></tr>
<tr><td></td><td>Able to construct a table to record the voltmeter readings without unit

<u>Sample answer:</u>

<table>
<tr><th>Pair of metals</th><th>Voltmeter reading</th></tr>
<tr><td>Zinc & copper</td><td>1.4</td></tr>
<tr><td>P & copper</td><td>0.8</td></tr>
<tr><td>Q & copper</td><td>2.8</td></tr>
<tr><td>R & copper</td><td>0.4</td></tr>
</table>
or

<table>
<tr><th>Pair of metals</th><th>Voltmeter reading</th></tr>
<tr><td>Zinc & copper</td><td>1.4 V</td></tr>
<tr><td>P & copper</td><td>0.8 V</td></tr>
<tr><td>Q & copper</td><td>2.8 V</td></tr>
<tr><td>R & copper</td><td>0.4 V</td></tr>
</table></td><td>2</td></tr>
<tr><td></td><td>Able to construct a table to record the voltmeter readings with either one correct heading</td><td>1</td></tr>
<tr><td></td><td>No response or wrong response</td><td>0</td></tr>
</table>

<table>
<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td>1(d)</td><td>Able to arrange the metals P, Q, R, zinc and copper in ascending order of the electropositivity of metals

<u>Sample answers:</u>
Copper, R, P, Zinc, Q</td><td>3</td></tr>
<tr><td></td><td>Able to arrange all metals in descending order of the electropositivity of metals // arrange at least 3 metals in correct sequence according to ascending order of the electropositivity of metals.

<u>Sample answers:</u>
Q, Zinc, P, R, Copper // R, P, zinc, Q, copper</td><td>2</td></tr>
<tr><td></td><td>Able to arrange at least 2 metals in correct sequence either in ascending order or in descending order of the electropositivity of metals

<u>Sample answers:</u>
Copper, R, Q zinc, P // Q, zinc, R, copper, P</td><td>1</td></tr>
<tr><td></td><td>No response or wrong response</td><td>0</td></tr>
</table>

Question	Rubric	Score
1(e)	*Able to predict the voltage produced accurately with correct unit* Sample answer: 2.0 V	3
	Able to predict the voltage produced accurately ***without*** *correct unit* Sample answer: 2.0	2
	Able to predict the voltage produced less accurately Sample answer: Less than 2.8 V // More than 0.8 V	1
	No response or wrong response	0

Question	Rubric	Score
1(f)	*Able to state the relationship between the time taken for the reaction to occur and the mass of zinc plate correctly or vice-versa* Sample answer: The longer the time taken for the reaction to occur, the lesser the mass of zinc plate remains // the shorter the time taken for the reaction to occur, the more the mass of zinc plate remains	3
	Able to state the relationship between the time taken for the reaction to occur and the mass of zinc plate less correctly Sample answer: The higher the time taken for the reaction to occur, the lesser the mass of zinc plate remains // When the mass of zinc plate decreases, the time taken for the reaction to occur increases	2
	Able to give an idea of the relationship between the time taken for the reaction to occur and the mass of zinc plate Sample answer: The mass of zinc plate is affected by the time taken	1
	No response or wrong response	0

Question	Rubric	Score
2(a)	*Able to state all the inferences correctly* Sample answers: Test tube I : iron nail does not rust Test tube II : iron nail does not rust Test tube III : iron nail rust	3
	Able to state all the inferences less correctly Sample answers: Test tube I : OH^- ion is present Test tube II : OH^- ion is present Test tube III : Fe^{2+} ion is present	2
	Able to give an idea for the inferences Sample answers: Test tube I : iron nail rust // Fe^{2+} ion is present Test tube II : iron nail rust // Fe^{2+} ion is present Test tube III : iron nail does not rust // OH^- ion is present	1
	No response or wrong response	0

Question	Rubric	Score
2(b)	*Able to state all the three variables correctly* Sample answer: **Manipulated variable**: Type of metals **in contact with iron nail** **Responding variable**: Rusting of iron nail // colour produced **Constant variable**: Type of nail // iron nail	3
	Able to state three variables less correctly or any two variables correctly Sample answer: **Manipulated variable**: Type of metals // pair of metals **Responding variable**: Rate of rusting **Constant variable**: Type of **iron** nail	2
	Able to state any one variable correctly	1
	No response or wrong response	0

Question	Rubric	Score
2(c)	*Able to state the relationship between the manipulated variable and the responding variable with correct direction.* Sample answer: When iron nail is in contact with a more electropositive metal, rusting does not occur; when iron nail is in contact with a less electropositive metal, rusting occurs	3
	Able to state the relationship between the manipulated variable and responding variable but less accurate in stating the direction. Sample answer: When iron nail is in contact with a more electropositive metal, rusting does not occur // When iron nail is in contact with a less electropositive metal, rusting occurs // Rusting occurs when iron nail is in contact with a less electropositive metal but rusting does not occur when iron nail is in contact with a more electropositive metal // When iron nail is in contact with a more electropositive metal, rusting is prevented; when iron nail is in contact with a less electropositive metal, rusting is **speeded up//** Iron nail rusts when copper is used but iron nail does not rust with zinc and magnesium are used	2
	Able to give an idea of hypothesis Sample answer: Type of metals coiled on iron nail affects the rusting or iron.	1
	No response or wrong response	0

Question	Rubric	Score
2(d)	*Able to fulfill the following aspects* *(i) what have been done* *(ii) what is observed* Sample answer: Formation of blue colour when iron nail is coiled with a less electropositive metal	3
	Able to state the operational definition less correctly Sample answer: Formation of **rust** when iron nail is coiled with a less electropositive metal	2
	Able to state an idea for the rusting of iron Sample answer: Formation of rust / Fe^{2+} ion // oxidation / corrosion of iron	1
	No response or wrong response	0

<table>
<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td>2(e)</td><td>Able to classify all the metals correctly

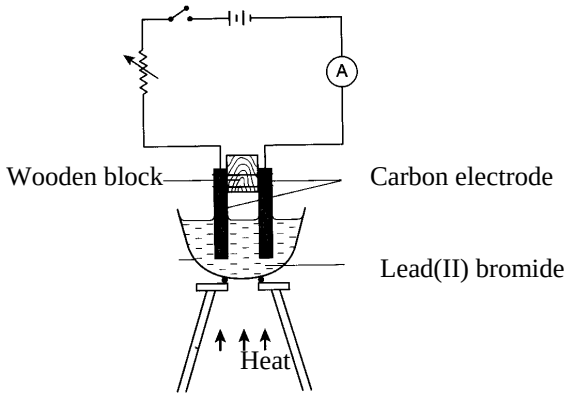
<u>Sample answer:</u>
<table><tr><th>Metal that is more electropositive than iron</th><th>Metal that is less electropositive than iron</th></tr><tr><td>zinc
magnesium</td><td>copper</td></tr></table></td><td>3</td></tr>
<tr><td></td><td>Able to classify two metals correctly in both categories or in vice-versa</td><td>2</td></tr>
<tr><td></td><td>Able to classify one metal correctly</td><td>1</td></tr>
<tr><td></td><td>No response</td><td>0</td></tr>
</table>

Question	Rubric	Score
3(a)	*Able to state the problem statement of the experiment correctly* Sample answer How does the type of compounds affect the electrical conductivity? // Does *lead(II) bromide conduct electricity in molten state but Naphthalene does not conduct electricity in molten state* ?	3
	Able to state the problem statement of the experiment less correctly Sample answer Does the *lead(II) bromide conduct electricity in molten state* ? // Does the *naphthalene conduct electricity in molten state* ?	2
	Able to give an idea of the problem statement Sample answer To investigate / compare the electrical conductivity of ionic and covalent compound	1
	No response or wrong response	0

Question	Rubric	Score
3(b)	*Able to state the **three** variables correctly.* Sample answer **Manipulated variable :** lead(II) bromide and naphthalene// Ionic and covalent compounds **Responding variable :** light up of bulb // deflection of ammeter / voltmeter' needle // electrical conductivity **Fixed variable : ** carbon electrodes	3
	*Able to state **three** variables less correctly or **any two** variables correctly.* Sample answer **Manipulated variable :** types of substances **Responding variable :** ammeter / voltmeter reading **Fixed variable : ** mass of substances / bulb / ammeter	2
	*Able to state **two** variables less correctly or **any one** variable correctly.*	1
	No response or wrong response	0

Question	Rubric	Score
3(c)	*Able to suggest a relationship correctly between the **MV** and the **RV** with direction* Sample answer Molten lead(II) bromide causes the bulb to light up whereas molten naphthalene does not cause the bulb to light up // Molten lead(II) bromide can conduct electricity whereas molten naphthalene cannot conduct electricity	3
	*Able to suggest a relationship between the **MV** and the **RV*** Sample answer **Molten** lead(II) bromide // **molten** ionic compound causes the bulb to light up / conducts electricity // **Molten** naphthalene // **molten** covalent compound does not cause the bulb to light up / conducts electricity // Lead(II) bromide can conduct electricity whereas naphthalene cannot conduct electricity //	2
	Able to suggest an idea of hypothesis Sample answer Lead(II) bromide / naphthalene affects the electrical conductivity	1
	No response or wrong response	0

Question	Rubric	Score
3(d)	*Able to give complete list of substances and apparatus* Sample answer 2 substances : Lead(II) bromide , naphthalene 8 apparatus : batteries , carbon electrodes , bulb/ammeter , crucible , Bunsen burner , tripod stand , pipe-clay triangle , connecting wires [**can refer to labelled diagram or procedure but only 1 substance and 2 apparatus**]	3
	Able to give an incomplete list of substances and apparatus Sample answer 2 substances : Lead(II) bromide , naphthalene 8 apparatus : batteries , carbon electrodes , bulb/ammeter , [any suitable container], Bunsen burner , connecting wires [**can refer to labelled diagram or procedure but only 1 substance and 1 apparatus**]	2
	*Able to give at least **one** substance and batteries , carbon electrodes , bulb/ammeter,* connecting wires	1
	No response or wrong response	0

Question	Rubric	Score
3(e)	*Able to list all the steps correctly* <u>Sample answer</u> 1. A crucible is filled with lead(II) bromide solid until it is half full. 2. Two carbon electrodes are immersed into lead(II) bromide and carbon electrodes are connected to batteries and bulb. 3. Record observation 4. The lead(II) bromide solid is heated until its melts. 5. Record observation 6. Repeat steps 1 to 5 using naphthalene. [If description in procedure incomplete, can refer to diagram]  	3
	Able to list steps 1,2 , 4 and 6	2
	Able to give steps 2 and 4	1
	No response or wrong response	0

<table>
<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td>3(f)</td><td>Able to fulfill the following aspects:
1. correct headings
2. Complete list of manipulated variables

<u>Sample answer</u>

<table><tr><th>Type of compound</th><th>Observation</th></tr><tr><td>Lead(II) bromide</td><td></td></tr><tr><td>naphthalene</td><td></td></tr></table></td><td>2</td></tr>
<tr><td></td><td>Able to tabulate the data with the following aspects:
1. one of the suitable headings
2. one name of the compound

<u>Sample answer</u>

<table><tr><th>Substance</th><th>Observation</th></tr><tr><td>Lead(II) bromide</td><td></td></tr></table></td><td>1</td></tr>
<tr><td></td><td>No response or wrong response or empty table</td><td>0</td></tr>
</table>

END OF MARKING SCHEME