4541/1
Chemistry
Paper 1
September

1 1/4 jam

PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA
SEKOLAH MENENGAH MALAYSIA (PKPSM) CAWANGAN MELAKA
DENGAN KERJASAMA
JABATAN PELAJARAN MELAKA

PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2010

CHEMISTRY

Kertas 1

Satu jam lima belas minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini mengandungi **50** soalan.*
2. *Jawab **semua** soalan.*
3. *Jawab dengan menghitamkan ruangan yang betul pada kertas jawapan.*
4. *Hitamkan **satu** ruangan sahaja bagi setiap soalan.*
5. *Rajah tidak dilukis mengikut skala **kecuali** dinyatakan*
6. *Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan*

This question paper consists of 26 printed pages

Kertas soalan ini mengandungi 26 halaman bercetak.

INFORMATION FOR CANDIDATES

1. *This question paper consists of 50 questions.*

2. *Answer* **all** *questions.*

3. *Answer each question by blackening the correct space on the answer sheet.*

4. *Blacken only* **one** *space for each question.*

5. *If you wish to change your answer, erase the blackened mark that you have made. Then blacken the space for the new answer.*

6. *The diagrams in the questions provided are not drawn to scale unless stated.*

7. *You may use a non-programmable scientific calculator.*

MAKLUMAT UNTUK CALON

1. *Kertas soalan ini mengandungi 50 soalan.*

2. *Jawab* **semua** *soalan*

3. *Jawab dengan menghitamkan ruangan yang betul pada kertas jawapan.*

4. *Hitamkan* **satu** *ruangan sahaja bagi setiap soalan.*

5. *Sekiranya anda hendak menukarkan jawapan, padamkan tanda yang telah dibuat. Kemudian hitamkan jawapaan yang baru.*

6. *Rajah yang mengirimi soalan tidak dilukis mengikut skala kecuali dinyatakan.*

7. *Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan*

Question 1 *to* **Question 50** *are followed by four options* **A, B, C** *or* **D.**
Choose the best option for each question and blackened the corresponding space on the objective answer sheet.

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

1 Which of the following process occurs when iodine is heated?
Proses yang manakah berlaku apabila iodin dipanaskan?

A Melting
Peleburan

B Sublimation
Pemejalwapan

C Condensation
Kondensasi

D Boiling
Pendidihan

2 Which of the following statement provides the best evidence that matter exists as tiny particles moving at random ?
Pernyataan yang manakah memberikan bukti yang dapat menunjukkan jirim terdiri daripada zarah halus yang bergerak rawak?

A Metals can conduct electricity
Logam boleh mengkonduksi arus elektrik

B A thin layer is formed when oil is dropped onto water
Satu lapisan nipis terbentuk apabila minyak dititiskan di atas permukaaan air

C The smell of perfume is detected in all parts of the room when the bottle is opened
Bau harum minyak wangi tersebar ke seluruh ruang apabila penutup botol dibuka

D A small volume of water produces a large volume of steam
Isipadu kecil air dapat menghasilkan isipadu stim yang lebih besar

3 Which of the following process will increase the kinetic energy of the particles of a substance ?
Proses yang manakah antara berikut akan meningkatkan tenaga kinetik zarah-zarah bagi suatu bahan

A Condensation
Kondensasi

B Freezing
Pembekuan

C Boiling
Pendidihan

D Crystallization
Penghabluran

4 Which of the following substance consists of molecules?
Manakah bahan berikut mengandungi molekul?

A Naphthalene
Naftalena

B Copper
Kuprum

C Sodium chloride
Sodium chloride

D Lead(II) iodide

Plumbum(II) iodida

5 Diagram 1 shows the heating curve for substance P.
Rajah 1 menunjukkan lengkung pemanasan bagi bahan P.

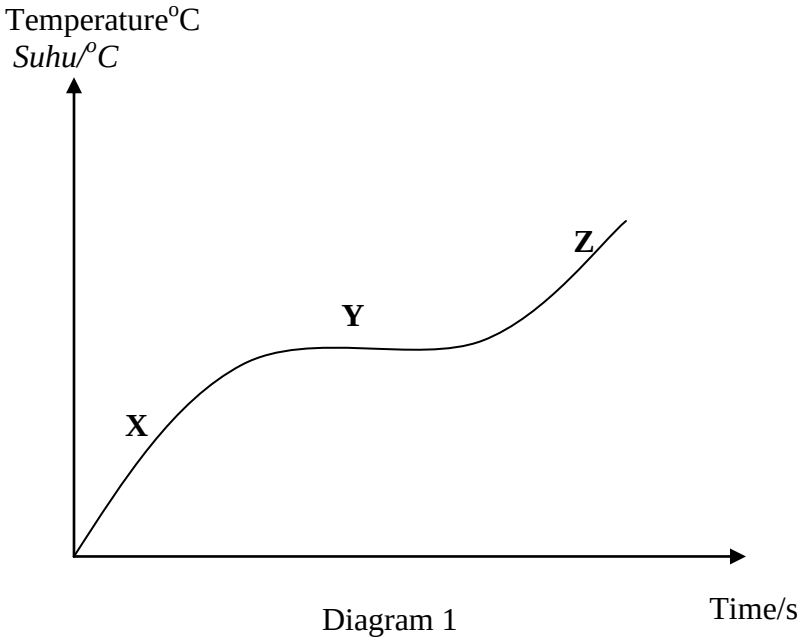


Diagram 1
Rajah 1

Which of the following gives the correct states of matter for substance P at X, Y and Z ?
Pernyataan manakah benar bagi menunjukkan keadaan rupa bentuk jirim bagi bahan P pada X, Y dan Z ?

	X	Y	Z
A	Solid *Pepejal*	Liquid *Cecair*	Gas
B	Solid *Pepejal*	Solid and liquid *Pepejal dan cecair*	Gas
C	Solid *Pepejal*	Solid and liquid *Pepejal dan cecair*	Liquid *Cecair*
D	Liquid *Cecair*	Liquid and gas *Cecair dan gas*	Solid *Pepejal*

6 An atom of element X has 13 protons and 14 neutrons in its nucleus. Which of the following is the electron arrangement of atom X ?
Atom bagi unsur X mempunyai 13 proton dan 14 neutron di dalam nukleusnya. Yang mana antara berikut merupakan susunan electron bagi atom X.

A 2.3
B 2.4
C 2.8.4
D 2.8.3

7 Statements below show the contribution of a scientist to the development of the Periodic Table of elements.
Pernyataan berikut menunjukkan sumbangan seorang ahli sains dalam perkembangan Jadual Berkala Unsur.

- Arranged all the known elements according to the ascending order of their atomic masses
- *Menyusun semua unsur yang diketahui berdasarkan susunan menaik jisim atom masing-masing*
- Showed that a periodic pattern existed among the elements using Law of Octaves
- *Menunjukkan corak berulang di antara unsur menggunakan Hukum Oktaf*

Who is the scientist ?
Siapakah ahli sains tersebut?
A Lothar Meyer
B John Newlands
C Antoine Lavoisier
D John W. Dobereiner

8 Table 1 shows the proton number of five elements. Which elements are in the same group in the Periodic Table?
Jadual 1 menunjukkan nombor proton bagi lima unsur.Unsur manakah berada di dalam kumpulan yang sama dalam Jadula Berkala?

Element *Unsur*	R	S	T	U	V
Proton number *Nombor proton*	9	11	12	15	17

Table 1
Jadual 1

A S and T

B R and S

C R and V

D S and U

9 Table 2 shows the electron arrangement of atom R, S, T and U.
Jadual 2 menunjukkan susunan elektron bagi atom R, S , T dan U..

Atom ***Atom***	**Arrangement of electron** ***Susunan elekkton***
R	2.4
S	2.6
T	2.8.1
U	2.8.7

Table 2
Jadual 2

Which of the following atoms can form ionic bond?
Antara pasangan atom-atom berikut, yang manakah boleh membentuk ikatan ionik?

A T and U
B R and U
C S and U
D R and S

10 Diagram 2 shows the set-up of the apparatus to determine the empirical formula of a metal oxide.
Rajah 2 *menunjukkan susunan radas untuk menentukan formula empirik suatu oksida logam.*

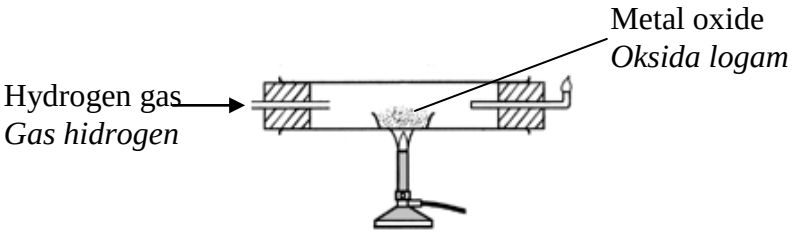


Diagram 2
Rajah 2

Which of the following metal oxide is suitable to be used in the experiment?
Antara oksida logam yang berikut, yang manakah sesuai digunakan dalam eksperimen tersebut?

A Magnesium oxide
Magnesium oksida
B Sodium oxide
Natrium oksida
C Zinc oxide
Zink oksida
D Lead(II) oxide
Plumbum(II) oksida

11 Diagram 3 shows a set-up of apparatus of a redox reaction.
Rajah 3 menunjukkan susunan radas untuk tindakbalas redoks.

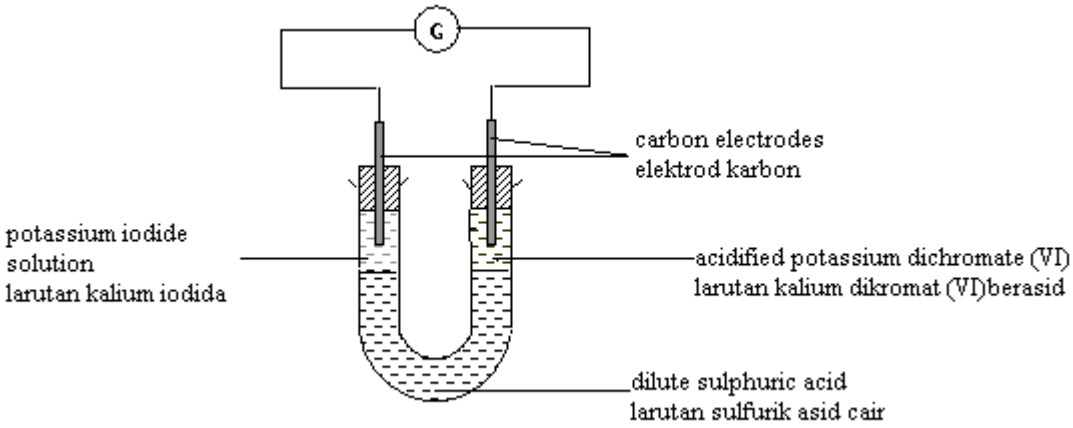


Diagram 3
Rajah 3

Which of the following changes in the oxidation numbers of the reactants are true?
Manakah antara pernyataan berikut adalah benar?

	Iodide ion in Potassium Iodide solution *Ion Iodida dalam Larutan kalium iodida*	Chromium in Acidified Potassium Dichromate (VI) *Kromium dalam Larutan kalium dikromat (VI) berasid*
A	0 → -1	+6 → +3
B	-1 → 0	+6 → +3
C	0 → -1	+3 → +6
D	-1 → 0	+3 → +6

12 Which of the following chemical equation represents a redox reaction ?
Yang manakah antara persamaan kimia berikut mewakili tindak balas Redoks?

A $HCl + NaOH \longrightarrow NaCl + H_2O$

B $NaCl + AgNO_3 \longrightarrow AgCl + NaNO_3$

C $Ba(OH)_2 + K_2SO_4 \longrightarrow BaSO_4 + 2\ KOH$

D $H_2 + Cl_2 \longrightarrow 2\ HCl$

13 Which of the following metals can be extracted from their ores by reduction of metal oxides using carbon ?
Yang manakah antara logam berikut boleh diekstrak dari bijihnya melalui tindak balas penurunan oksida logam dengan karbon?

I Iron
Besi
II Tin
Timah
III Aluminium
Aluminium
IV Magnesium
Magnesium

A I and II only

B II and IV only

C III and IV only

D I, II and III only

14 The rusting of an iron nail in a test tube containing water can be speed up by
Pengaratan paku besi dalam tabung uji berisi air dapat dipercepatkan dengan

A coiling it with a more electropositive metal
melilit paku itu dengan logam yang lebih elektropositif daripadanya

B placing the test tube in a refrigerator
meletakkan tabung uji itu ke dalam peti sejuk

C adding sodium chloride into the test tube
menambah natrium klorida ke dalam tabung uji

D pouring a layer of oil on top of the water in the test tube
menuang selapisan minyak ke atas air dalam tabung uji itu

15 Diagram 4 shows a set-up of apparatus for an electrolysis process
Rajah 4 menunjukkan susunan radas bagi suatu proses elektrolisis

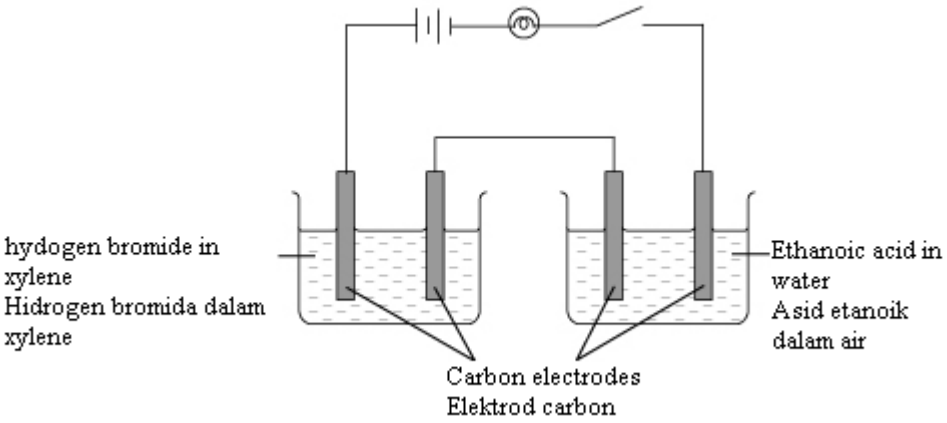


Diagram 4
Rajah 4

The bulb in the circuit will light up if
Mentol di dalam litar ini akan bernyala jika

A the carbon electrodes are replaced by metals
karbon elektrod digantikan dengan logam

B the ethanoic acid is replaced by hydrochloric acid
asid etanoik digantikan dengan asid hidroklorik

C xylene is replaced by water
xylene digantikan dengan air

D hydrogen bromide in xylene is heated during the electrolysis process
hidrogen bromida dalam xylene dipanaskan semasa proses elektrolisis ini

16 Calculate the mass of sodium hydroxide present in 100 cm^3 of 0.5 mol dm^{-3} sodium hydroxide solution.
Hitung jisim natrium hidroksida yang hadir dalam 100 cm^3 0.5 mol dm^{-3} larutan natrium hidroksida.
[Relative atomic mass: H,1; O,16; Na,23]

A 0.4 g
B 0.5 g
C 1.0 g
D 2.0 g

17 Table 3 shows the result of an experiment to construct the electrochemical series by displacement of metals from their salt solutions by a more elektropositive metal.
Jadual 3 menunjukkan keputusan bagi suatu eksperimen untuk membina Siri Elektrokimia melalui tindak balas penyesaran logam daripada larutan garamnya oleh logam yang lebih elektropositif.

Solution *Larutan* / Metal *Logam*	$P(NO_3)_2$	$Q(NO_3)_2$	$R(NO_3)_2$
P		√	√
Q	X		√
R	X	X	

√ - displacement reaction occurs *penyesaran berlaku*

X - no displacement reaction *penyesaran tidak berlaku*

Table 3
Jadual 3

Which of the following metals could be X, Y and Z ?
Yang manakah antara logam-logam berikut mungkin X,Y dan Z ?

	P	**Q**	**R**
A	Mg	Ag	Sn
B	Mg	Zn	Cu
C	Ag	Sn	Mg
D	Zn	Cu	Mg

18 Diagram 5 shows the set-up of apparatus for the electrolysis of dilute sodium chloride solution using carbon as electrodes.
Rajah 5 menunjukkan susunan radas bagi elektrolisis larutan natrium klorida cair menggunakan karbon sebagai elektrod.

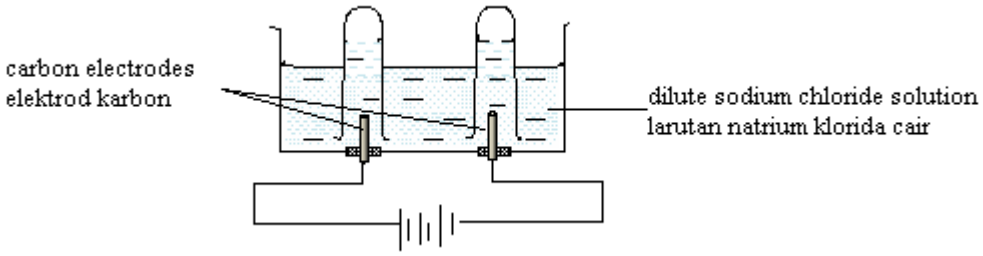


Diagram 5
Rajah 5

Which of the following statement is true for the electrolysis process ?
Yang manakah antara pernyataan –pernyataan berikut adalah benar bagi proses elektrolisis ini?

A The ions present in the electrolyte are sodium ions and chloride ions
Ion-ion yang hadir dalam eletrolit ialah ion natrium dan ion klorida

B Hydrogen gas is produced at the anode
Gas hidrogen dihasilkan di anod

C The factor that affects the product formed at the cathode is the concentration of electrolyte.
Faktor yang mempengaruhi hasil yang dibentuk di katod ialah kepekatan elektrolit

D When the gas collected at the cathode is tested with burning splinter, a 'pop' sound is produced.
Apabila gas yang dikumpulkan di katod diuji dengan kayu uji bernyala, bunyi 'pop' dihasilkan

19 M oxides can react with carbon to form metal M and carbon dioxide gas.The reactivity of the reaction is most reactive when the oxide of metal M is
Oksida logam M boleh bertindak balas dengan karbon untuk menghasilkan logam M dan gas karbon dioksida. Kereaktifan tindak balas ini paling cergas apabila oksida logam M ialah

A Tin oxide
Timah oksida

B Iron oxide
besi oksida

C Copper (II) oxide
Kuprum(II) oksida

D Magnesium oxide
Magnesium oksida

20 The chemical equation below represents the displacement reaction of Iodine from its halide solution using bromine.
Persamaan kimia di bawah mewakili tindak balas penyesaran Iodin daripada larutan halidanya oleh bromin.

$$2\,KI + Br_2 \longrightarrow I_2 + 2KBr$$

Which of the following statements are true for the reaction ?
Yang manakah di antara pernyataan –pernyataan berikut adalah benar bagi tindak balas ini?

I Bromine is reduced to bromide ion
Bromin diturunkan kepada ion bromida

II Bromine acts as the oxidising agent
Bromin bertindak sebagai agen pengoksidaan

III The oxidation number of bromine changes from 0 to -2
Nombor pengoksidaan bromin bertukar dari) ke -2

IV Iodide ions release electron in the reaction to form Iodine
Ion iodida melepaskan elektron dalam tindak balas untuk menghasilkan Iodin

A I and II only

B III and IV only

C I, II and IV only

D I, II , III and IV

21 Which of the substance below can be used to neutralize the insect sting which is alkaline?
Bahan yang manakah antara berikut paling sesuai digunakan untuk meneutralkan sengatan serangga yang bersifat alkali?

A Carbon
Karbon

B Vinegar
Cuka

C Common salt
Garam

D Sodium bicarbonate
Natrium bikarbonat

22 Diagram 6 shows a set-up of the apparatus of a chemical cell .
Rajah 6 menunjukkan susunan radas bagi suatu sel kimia.

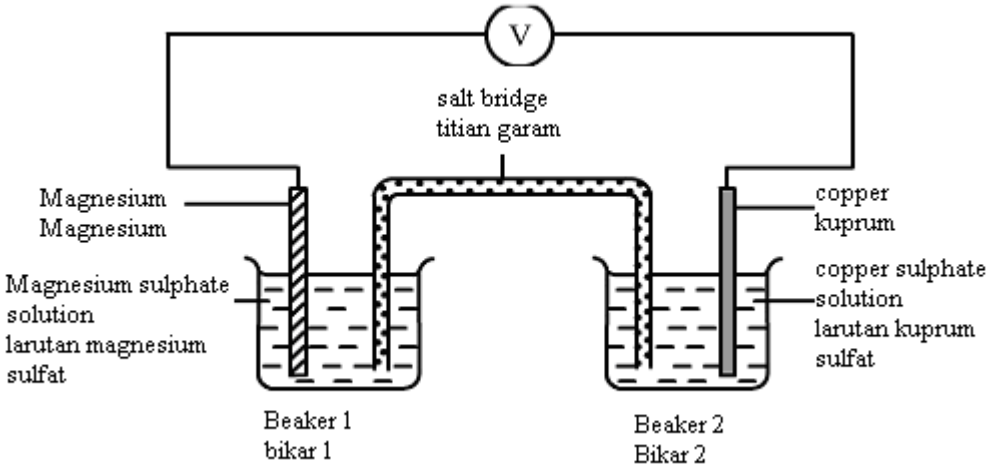


Diagram 6
Rajah 6

The following statements are true for the reaction in this chemical cell except
Pernyataan-pernyataan berikut adalah benar untuk tindak balas yang berlaku di dalam sel kimia ini kecuali

A magnesium electrode increases in size
saiz elektrod magnesium bertambah
B the intensity of the blue colour of copper (II) sulphate solution decreases
keamatan warna biru larutan kuprum (II) sulfat berkurangan
C Copper acts as the positive terminal in the chemical cell
Kuprum bertindak sebagai terminal positive dalam sel kimia ini
D The flow of electron is from magnesium electrode to copper electrode in the external circuit.
Pengaliran eletron adalah dari elektrod magnesium ke elektrod kupprum dalam litar luar

23 Which of the following acid is a weak acid?
Antara asid berikut, yang manakah merupakan asid lemah?

A Hydrochloric acid
Asid hidroklorik
B Ethanoic acid
Asid etanoik
C Nitric acid
Asid nitrik
D Sulphuric acid
Sulfurik asid

24 Diagram 7 shows the flow of ammonia gas into distilled water which contains a few drops of phenolphthalein.
Rajah 7 menunjukkan gas ammonia yang dialirkan ke dalam air suling yang mengandungi beberapa titik fenolftalein.

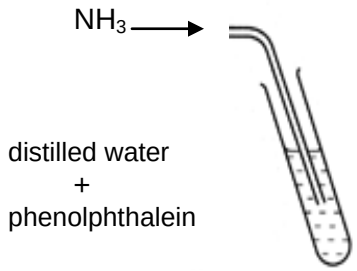


Diagram 7
Rajah 7

Which of the following is the correct observation of the solution?
Yang mana antara berikut menunjukkan pemerhatian yang betul bagi larutan tersebut?

A The solution remains colourless.
Larutan itu kekal menjadi tidak berwarna
B Red solution turns purple.
Larutan merah mejadi ungu
C Green solution turns to red.
Larutan hijau menjadi merah.
D The colourless solution turns pink.
Larutan tanpa warna menjadi merah jambu.

25 A precipitate is formed when hydrochloric acid is added to solution X. Which of the following solution is most probably solution X?
Mendakan terbentuk apabila asid hidroklorik ditambah kepada larutan X. Antara larutan berikut, yang manakah mungkin larutan X?

A Zinc nitrate
Zink nitrat
B Silver nitrate
Argentum nitrat
C Calcium nitrate
Kalsium nitrat
D Magnesium nitrate
Magnesium nitrat

26 A beaker contains 100 cm^3 of 0.5 mol dm^{-3} sodium chloride solution.
Calculate the number of moles of sodium chloride in the beaker.
Sebuah bikar mengandungi 100 cm^3 larutan natrium klorida 0.5 mol dm^{-3}. Hitung bilangan mol bagi natrium klorida dalam bikar.

A 0.05
B 0.50
C 5.00
D 50.0

27 Table 4 shows the volume and the type of acid in four different beakers.
Jadual 4 berikut menunjukkan isipadu dan jenis asid yang diisi ke dalam empat bikar yang berasingan.

Beaker A	**Beaker B**	**Beaker C**	**Beaker D**
25cm^3 1 moldm^{-3} hydrochloric acid. *25 cm^3 1 moldm^{-3} asid hidroklorik*	25 cm^3 1moldm^{-3} sulphuric acid. *25 cm^3 1 mol dm^3 asid sulfurik,*	25 cm^3 1 moldm^{-3} ethanoic acid. *25 cm^3 1 moldm^{-3} asid etanoik*	25 cm^3 1 moldm^{-3} nitric acid. *25 cm^3 1 moldm^{-3} asid nitrik*

Table 4
Jadual 4

Which of the acid has the highest concentration of hydrogen ions?
Larutan asid yang manakah mengandungi kepekatan ion hidrogen yang paling tinggi?

A Beaker A
B Beaker B
C Beaker C
D Beaker D

28 200 cm^3 of 0.5 moldm^{-3} hydrochloric acid was prepared from a standard solution 2 moldm^{-3} hydrochloric acid. Calculate the volume of the standard solution of 2 moldm^{-3} hydrochloric acid needed to be diluted with water.
200 cm^3 0.5 moldm^{-3} larutan asid hidroklorik disediakan daripada larutan piawai asid hidroklorik berkepekatan 2 moldm^{-3}. Hitung isipadu larutan piawai yang diperlukan untuk pencairan tersebut.

A 50 cm^3
B 75 cm^3
C 100 cm^3
D 150 cm^3

29 Which of the following pairs of compounds are in the same homologous series?
Manakah antara pasangan sebatian berikut berada dalam siri homolog yang sama?

	Compound 1 ***Sebatian 1***	**Compound 2** ***Sebatian 2***
A	C_2H_4	C_4H_{10}
B	C_2H_6	C_6H_6
C	C_2H_5OH	$CH_3CH_2CH_2OH$
D	C_2H_5OH	C_2H_5COOH

30 Diagram 8 shows the observation for the comformation test for nitrate ion.
Rajah 8 menunjukkan pemerhatian bagi ujian pengesahan ion nitrat.

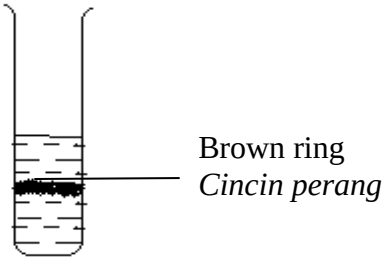


Diagram 8
Rajah 8

Which of the solutions are used to produce the brown ring?
Larutan yang manakah boleh digunakan untuk menghasilkan cincin perang tersebut?

I Dilute sulphuric acid
Larutan asid sulfurik cair
II Iron(II) sulphate solution
Larutan ferum(II) sulfat
III Nitric acid solution
Larutan asid nitrik
IV Concentrated sulphuric acid
Larutan asid sulfurik pekat

A I dan III only
B I, II dan III only
C II dan IV only
D I, II dan IV only

31 The equation below shows the reaction between copper(II) oxide and dilute nitic acid.
Persamaan dibawah menunjukkan tindakbalas di antara kuprum(II) oksida dan asid nitrik cair.

$$CuO + 2HNO_3 \rightarrow Cu(NO_3)_2 + H_2O$$

Calculate the mass of copper(II) nitrate salt formed when 3.2g of copper(II) oxide powder reacts with excess dilute nitric acid.
Hitung jisim garam kuprum(II) nitrat yang akan terbentuk apabila 3.2 g serbuk kuprum(II) oksida bertindakbalas dengan asid nitric cair berlebihan.
[relative atomic mass : Cu = 64 ; O = 16 ; N=14]
A 3.76 g
B 4.90 g
C 5.04 g
D 7.52 g

32 Vanadium(V) oxide is a catalyst that is used in
Vanadium(V) oksida ialah mangkin yang digunakan dalam

A Haber process
Proses Haber
B Contact Process
Proses Sentuh
C Oswald Process
Proses Oswald
D Hydrogenation process
Proses penghidrogenan

33 All the following medicines relieve pain **except**
*Semua ubat berikut mengurangkan kesakitan **kecuali***
A aspirin
aspirin
B codeine
kodeina
C paracetamol
parasetamol
D streptomycin
streptomisin

34 Choose the statements that are **true** about detergent
*Pilih pernyataan yang **benar** mengenai detergen*

I Detergent is non-biodegradable
Detergen tidak terbiodegradasi
II Detergent is still effective in hard water
Detergen masih berkesan dalam air liat
III Detergent clean better compared to soap
Detergen membersih lebih baik berbanding sabun
IV Detergent can be custom-made for a specific cleaning task.
Detergen boleh dihasilkan untuk tujuan pembersihan tertentu

A I and II only

B III and IV only

C II, III and IV only

D I, II, III and IV

35 The following word equation shows the preparation of soaps.
Persamaan perkataan berikut menunjukkan proses penyediaan sabun.

Fats + sodium hydroxide → glycerol + soaps
Lemak + natrium hidroksida → gliserol + sabun

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

A Saponification
Saponifikasi
B Dehydration
Pendehidratan
C Neutralization
Peneutralan
D Fermentation
Penapaian

36 When 25 cm^3 of 0.25 mol dm^{-3} silver nitrate solution is added into 25 cm^3 of 0.25 mol dm^{-3} sodium chloride solution, the temperature of the mixture rises by 3^oC. What is the quantity of heat released in this experiment?

Apabila 25 cm^3 of 0.25 mol dm^{-3} larutan argentum nitrat ditambah ke 25 cm^3 of 0.25 mol dm^{-3} larutan natrium klorida, suhu campuran tersebut meningkat sebanyak 3^oC. Apakah kuantiti haba yang dibebaskan di dalam eksperimen ini.

(Specific heat capacity of water = 4.2 J g^{-1} $^oC^{-1}$)
(Muatan haba tentu air = 4.2J g^{-1} $^oC^{-1}$)

A 25 x 4.2 x 0.25 x 3.0 J
B 50 x 4.2 x 3.0 J
C 50 x 4.2 x 0.25 x 3.0 J
D 25 x 4.2 x 3.0 J

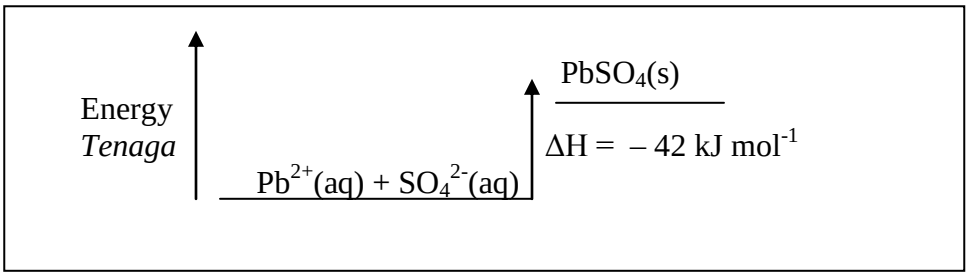
37 The time taken for the reaction between lumps of marble with sulphuric acid can be shorten by
Masa yang diambil untuk tindak balas antara ketulan marmar dengan asid sulfurik boleh dipendekkan dengan
A adding distilled water
menambahkan air suling
B adding concentrated of sulphuric acid
menambahkan asid sulfurik pekat
C Using the bigger size of marbles
menggunakan saiz marmar yang lebih besar
D keeping the mixture of the reaction in refrigerator
meletakkan campuran tindak balas di dalam peti sejuk

38 The thermochemical equation represents the precipitation of lead(II) sulphate :
Persamaan termokimia mewakili tindak balas bagi pemendakan plumbum(II) sulfat:

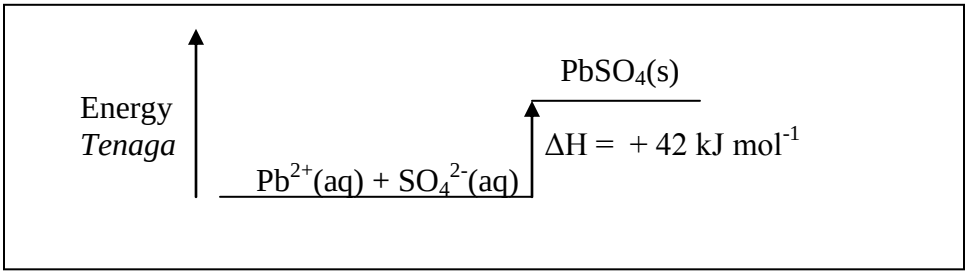
$$Pb^{2+}(aq) + SO_4^{2-}(aq) \rightarrow PbSO_4(s) \qquad \Delta H = -42 \text{ kJ mol}^{-1}$$

Which energy level diagram is correct ?
Gambar rajah aras tenaga manakah yang betul ?

A



B



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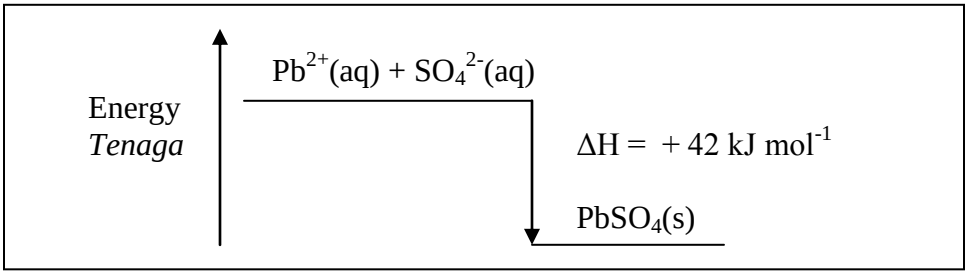
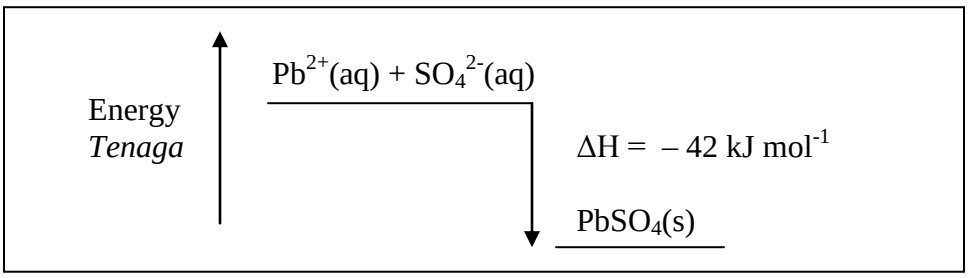


D



39 The thermochemical equation for displacement of copper by zinc is given below.
Persamaan termokimia bagi penyesaran kuprum oleh zink diberikan seperti dibawah.

$$Zn(s) + CuSO_4(aq) \rightarrow ZnSO_4(aq) + Cu(s) \qquad \Delta H = -210 \text{ kJ mol}^{-1}$$

What is the mass of copper, Cu formed when 84 kJ of heat is released?
[Relative atomic mass: Cu = 64]
Berapakah jisim kuprum, Cu yang terbentuk apabila 84 kJ haba dibebaskan?
[Jisim atom relatif: Cu = 64]

A 3.3 g
B 25.6 g
C 160.0 g
D 0.4 g

40 Which acid produces the highest rate of reaction when reacts with 2 g of magnesium?
Asid manakah menghasilkan kadar tindak balas yang paling tinggi apabila bertindak balas dengan 2 g magnesium ?

A 100 cm^3 of 0.1 mol dm^{-3} nitric acid
100 cm^3 asid nitrik 0.1 mol dm^{-3}
B 100 cm^3 of 0.1 mol dm^{-3} sulphuric acid
100 cm^3 asid sulfurik 0.1 mol dm^{-3}
C 100cm^3 of 0.1 mol dm^{-3} ethanoic acid
100 cm^3 asid etanoik 0.1 mol dm^{-3}
D 100 cm^3 0.1 mol dm^{-3} hydrochloric acid
100cm^3 asid hidroklorik 0.1 mol dm^{-3}

41 The following information shows the effect of concentration on the rate of reaction.
Kenyataan berikut menunjukkan kesan kepekatan terhadap kadar tindak balas.

When the concentration of sodium thiosulphate, $Na_2S_2O_3$ solution increases, the time taken for the mark 'X' to disappear from sight becomes shorter.

Which of the following statement best concludes about the information above?
Manakah antara yang berikut merupakan kesimpulan terbaik tentang kenyataan di atas?
A The concentration is directly proportional to the time taken
Kepekatan berkadar terus dengan masa
B The rate of reaction is directly proportional to the time taken
Kadar tindak balas berkadar terus dengan masa
C The rate of reaction is directly proportional to the concentration
Kadar tindak balas berkadar terus dengan kepekatan
D The rate of reaction is inversely proportional to the concentration

Kadar tindak balas berkadar songsang dengan kepekatan

42 The molecular formula of an organic compound is C_4H_{10}.
Formula molekul sebatian organik adalah C_4H_{10}.

Which of the following is the isomer for the above molecular formula?
Antara yang berikut, yang manakah isomer bagi formula molekul di atas?

A $CH_2= CH-CH_2-CH_3$

B $CH_3-CH=CH-CH_3$

C
```
CH3-CH- CH3
       |
      CH3
```

D
```
CH3-CH2-  CH2
          |
         CH3
```

43 Photochromic glass darkens on exposure to sunlight. The salt used to make photochromic glass is
Kaca fotokromik menjadi gelap apabila didedahkan kepada cahaya matahari. Garam yang digunakan untuk membuat kaca fotokromik ialah

A Silver chloride
Argentum klorida

B Iron(II) sulphate
Ferum (II) sulfat

C Lead(II) nitrate
plumbum(II) nitrat

D Copper(II) sulphate
Kuprum(II) sulfat

44 Which of the following pairs of compounds are in the same homologous series?
Manakah antara pasangan sebatian berikut berada dalam siri homolog yang sama?

	Compound 1 ***Sebatian 1***	**Compound 2** ***Sebatian 2***
A	C_2H_4	C_4H_{10}
B	C_2H_6	C_6H_6
C	C_2H_5OH	$CH_3CH_2CH_2OH$
D	C_2H_5OH	C_2H_5COOH

45 Diagram 9 shows the graph of total volume of carbon dioxide against time for the reaction of calcium carbonate with dilute acid for experiment P and experiment Q.
Rajah 9 menunjukkan graf bagi jumlah isipadu karbon dioksida melawan masa bagi tindak balas kalsium karbonat dengan asid cair bagi eksperimen P dan eksperimen Q.

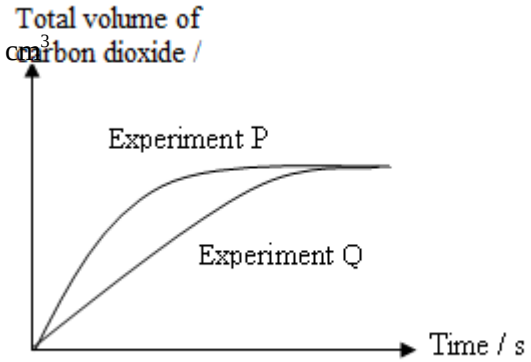


Diagram 9
Rajah 9

Which of the following explains the differences between both curves from the experiments?
Antara berikut, yang manakah menerangkan perbezaan antara dua lengkungan bagi eksperimen tersebut?

I The mixture of the reaction in experiment P is being heated compared to experiment Q
Campuran tindak balas dalam eksperimen P dipanaskan berbanding eksperimen Q

II Catalyst is used in experiment P but not in experiment Q
Mangkin digunakan dalam eksperimen P tetapi tidak dalam eksperimen Q

III Quantities of calcium carbonate and acid used in experiment P are more than that in experiment Q
Kuantiti kalsium karbonat dan asid yang digunakan dalam eksperimen P melebihi daripada eksperimen Q

IV The size of calcium carbonate used in experiment P is smaller than experiment Q
Saiz kalsium karbonat yang digunakan dalam eksperimen P lebih kecil daripada eksperimen Q

A III and IV only
B I, II and III only
C I, II and IV only
D I, II , III and IV

46 The following equation represents the reaction between propene and bromine.
Persamaan berikut mewakili tindak balas antara propena dan bromin.

$$\text{Propene} + Br_2 \rightarrow X$$
$$\textit{Propena} + Br_2 \rightarrow X$$

What is the IUPAC name of compound X?
Apakah nama IUPAC bagi sebatian X?

A Tetrabromopropane
Tetrabromopropana
B 1-bromopropane
1-bromopopana
C 1,1-dibromopropane
1,1-dibromopropana
D 1,2-dibromopropane
1,2-dibromopropana

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

A Aspartame
Aspartam
B Monosodium glutamate
Mononatrium glutamat
C Ascorbic acid
Asid askorbik
D Benzoic acid
Asid benzoik

48

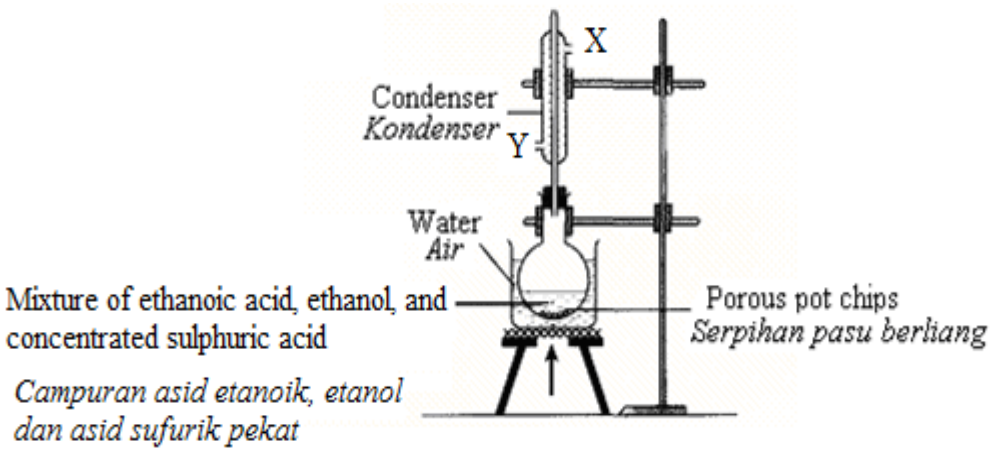


Diagram 10
Rajah 10

Diagram 10 shows the set-up of apparatus to prepare an organic compound in the laboratory.
Rajah 10 menunjukkan susunan radas untuk menyediakan suatu sebatian organik dalam makmal.

Which of the following statements are true about the experiment?
Manakah antara berikut benar mengenai eksperimen?

I The water is in from X and is out from Y.
Air masuk melalui X dan keluar melalui Y.

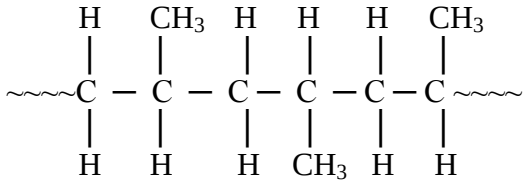
II Concentrated sulphuric acid is used as a catalyst.
Asid sulfurik pekat digunakan sebagai mangkin.

III The distillate collected is an ester
Hasil sulingan yang diperolehi adalah dari ester

IV The porous pot chips are added to prevent bumping when boiling the mixture.
Serpihan pasu berliang dimasukkan untuk mencegah pembuakan ketika pendidihan campuran.

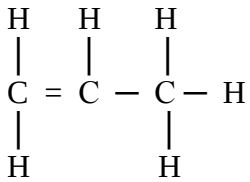
A I and II
B I and IV
C I, II and III
D II, III and IV

49 Part of the structure of polymer is shown below .
Struktur sebahagian daripada suatu polimer ditunjukkan di bawah

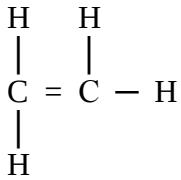


Which of the following is the monomer of the polymer?
Di antara berikut yang manakah monomer bagi polimer tersebut?

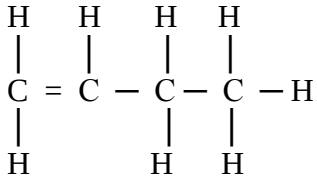
A



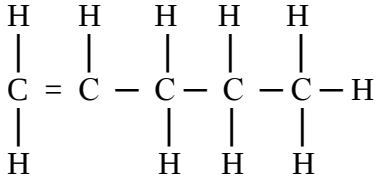
B



C



D



50 In an experiment, hydrogen peroxide, H_2O_2 solution decomposes completely to produce oxygen gas.
Dalam suatu eksperimen, larutan hidrogen peroksida, H_2O_2 terurai dengan lengkap menghasilkan oksigen.

Diagram 11 shows an energy profile diagram. E_a is the activation energy for the decomposition of hydrogen peroxide.
Rajah 11 menunjukkan suatu gambar rajah profil tenaga. E_a ialah tenaga pengaktifan bagi penguraian hidrogen peroksida

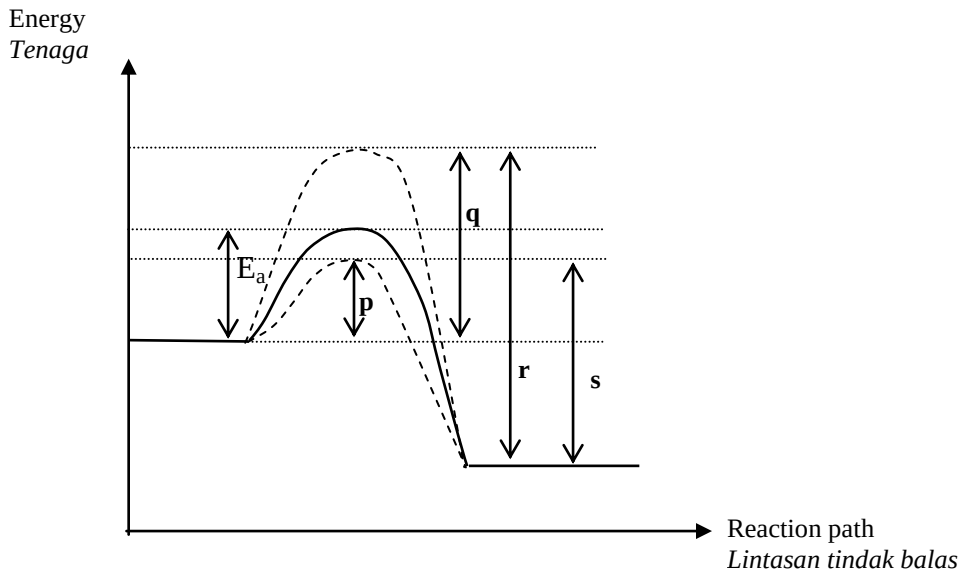


Diagram 11
Rajah 11

Which of the following is the activation energy for the dissociation of hydrogen peroxide when manganese(IV) oxide is added?
*Antara berikut yang manakah tenaga pengaktifan bagi penguraian hidrogen peroksida apabila mangan(*IV*) oksida ditambahkan*?

A p
B q
C r
D s

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

SULIT

4541/2
Chemistry
Kertas 2
September
2 ½ jam

Nama

Tingkatan

PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA SEKOLAH MENENGAH MALAYSIA (PKPSM) CAWANGAN MELAKA DENGAN KERJASAMA JABATAN PELAJARAN MELAKA

PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2010

CHEMISTRY

Kertas 2
Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini mengandungi tiga bahagian:* ***Bahagian A, Bahagian B and Bahagian C.***
2. *Jawab* ***semua soalan dalam Bahagian*** **A.** *Tulis jawapan dalam* Bahagian **A** *dalam ruangan yang disediakan..*
3. *Jawab* ***satu*** *soalan dalam* ***Bahagian B*** *dan satu soalan dalan* ***Bahagian C.*** *Jawab saoalan dalam* ***Bahagian A*** *dan* ***Bahagian B*** *dengan terperinci. Anda boleh menggunakan persamaan kimia, rajah, jadual, graf dan kaedah yang bersesuaian untuk menerangkan jawapan anda.*
4. *Tunjukkan jalan kerja. Ia dapat membantu anda mendapat markah.*
5. *Rajah dalam soalan tidak dilukis mengikut skala.*
6. *Markah yang diperuntukkan bagi setiap soalan ditunjukkan dalam kurungan.*
7. *Anda boleh menggunakan kalkulator saintifik yang tidak diprogramkan.*
8. *Serahkan kertas jawapan pada akhir waktu peperiksaan.*

Untuk kegunaan pemeriksa		
Bahagian	No.	Markah
A	1	
	2	
	3	
	4	
	5	
	6	
Jumlah		
B	7	
	8	
Jumlah		
C	9	
	10	
Jumlah		
Jumlah Markah		

Kertas soalan ini mengandungi 24 halaman bercetak

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of three sections: **Section A**, **Section B** and **Section C.**
   Kertas soalan ini mengandungi tiga bahagian: ***Bahagian A,*** **Bahagian B** *dan* **Bahagian C.**

2. Answer **all** questions in Section A. Write your answers for **Section A** in the spaces provided in the question paper.
   Jawab **semua** *soalan dalam* **Bahagian A.** *Tuliskan jawapan bagi* **Bahagian A** *dalam ruang yang disediakan dalam kertas soalan.*

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

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

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

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

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

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

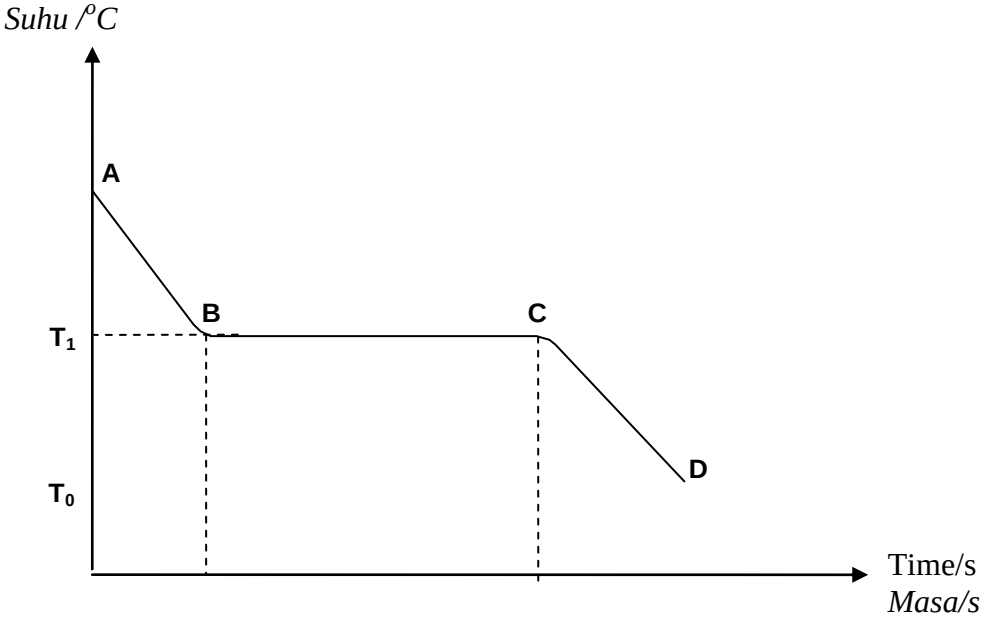
9. You may use a non-programmable scientific calculator.
   Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.

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

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

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

1 Diagram 1.1 shows the graph temperature against time when liquid naphthalene is cooled
Rajah 1.1 menunjukkan graf suhu melawan masa apabila cecair naftalena disejukkan



Rajah 1.1

` (a State the freezing point of naphthalene.
Nyatakan takat beku bagi naftalena

…….....
[1mark]

1(a) 1

(b) What is the physical state of naphthalene at:
Apakah keadaan fizik bagi naftalena pada

(i) AB :……..

(ii) CD :……
[2marks]

1(b)(i)(ii) 2

(c) Explain why there is no change in temperature from B to C.
Terangkan mengapa tiada perubahan suhu dari B ke C

1(c)

.....

.....

2

[2marks]

(d) Draw the arrangement of naphthalene particles at CD
Lukiskan susunan zarah naftalena pada CD

1(d)

1

[1mark]

(e) Table 1.2 shows four substances and their respective formulae.
Jadual 1.2 menunjukkan empat bahan dan formula kimianya.

Substances *Bahan*	Chemical formula *Formula kimia*
Bromine *Bromine*	Br_2
Iron *Besi*	Fe
Naphthalene *Naftalena*	$C_{10}H_8$
Copper(II) sulphate Kuprum(II) sulfat	$CuSO_4$

Table 1.1

Use information from Table 1.1 to answer the following questions.
Gunakan maklumat daripada Jadual 1.1 untuk menjawab soalan berikut

(i) State one compound which exist as a molecule.
Nyatakan satu sebatian yang wujud dalam bentuk molekul

1(e)(i)

.....

1

[1mark]

(ii) Which substance can conduct electricity in the solid state?
Bahan yang manakah dapat mengalirkan arus elektrik dalam keadaan pepejal ?

1(e)(ii)

.....

1

[1mark]

(iii) What type of particles are present in copper(II) sulphate?
Apakah jenis zarah yang terdapat dalam kuprum(II) sulfat ?

.....
[1mark]

1(e)(iii) 1

(f) A few drops of liquid bromine are dropped into a gas jar. The brown bromine vapour spreads to the upper part of the gas jar.
Beberapa titik cecair bromin dimasukkan ke dalam balang gas. Warna perang gas bromin memenuhi bahagian atas balang gas tersebut.

Name the process that occurs.
Namakan proses yang berlaku

……
[1mark]

1(f) 1

Total A1 10

2 The diagram 2.1 shows the electron arrangements for five atoms of elements found in the Periodic Table.
Rajah 2.1 menunjukkan susunan elektron bagi lima atom unsur yang terdapat di dalam Jadual Berkala Unsur.

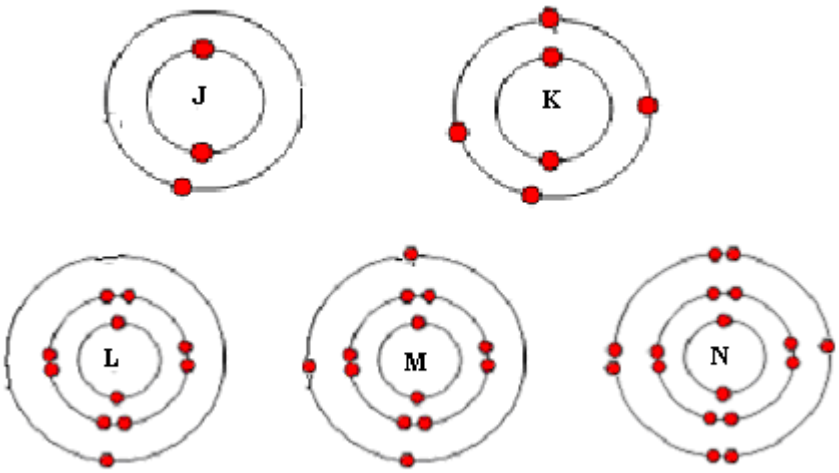


Diagram 2.1
Rajah 2.1

(a) (i) State the position of element M in the Periodic Table of Elements.
Nyatakan kedudukan unsur M di dalam Jadual Berkala Unsur.

……...
[1mark]

2(a)(i) 1

(ii) Which of these elements have the same chemical properties.
Yang manakah antara unsur-unsur berikut mempunyai sifat kimia yang sama?

……
[1mark]

2(a)(ii) 1

(b) (i) State one observation when element L reacts with water.
Nyatakan satu pemerhatian apabila unsur L bertindak balas dengan air.

……

……
[1 mark]

2(b)(i) 1

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

……
[2 marks]

2(b)(ii) 2

(c) Which of these elements will form amphoteric oxide?
Yang manakah antara unsur-unsur tersebut menghasilkan oksida amfoterik?

.....
[1mark]

2(c) 1

(d) (i) State the type of chemical bond that forms between element K and element N.
Nyatakan jenis ikatan kimia yang terbentuk di antara unsur K dan unsur N .

……
[1mark]

2(d)(i) 1

(ii) Draw the electron arrangement for the compound that forms in (d)(i).
Lukiskan susunan elektron bagi sebatian yang terbentuk di (d)(i).

[2marks]

2(d)(ii) 2

(iii) Give one physical property of the compound formed.
Berikan satu sifat fizik bagi sebatian yang terbentuk itu.

2(d)(iii)

1

……

[1mark]

Total A2

10

3 Step 1 and step 2 in diagram 3.1 show the steps in preparation of copper (II) carbonate from copper (II) oxide, whereas step 3 shows the thermal decomposition of copper(II) carbonate to copper (II) oxide
Langkah 1 dan langkah 2 dalam rajah 3.1 menunjukkan langkah-langkah dalam penyediaan kuprum (II) karbonat daripada kuprum (II) oksida, sementara langkah 3 menunjukkan penguraian secara pemanasan kuprum (II) karbonat kepada kuprum (II) oksida
.

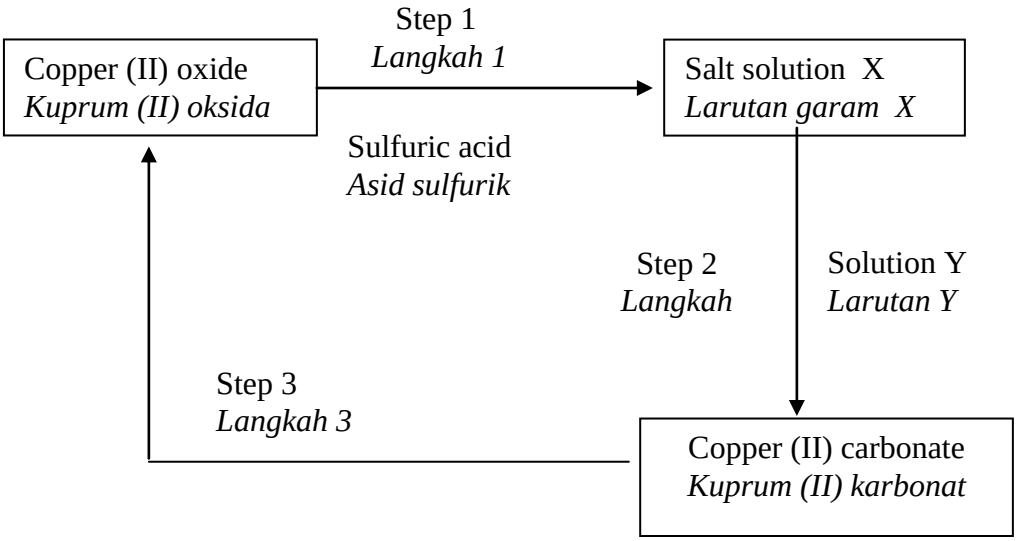


Diagram 3.1
Rajah 3.1

(a) State the colour of copper (II) oxide.
Nyatakan warna kuprum (II) oksida..

…….....
[1mark]

3(a) 1

(b) Name salt solution X.
Namakan larutan garam X

……
[1mark]

3(b) 1

(c) (i) Suggest solution Y that is required to be added to solution X to produce copper (II) carbonate.
Cadangkan larutan Y yang perlu ditambah kepada larutan X *untuk menghasilkan kuprum (II) karbonat*.

……
[1mark]

3(c)(i) 1

(ii) Write an ionic equation for the formation of copper (II) carbonate in (c) (i).
Tuliskan persamaan ion bagi pembentukan kuprum (II) karbonat in (c)(i)..

……

[1mark]

3(c)(ii) 1

(d) In step I, 50 cm^3 of 0.2 $moldm^{-3}$ sulphuric acid reacts with excess copper (II) oxide.
50 cm^3 asid sulfurik 0.2 mol dm^{-3} bertindak balas dengan kuprum (II) oksida yang berlebihan.

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

.....

[1mark]

3(d)(i) 1

(ii) Calculate the mass of salt X produced
Hitungkan jisim garam X *yang terhasil.*

[Given that relative atomic mass Cu=64 , S=32 ,O=16]
[*Diberi jisim atom relatif* Cu=64 , S=32 ,O=16]

[3 *marks*]

3(d)(ii) 3

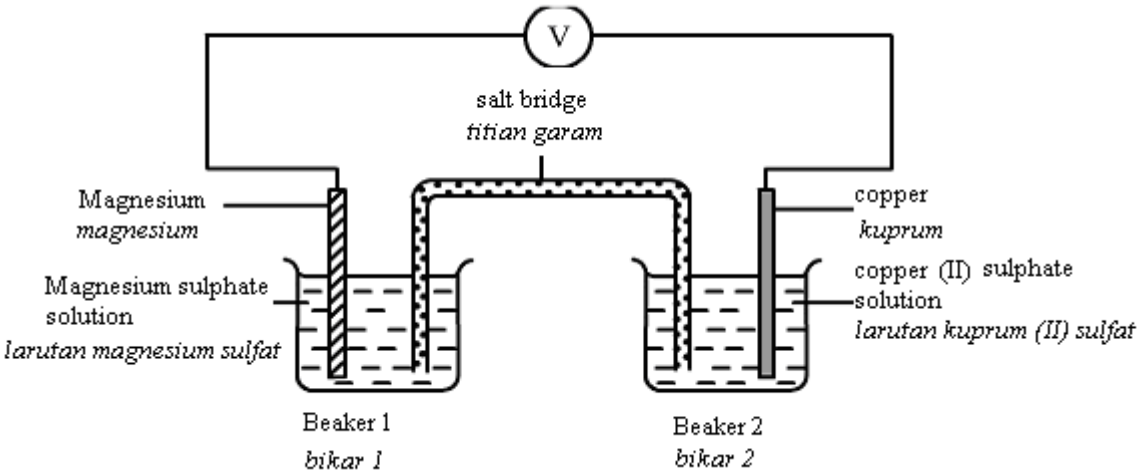
(e) Draw a labelled diagram of the set-up of apparatus to convert copper (II) carbonate to copper (II) oxide.
Lukis susunan radas berlabel untuk penukaran kuprum(II) karbonat kepada kuprum (II) oksida .

[2marks]

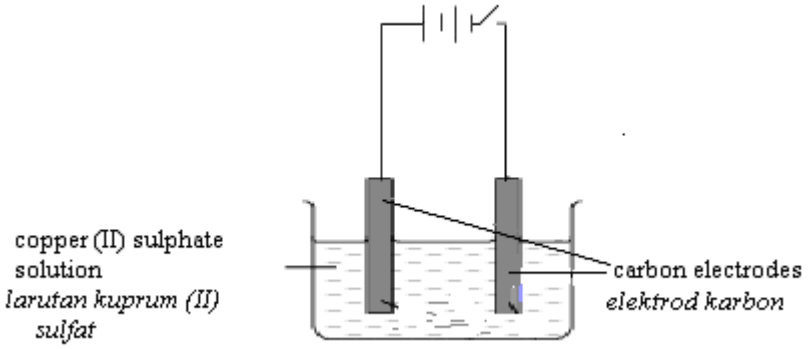
3(e) 2

Total A3 10

4 The diagram 4.1 below shows the set-up of apparatus for two types of cells.
Rajah 4.1 di bawah menunjukkan susunan radas bagi dua jenis sel.



Cell 1
Sel 1



Cell 2
Sel 2

Diagram 4.1
Rajah 4.1

(a) Name the type of cells in cell 1 and cell 2.
Namakan jenis Sel 1 dan Sel 2.

Cell 1 : Cell 2 :
Sel 1 : ……. *Sel 2* : ……..

[2 mark]

4(a)
2

(b) State the energy change that takes place in cell 1.
Nyatakan perubahan tenaga yang berlaku dalam Sel 1.

……...
[1 mark]

4(b) 1

(c) (i) State one observation in the electrolyte you would expect in beaker 2 of cell 1.
Nyatakan satu pemerhatian yang dijangkakan di dalam elektrolit dalam bikar 2 Sel 1.

…….

…….
[1mark]

4(c)(i) 1

(ii) Explain your answer in 1(c)(i) .
Terangkan jawapan anda di 1(c) (i) .

……

…….
[1mark]

4(c)(ii) 1

(d) Label the negative terminal of cell 1 in the diagram 4.1
Labelkan terminal negatif bagi sel 1 di rajah 4.1
[1mark]

4(d) 1

(e) State all the ions present in the electrolyte in cell 2 .
Nyatakan semua ions yang hadir dalam elektrolit di dalam sel 2 .

……. …..
[1mark]

4(e) 1

(f) The circuit in cell 2 is completed and the current is allowed to flow for ten minutes.
Litar dalam sel 2 dilengkapkan dan arus elektrik dibenarkan mengalir selama 10 minit.

(i) State the observation at the anode of this cell.
Nyatakan pemerhatian di anod bagi sel ini.

……

…….
[1mark]

4(f)(i) 1

(ii) Write the half equation for the reaction at the anode.

Tulis setengah persamaan bagi tindak balas di anod. 4(f)(ii)

…… [1mark] 1

(g) Give one similarity between Cell 1 and Cell 2 in terms of their redox reaction.
Berikan satu persamaan di antara Sel 1 dan Sel 2 dari segi tindak balas redoksnya.

…… 4(g)

…… [1mark] 1

Total A4

10

5 Diagram 5.1 shows the conversion of organic compounds from one homologous series to another.
Rajah 5.1 menunjukkan perubahan sebatian organik dari satu siri homolog ke siri homolog yang lain .

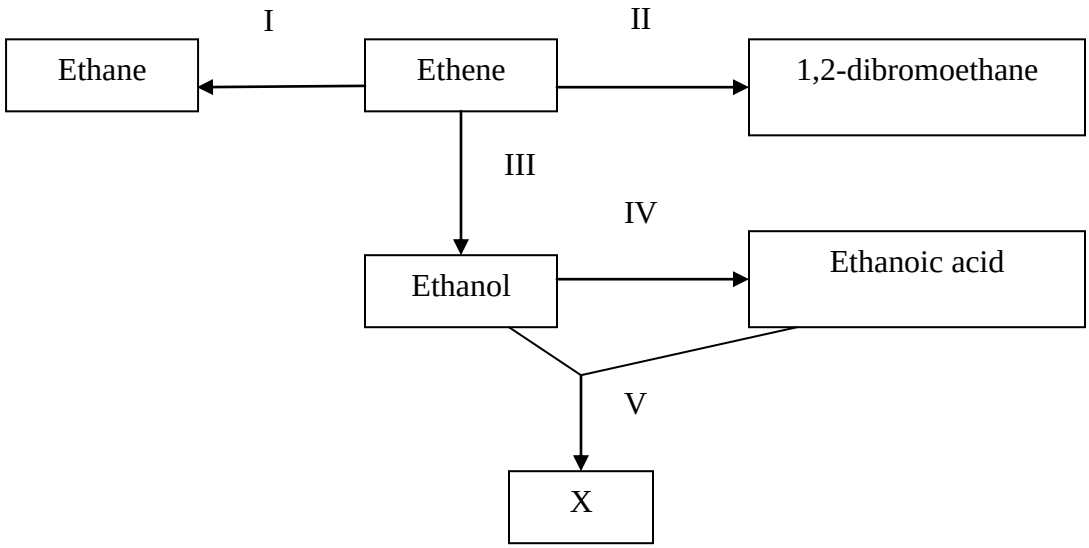


Diagram 5.1
Rajah 5.1

(a) (i) Name the reaction that occurs in Conversion I
Namakan tindak balas yang berlaku dalam Perubahan I ?

5(a)(i)

……..……..……
[1 mark]

1

(ii) Name the reagent used in Conversion II.
Namakan bahan tindak balas yang digunakan dalam Perubahan II.

5(a)(ii)

……..……
[1 mark]

1

(b) Write the chemical equation for Conversion II.
Tuliskan persamaan kimia untuk Perubahan II .

5(b)

……..……
[1 mark]

1

(c) Name the catalyst used in Conversion III.
Namakan mangkin yang digunakan dalam Perubahan III .

5(c)

.....……
[1 mark]

1

(d) Acidified potassium dichromate (VI) solution is used for Conversion IV.
Larutan kalium dikromat(VI) berasid digunakan untuk Perubahan IV.

(i) State the observation for this reaction.
Nyatakan pemerhatian bagi tindak balas ini .

5(d)(i)

……..……
[1 mark]

1

(ii) Write the chemical equation for Conversion IV.
Tuliskan persamaan kimia untuk Perubahan IV .

5(d)(ii)

……...
[1 mark]

1

(e) In conversion V, ethanol reacts with ethanoic acid to produce X.
Dalam perubahan V, etanol bertindak balas dengan etanoik asid untuk menghasilkan X.

(i) Name the reaction in Conversion V
Namakan tindak balas dalam Perubahan V.

5(e)(i)

……..……
[1 mark]

1

(ii) State one physical properties of X
Nyatakan satu sifat fizik bagi X.

5(e)(ii)

1

……..……
[1mark]

(iii) Name and draw the structural formula for X.
Nama dan lukiskan formula stuktur bagi X

5(e)(iii)

2

[2 mark]

Total A5

10

6 Diagram 6.1 shows a flow chart for the industrial manufacture of compound Z from sulphuric acid and ammonia.
Rajah 6.1 menunjukkan carta aliran bagi pembuatan secara industri bahan Z daripada asidsulfrik dan ammonia.

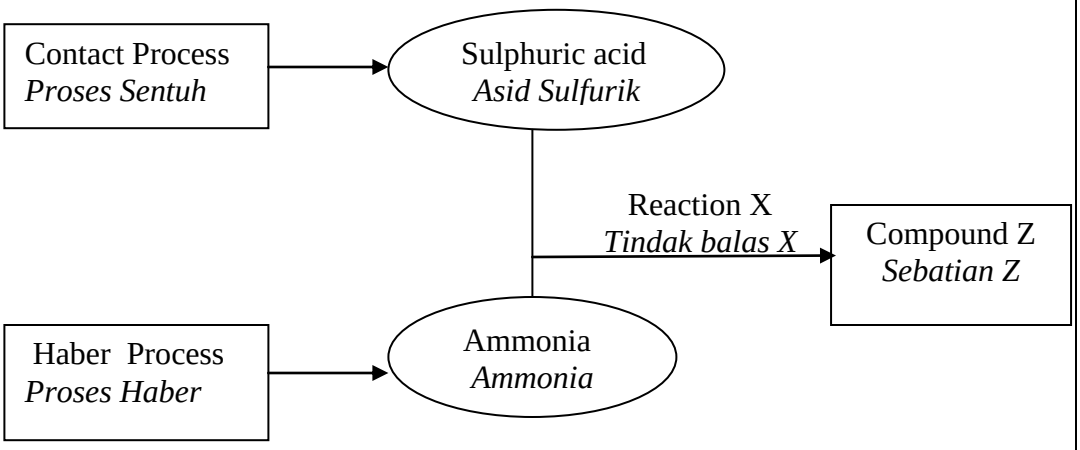


Diagram 6.1
Rajah 6.1

(a) Ammonia is produced in Haber Pocess.
Ammonia dihasilkan di dalam Proses Haber.

(i) State two reactants that are used in the reaction to manufacture ammonia.
Nyatakan dua bahan tindak balas yang digunakan dalam pembuatan ammonia.

6(a)(i) 1

……...

[1mark]

(ii) Write the chemical equation for the reaction.
Tuliskan persamaan kimia bagi tindak balas tersebut.

6(a)(ii) 2

.....

[2marks]

(b) In diagram 6.1, sulphuric acid reacts with aqueous ammonia to form compound Z.
Dalam rajah 6.1 , asid sulfurik bertindak balas dengan larutan ammonia membentuk sebatian Z

(i) Name reaction X.
Namakan tindak balas X

6(b)(i) 1

.....…….....

[1 mark]

(ii) Write the chemical equation for the reaction.
Tuliskan persamaan kimia bagi tindak balas X

…….....

[1 mark]

6(b)(ii) 1

iii) State one of the uses of compound Z in daily life.
Nyatakan satu *kegunaan sebatian Z dalam kehidupan seharian.*

…….....

[1 mark]

6(b)(iii) 1

(c) Diagram 6.2 shows the structural formula of two cleaning agent
Rajah 6.2 menunjukkan formula struktur bagi dua agen pencuci

Part P Part Q Part P Part Q
A **B**

Diagram 6.2
Rajah 6.2

(i) State which cleaning agent is a soap.
Nyatakan agen pencuci yang manakan sabun

……

[1 mark]

6(c)(i) 1

(ii) Differentiate the cleaning agent molecules based on these aspects :
Bezakan molekul agen pencuci tersebut berdasarkan aspek-aspek berikut:

	A	**B**
Name of part Q *Nama bahagian Q*		
Sources *Sumber*		
Effectiveness in hard water *Keberkesanan dalam air liat*		

[3 marks]

6(c)(ii) 3

Total A6

10

Section B

[20 *marks*]

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

7 Table 7.1 shows the data obtained in an experiment when 5g of small-sized marble chips react with 50 cm^3 1.0 $moldm^{-3}$ hydrochloric acid.

Jadual 7.1 menunjukkan data yang diperolehi daripada satu eksperimen apabila 5g serpihan marmar bertindak balas dengan 50 cm^3 1.0 $moldm^{-3}$ asid hidroklorik

Time/s	0	30	60	90	120	150	180	210
Burette reading / cm^3	50.00	42.00	34.90	29.40	25.40	21.90	19.40	17.40
Volume of carbon dioxide gas / cm^3	0.00	8.00	15.10	20.60	24.60	28.10	30.60	32.60

Table 7.1
Jadual 7.1

(a) (i) What is meant by rate of reaction in this experiment?
Apakah yang dimaksudkan dengan kadar tindak balas di dalam eksperimen ini?
[1mark]

(ii) Write the ionic equation for the reaction that takes place.
Tuliskan persamaan ion bagi tindak balas yang berlaku.
[2marks]

(b) (i) Plot the graph of volume of carbon dioxide against time on a piece of graph paper.
Plotkan graf isipadu gas karbon dioksida melawan masa di atas kertas graf.

[4marks]

(ii) Based on the graph plotted, calculate the rate of reaction at 60 seconds and 120 seconds. Comment on these values obtained and give explanation for the different rates of reactions.
Berdasarkan graf yang diplot, kira kadar tindak balas pada 60 saat dan 120 saat. Komen ke atas nilai-nilai yang didapati dan terangkan mengapa perbezaan kadar tindak balasnya.
[7 marks]

(c) Sketch on the same graph, the curve that would be obtained if large-sized marble chips are used to replace the small-sized marble chips. By using the collision theory, explain the effect of the size of marble chips used on the rate of reaction.

Lakarkan pada graf yang sama , lengkung yang akan didapati jika ketulan marmar besar digunakan bagi menggantikan ketulan marmar kecil. Dengan menggunakan teori perlanggaran, terangkan kesan saiz ketulan marmar yang digunakan ke atas kadar tindak balas.

[6 marks]

8 (a) Table 8.1 shows the atomic radii and melting points of part of group 18 elements.
Jadual 8.1 menunjukkan jejari atom dan takat lebur sebahagian unsur18 kumpulan .

Group 18 Elements ***Unsur Kumpulan 18***	**Physical Properties** ***Sifat Fizik***	
	Atomic radius/ nm ***Jejari atom / nm***	**Melting Point / ^{o}C** ***Takat Lebur /^{o}C***
Helium *Helium*	0.050	-270
Neon *Neon*	0.070	-248
Argon *Argon*	0.094	-189
Krypton *Krypton*	0.109	-156

Table 8.1
Jadual 8.1

(i) By referring to the table, describe and explain the trend of change in the physical properties of the Group18 elements as we down the group in the Periodic Table.

Dengan merujuk kepada jadual ini, huraikan dan terangkan pola perubahan sifat fizik unsur-unsurKumpulan 18 apabila kita menuruni kumpulan ini dalam Jadual Berkala.

[6marks]

(ii) Give the uses of the Group 18 elements in table 8 in our daily life.
Berikan kegunaan unsur-unsur Kumpulanr 18 dalam jadual 8 dalam kehidupan seharian kita.

[4marks]

(b) (i) Explain why Group 18 gases are monoatomic whereas Group 17 gases are diatomic.
Terangkan mengapa gas-gas Kumpulan 18 adalah monoatom manakala gas-gas Kumpulan 17 dwiatom.

[3marks]

(ii) Describe briefly the chemical reactivity of group 17 elements as we go down the group in the Periodic Table.
Huraikan secara ringkas kereaktifan tindak balas kimia unsur-unsur kumpulan 17 apabila kita menuruni kumpulan ini dalam Jadual Berkala.

[4marks]

(iii) Draw the electron arrangement of the compound formed when chlorine reacts with sodium and name the chemical bond in this compound.
[Proton Number : Na ; 11, Cl ; 17]

Lukiskan susunan elektron bagi sebatian yang terbentuk apabila klorin bertindak balas dengan natrium dan namakan ikatan kimia dalam sebatian ini.
[Nombor Proton : Na ;11 , Cl; 17]

[3marks]

Section C
[20 *marks*]
Answer any ***one*** *question.*
The time suggested to answer this section is 30 minutes.

9 (a) Magnesium hydroxide is one of the substances that are added in tooth paste. Write the chemical formula for magnesium hydroxide and state its function in tooth paste.

Magnesium hidroksida merupakan salah satu bahan yang terdapat dalam ubat gigi. Tuliskan formula kimia bagi magnesium hidroksida dan nyatakan fungsinya dalam ubat gigi.

[2 marks]

(b) Table 9.1 shows the concentration and pH values for solution P and solution Q. Solution P is a strong acid solution while solution Q is a weak acid solution.

Jadual 9.1 menunjukkan kepekatan dan nilai pH bagi larutan P dan larutan Q. Larutan P ialah larutan asid kuat manakala larutan Q ialah larutan asid lemah.

Solution *Larutan*	Concentration / mol dm^{-3} *Kepekatan / mol dm^{-3}*	pH value *Nilai pH*
P	0.1	1.0
Q	0.1	3.0

Table 9.1
Jadual 9.1

(i) Name an example of a strong acid and a weak acid.
Namakan satu contoh asid kuat dan satu contoh asid lemah.

[2 marks]

(ii) Explain why the pH values for these solutions are different.
Terangkan mengapa nilai pH bagi kedua-dua larutan ini adalah berbeza.

[5 marks]

(c) You are required to prepare dry zinc sulphate salt. The chemical substances supplied are

- zinc nitrate solution
- dilute sulphuric acid
- sodium carbonate solution

Describe a laboratory experiment to prepare the salt. In your description, include chemical equations involved.

Anda dikehendaki menyediakan garam zinc sulfat yang kering. Bahan-bahan kimia yang diberikan adalah

- *larutan zinc nitrat*
- *larutan asid sulfurik cair*
- *larutan natrium karbonat*

Huraikan satu eksperimen makmal bagaimana anda boleh menyediakan garam tersebut. Dalam penerangan anda, sertakan persamaan kimia yang terlibat.

[11 *marks*]

10 (a) In an experiment to determine the heat of precipitation of lead (II) carbonate, 50.0 cm^3 of 2.0 mol dm^{-3} lead(II) nitrate solution is reacted with 50.0 cm^3 of 2.0 mol dm^{-3} sodium carbonate solution. Increment of the temperature in the mixture is 10 ^oC.

Dalam satu eksperimen untuk menentukan haba pemendakan bagi plumbum(II) karbonat, 50.0 cm^3 larutan plumbum(II) nitrat 2.0 mol dm^{-3} bertindak balas dengan 50.0 cm^3 larutan natrium karbonat 2.0 mol dm^{-3}. Peningkatan suhu campuran ialah 10^oC.

The equation for the reaction is :
Persamaan kimia bagi tindak balas ialah:

$$Pb(NO_3)_2 + Na_2CO_3 \longrightarrow PbCO_3 + 2NaNO_3$$

Calculate the value of the heat of precipitation of lead(II) carbonate in this reaction.
[Specific heat capacity of water is 4.2 J g^{-1} $^oC^{-1}$]

Hitungkan nilai haba pemendakan bagi plumbum(II) karbonat dalam tindak balas ini.
[Muatan haba spesifik bagi air ialah 4.2 J g^{-1} $^oC^{-1}$]

[4 *marks*]

(b) Table 10.1 shows the molecular formula and heat of combustion of three types of alcohol.
Jadual 10.1 menunjukkan formula molekul dan haba pembakaran bagi tiga jenis alcohol.

Alcohol ***Alkohol***	**Molecular formula** ***Formula Molekul***	**Heat of combustion/kJ mol^{-1}** ***Haba pembakaran/kJ mol^{-1}***
Methanol *Metanol*	CH_3OH	725
Ethanol *Etanol*	C_2H_5OH	1 376
Propan-1-ol *Propan-1-ol*	C_3H_7OH	2 015

Table 10.1
Jadual 10.1

(i) What is the meaning of the 'heat of combustion of an alcohol'?
Apakah yang dimaksudkan dengan 'haba pembakaran alkohol' ?

[1 *mark*]

(ii) Explain why there are differences in the value of heat of combustion of the alcohols in Table 10.1
Terangkan kenapa terdapat perbezaan dalam nilai haba pembakaran bagi alcohol-alkohol dalam Jadual 10.1

[3 marks]

(c) Describe an experiment that you can carry out in your school laboratory to determine the heat of combustion of **ethanol**. Your description should include precautionary steps and the steps involved in the calculation.

Huraikan satu eksperimen yang dapat anda jalankan dalam makmal sekolah bagi menentukan haba pembakaran etahol. Huraian anda hendaklah merangkumi langkah berjaga-jaga dan langkah-langkah pengiraan yang berkaitan.

[12marks]

END OF QUESTION PAPER
SOALAN TAMAT

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** Flourine 19	10 **Ne** Neon 20
11 **Na** Sodium 23	12 **Mg** Magnesium 24											13 **Al** Aluminum 27	14 **Si** Silicon 28	15 **P** Phosphorus 31	16 **S** Sulfur 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	48 **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** Unnilseptium 262	108 **Uno** Unniloctium 265	109 **Une** Unnilennium 266									

10 — Proton number
Ne — Symbol
Neon — Name of element
20 — Relative atomic mass

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** Lawrensium 257

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

4541/3
Chemistry
Kertas 3
September
2010
1 1/2 jam

Nama

Kelas

PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA
SEKOLAH MENENGAH MALAYSIA (PKPSM) CAWANGAN MELAKA
DENGAN KERJASAMA
JABATAN PELAJARAN MELAKA

PEPERIKSAAN PERCUBAAN

SIJIL PELAJARAN MALAYSIA 2010

CHEMISTRY

Kertas 3

Satu jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan nama dan tingkatan pada ruang yang disediakan.*
2. *Kertas soalan ini adalah dalam dwi bahasa.*
3. *Calon hendaklah membaca arahan pada halaman 2 .*

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

Kertas soalan ini mengandungi 9 halaman bercetak

SULIT

INFORMATION FOR CANDIDATES

1. This question paper consists of **two** questions. Answer **all** questions.
   *Kertas soalan ini mengandungi **dua** soalan. Jawab semua soalan.*

2. Write your answer for **Question 1** in the spaces provided in the question paper.
   *Tulis jawapan anda bagi **Soalan 1** pada ruang yang disediakan dalam kertas soalan ini.*

3. Write your answers for **Question 2** on the writing paper provided by the invigilators.
   *Tulis jawapan anda bagi **Soalan 2** pada kertas tulis yang disediakan.*

4. You may use equations, diagrams, tables, graph and other suitable methods to explain your answer.
   Anda boleh menggunakan persamaan , rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda.

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

6. 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.

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

8. The time suggested to answer each of the questions is 45 minutes.
   Masa yang dicadangkan untuk menjawab setiap soalan ialah 45 minit.

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

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

Answer **all** question
*Jawab **semua** soalan*

For Examiner's Use

1 An experiment is carried out to determine the end point of a neutralisation process. 25.00 cm^3 of aqueous potassium hydroxide 0.1 mol dm^{-3} is titrated using hydrochloric acid with an unknown concentration using phenolphthalein as an indicator. Hydrochloric acid is added until the end point of titration is reached.
Table 1 shows the three burette readings for the titration that have been conducted.

Satu eksperimen telah dijalankan untuk menentukan takat akhir bagi proses peneutralan. 25.00 cm^3 larutan kalium hidroksida 0.1 mol dm^{-3} dititratkan dengan asid hidroklorik yang kepekatannya tidak diketahui dengan menggunakan penunjuk fenolftalein. Asid hidroklorik ditambah sehingga takat akhir pentitratan dicapai.
Jadual 1 menunjukkan tiga bacaan buret bagi pentitratan yang telah dijalankan.

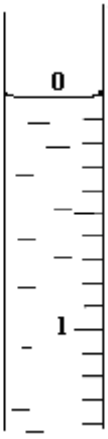
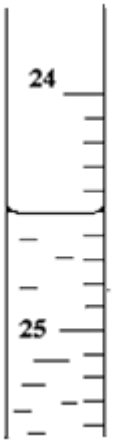
Titration Number. *Bilangan Titratan*	**I**	**II**	**III**
Initial Burette Reading *Bacaan Awal Buret*	 ……..	 ……..	 ……..
Final Burette Reading *Bacaan akhir buret*	 ……..	 ……..	 ……..

Table 1
Jadual 1

(a) State **one** observations at the end-point of this experiment.
Nyatakan satu pemerhatian pada takat akhir eksperimen ini

……...……

……

[3 *marks*] 3

(b) Record all the burette readings in the spaces provided in Table 1.
Rekodkan semua bacaan buret pada ruang yang disediakan dalam Jadual 1

[3 *marks*] 3

(c) Construct a table and record the initial burette reading, final burette reading and volume of hydrochloric acid used for each titration.
Bina satu jadual dan rekodkan bacaan awal buret, bacaan akhir buret dan isipadu asid hidrokorik yang digunakan bagi setiap pentitratan.

[3 *marks*] 3

(d) (i) Calculate the average volume of hydrochloric acid used in the experiment?
Hitungkan isipadu purata asid hidroklorik yang digunakan dalam eksperimen ini

[3 *marks*] 3

(ii) The chemical equation for the reaction is :
Persamaan kimia bagi tindak balas ini ialah:

$$KOH + HCl \rightarrow KCl + H_2O$$

Determine the concentration of hydrochloric acid used.
Tentukan kepekatan asid hidroklorik yang digunakan.

[3 *marks*] 3

(e) (i) If the hydrochloric acid is replaced by sulphuric acid of the same concentration, predict the volume of sulphuric acid required to neutralise 25.0 cm^3 of the potassium hydroxide solution.
Jika asid hidroklorik itu di gantikan dengan asid asid sulfurik berpekatan yang sama, ramalkan isipadu asid sulfurik yang diperlukan untuk meneutralkan 25.0 cm^3 larutan kalium hidroksida itu.

……...

…….....
[3 *marks*] 3

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

.....

.....

.....

……...
[3 *marks*] 3

In the next experiment, a student carried out an experiment to investigate the relationship between the concentration of an alkali solution with its pH value. The pH values of three different concentrations of potassium hydroxide are determined using pH meter.
Dalam eksperimen lain, seorang pelajar telah menjalankan satu eksperimen untuk mengkaji hubungan antara kepekatan larutan alkali dengan nilai pH larutan itu. Nilai pH bagi tiga kepekatan yang berbeza larutan kalium hidroksida telah ditentukan menggunakan meter pH.

Table 2 shows the pH readings of different concentration of solution in this experiment.
Jadual 2 menunjukkan bacaan pH bagi larutan-larutan yang diperolehi dalam eksperimen ini.

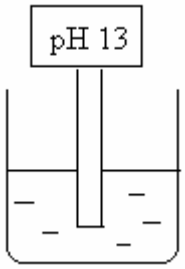
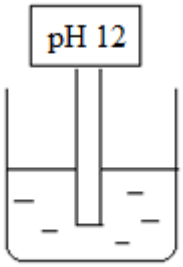
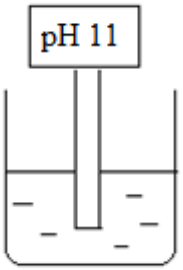
Concentration (mol dm^{-3}) *Kepekatan (mol dm^{-3})*		
0.1	0.01	0.001
		

Table 2
Jadual 2

(f) State a hypothesis for this experiment.
Nyatakan satu hipotesis untuk eksperimen ini.

……

……

[3 *marks*] 3

(g) State the variables for this experiment.
Nyatakan pembolehubah-pembolehubah dalam eksperimen ini.

(i) Manipulated variable:
Pembolehubah dimanipulasikan:

.....

(ii) .
Responding variable:
Pembolehubah bergerak balas:

(iii) .....
Constant variable:
Pembolehubah dimalarkan:

.....

3

[3 *marks*]

(h) Predict the pH value of 0.0001 mol dm^{-3} potassium hydroxide.
Ramalkan nilai pH bagi larutan kalium hidroksida 0.0001 mol dm^{-3}.

……

[3 *marks*] 3

(i) Classify the following alkalis into strong alkali and weak alkali.
Kelaskan alkali-alkali berikut kepada alkali kuat dan alkali lemah.

- Sodium hydroxide solution
  Larutan natrium hidroksida
- Ammonia solution
  Larutan ammonia
- Calcium hydroxide solution
  Larutan kalsium hidroksida
- Potassium hydroxide solution
  Larutan kalium hiroksida
- Sodium hydrogen carbonate solution
  Larutan natrium hidrogen karbonat

[3 *marks*] 3

Total 1

3

2 Choose one of the following tasks:
Pilih satu daripada tugasan berikut:

Task 1
Tugasan1

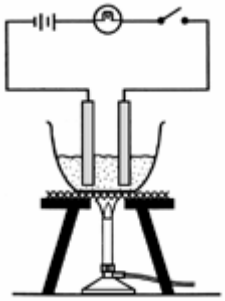


Diagram 1
Gambarajah 1

Diagram 1 shows the apparatus set-up for an experiment to compare the electrical conductivity between two types of chemical compound, P and Q.
Rajah 1 menunjukkan susunan radas bagi satu eksperimen untuk membezakan kekonduksian elektrik di antara 2 jenis sebatian kimia, P dan Q.

Refering to the situation above, plan a laboratory experiment to differentiate between 2 types of named chemical compound based on electrical conductivity.
Merujuk kepada situasi di atas, rancang satu eksperimen dalam makmal untuk membezakan 2 jenis sebatian kimia yang dinamakan berdasarkan kekonduksian elektrik.

Task 2
Tugasan 2

Photograph 1

Photograph 1 shows a tourist ship in the middle of the ocean. The ship body is made of iron. To prevent from rusting the ship body is covered with the more electropositive metal. This metal acts as a sacrificial anode thus the iron is protected.
Gambarfoto 1 menunjukkan sebuah kapal pelancongan di tengah lautan. Badan kapal diperbuat daripada besi. Bagi mengelakkan pengaratan, badan kapal dilapisi dengan logam yang lebih elektropositif. Logam ini bertindak sebagai logam korban yang dapat melindungi besi.

You are given some iron nails, magnesium ribbon and copper strip.
Refering to the situation above, plan a laboratory experiment to investigate the effect of other metal on the corrosion of iron.
Anda diberi paku besi, pita magnesium, dan kepingan kuprum.
Merujuk kepada situasi di atas, rancang satu eksperimen dalam makmal untuk mengkaji kesan logam lain terhadap pengaratan besi.

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

(a) Problem statement
Pernyataan masalah

(b) All the variables
Semua pembolehubah

(c) 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

SULIT
4541/1
4541/2
Chemistry
Mark Scheme
Paper 1 and 2

PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA
SEKOLAH MENENGAH MALAYSIA (PKPSM) CAWANGAN MELAKA
DENGAN KERJASAMA
JABATAN PELAJARAN MELAKA

PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2010

CHEMISTRY

Mark Scheme

Paper 1 and Paper 2

SET 2

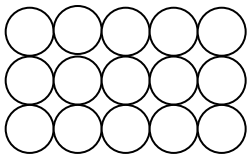
Skema Pemarkahan ini mengandungi 11 halaman bercetak.

Answers for Chemistry Paper 1

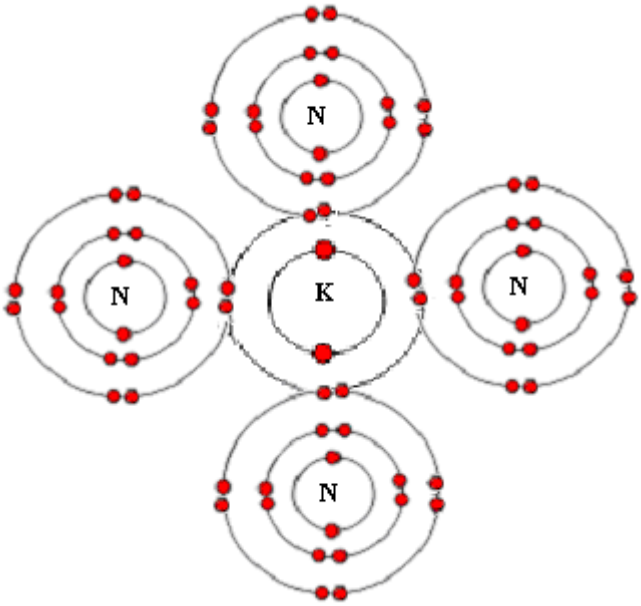
1	**B**	**2**	**C**	**3**	**C**	**4**	**A**	**5**	**C**
6	**D**	**7**	**B**	**8**	**C**	**9**	**A**	**10**	**D**
11	**B**	**12**	**D**	**13**	**A**	**14**	**C**	**15**	**C**
16	**D**	**17**	**B**	**18**	**D**	**19**	**C**	**20**	**C**
21	**B**	**22**	**A**	**23**	**B**	**24**	**D**	**25**	**B**
26	**A**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

Answers for Chemistry Paper 2

SECTION A

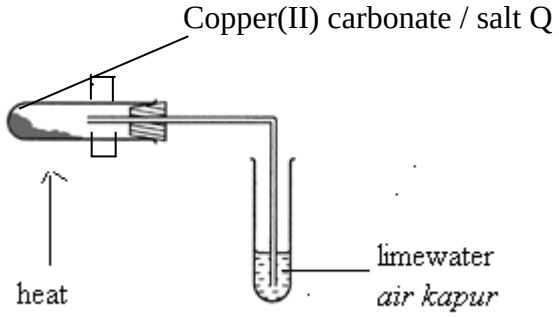
1	(a)	T_1 ^oC	**1**
	(b)(i)	AB : liquid	**1**
	(ii)	CD : solid	**1**
	(c)	1. Heat energy loss to the surrounding	**1**
		2. balanced by heat energy liberated by particles (to attract one another to form solid)	**1**
	(d)		**1** **1**
	(e)(i)	Naphthalene / bromine	**1**
	(ii)	Iron	**1**
	(iii)	Ions	**1**
	(f)	Diffusion	
		TOTAL	**10**

2	(a)	(i)	Group 13, Period 3	1
		(ii)	J and L	1
	(b)	(i)	Burns with yellow flame // produces 'hiss' sound	1
		(ii)	$2L + 2H_2O \longrightarrow 2\ LOH + H_2$	2
	(c)		M	1
	(d)	(i)	Covalent bond	1
		(ii)	[1. correct number of occupied electron shells and correct electrons	1
			in each shell for all the atoms, nuclei shown]	1
			[2. four atoms of N combine covalently (sharing a pair of electrons) with one atom of K]	



		(iii)	Low boiling point // insoluble in water// soluble in inorganic solvent// cannot conduct electricity (any other acceptable physical properties	1
			Total	**10**

3	(a)		Black	1
	(b)		Copper(II) sulphate	1
	(c)	(i)	Sodium / potassium carbonate or any suitable carbonate salts solution	1
		(ii)	$Cu^{2+} + CO_3^{2-} \rightarrow CuCO_3$	1
	(d)	(i)	$CuO + H_2SO_4 \rightarrow CuSO_4 + H_2O$	1
		(ii)	No of mol acid = $\frac{0.2 \times 50}{1000}$ // 0.01 mol	1
			No of mol of CuSO4 = 0.01 mol	1
			Mass= 0.01 x 160 // 1.6 g	1
	(e)			

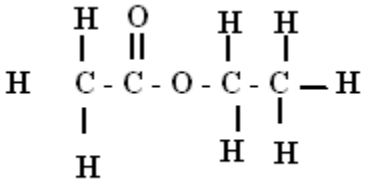


Functional apparatus		1
Labelled – heat, copper(II) carbonate, limewater		1
	Total	**10**

4	(a)		Cell 1 : Chemical cell // Voltaic Cell Cell 2 : Electrolytic Cell	2
	(b)		Chemical energy to Electrical Energy	1
	(c)	(i)	The intensity of blue colour of electrolyte decreases	1
		(ii)	The concentration of Cu^{2+} ions decreases in the electrolyte	1
	(d)		Magnesium electrode	1
	(e)		Cu^{2+}, SO_4^{2-}, H^+, OH^-	1
	(f)	(i)	Colourless gas bubbles released	1
		(ii)	$4\ OH^- \longrightarrow O_2 + 2H_2O$	1
	(g)		In both cells, oxidation occurs at the anode // reduction occurs at the cathode // electrons flow from anode to cathode	1
			Total	**10**

5	(a)	(i)	Hydrogenation	1
		(ii)	Bromine	1
	(b)		$C_2H_4 + Br_2 \rightarrow C_2H_4Br_2$	1
	(c)		Concentrated phosphoric acid	1

(d)	(i)	Colour change from orange to green	1
	(ii)	$C_2H_5OH + 2[O] \rightarrow CH_3COOH + H_2O$	1
(e)	(i)	Esterification	1
	(ii)	Pleasant / fruit smell	1
	(iii)	Ethyl ethanoate	1
			1



Total **10**

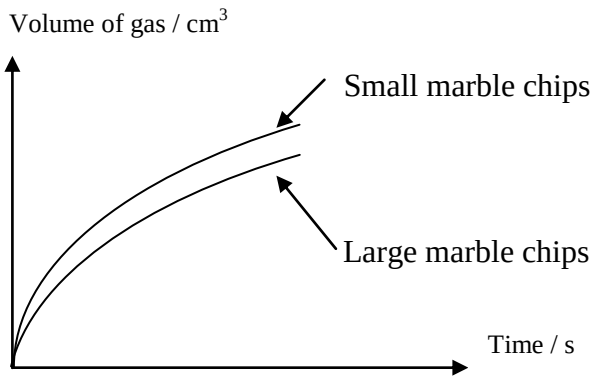
6	(a)	(i)	Hydrogen and nitrogen	**1**
		(ii)	$3H_2 + N_2 \rightarrow 2NH_3$ [1. correct reactants and products 2. balanced equation]	**1+1**
	(b)	(i)	Neutralization	**1**
		(ii)	$H_2SO_4 + 2NH_3 \rightarrow (NH_4)_2SO_4$ $//H_2SO_4 + 2NH_4OH \rightarrow (NH_4)_2SO_4 + H_2O$	**1**
		(iii)	Fertilizer	**1**
	(c)	(i)	B	**1**

(ii)

	A	B	
Name of part Q	Sulphonate	Carboxylate	**1**
Sources	petroleum	Oil // Fat	**1**
Effectiveness in hard water	Effective	Not effective	**1**

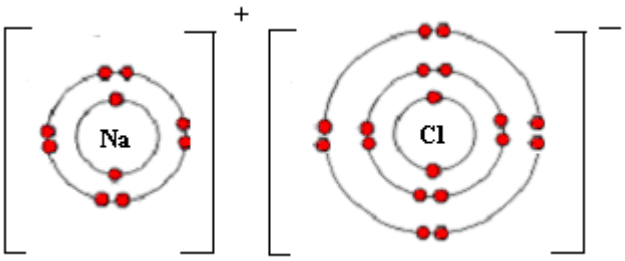
TOTAL **10**

SECTION B

7	(a)	(i)	Change of volume of carbon dioxide per unit time	**1**	**1**
		(ii)	$CO_3^{2-} + 2H^+ \longrightarrow CO_2 + H_2O$		
			[1. correct reactants and products	**1**	
			2. balanced equation]	**1**	**2**
	(b)	(i)	1. Axis labelled and with units	**1**	
			2. Scales appropriate (size: min ¾ of graph paper) and consistent	**1**	
			3. Points correctly plotted	**1**	**4**
			4. Smooth curve graph drawn	**1**	
		(ii)	1. Tangents of curves drawn at 60s and 120 s	**1**	
			2. calculation of rate of reaction at 60s ; 120s	**1+1**	
			3. correct values and units for rates of reactions at 60s ; 120s	**1+1**	
			4. rate of reaction at 60s is higher than at 120s	**1**	
			5. concentration of hydrochloric acid decreases with time	**1**	**7**
	(c)				
			[1. curve with less steep slope drawn on the same graph and labelled	**1**	
			[2. the final part of the slope is still increasing (no plateau)]	**1**	
			3. small size marble chips have larger total surface area over volume exposed for collisions	**1**	
			4. frequency of collisions between carbonate ions and hydrogen ions is higher	**1**	
			5. frequency of effective collisions increases	**1**	
			6. The rate of reaction will increase	**1**	**6**
				Total	**20**

8	(a)	(i)	1. Atomic radius increases as	**1**	
			2. more number of shells is needed to fill the increasing	**1**	

		number of electrons present in the atoms		
		3. Melting points increases down the group	**1**	
		4. atomic size increases down the group,	**1**	
		5. attraction forces between atoms become stronger	**1**	
		6. more heat is needed to overcome this stronger force of attraction	**1**	**6**
	(ii)	1. Helium - gas used to fill airships / weather // fill up the diver's oxygen tank // to cool metals to make superconductors	**1**	
		2. Neon - used in advertising lights / television tubes	**1**	
		3. Argon - used o fill up light bulbs // provide inert atmosphere for welding at high temperature	**1**	
		4. Krypton - used in lasers to repair retina of the eye // used to fill up photographic flash lamps.	**1**	**4**
(b)	(i)	1. The valence electrons in the group 18 atoms are stable / (duplet and octet) while in group 17 , the atoms have 7 valence electrons.	**1**	
		2. In order to achieve stable electron arrangement, each atom of Group 17 elements need to share its valence electron with another atom.	**1**	
		3. For group 18 elements, the atoms need not have to share their valence electrons.	**1**	**3**
	(ii)	1. The reactivity decreases	**1**	
		2. In chemical reaction, halogen atoms need to gain one electron (into their outermost shell.)	**1**	
		3. The atomic size of halogens increases down the group// the outermost occupied shell of each atom becomes further from nucleus	**1**	
		4. The strength of nucleus to attract electron becomes weaker	**1**	**4**
	(ii)	1. Ionic bond	**1**	
		2. [- correct number of occupied electron shells, correct electrons in each shell and nuclei shown for both ions]	**1**	
		-one sodium ion combine with one chloride ion, correct charges of ions written]	**1**	**3**



Total **20**

SECTION C

9	(a)		$Mg(OH)_2$	**1**	
			To neutralise the acid produced by bacteria	**1**	**2**
	(b)	(i)	Sulphuric / hydrochloric / nitric acid	**1**	
			Ethanoic acid or any suitable weak acid	**1**	**2**
		(ii)	1. Strong acid ionises completely in water	**1**	
			2. to produce high concentration of hydrogen ions	**1**	
			3. Weak acid ionises partially in water	**1**	
			4. to produce low concentration of hydrogen ions	**1**	
			5. The higher the concentration of hydrogen ions, the lower the pH value // The lower the concentration of hydrogen ions, the higher the ph value	**1**	**5**
	(c)		1. Pour [20-100]cm^3 of zinc nitrate solution [0.1-1.0]mol dm^{-3} into a beaker	**1**	
			2. Add [20-100]cm^3 of sodium carbonate solution [0.1-1.0]mol dm^{-3}	**1**	
			3. Stir and filter the mixture to get the precipitate/residue	**1**	
			4. Pour [20-100]cm^3 dilute / [0.1-1.0]mol dm^{-3} sulphuric acid into a beaker	**1**	
			5. Add the residue/precipitate into the acid until in excess	**1**	
			6. Stir and filter the mixture	**1**	
			7. Heat the filtrate until saturated solution obtained / 1/3 of original volume	**1**	
				1	
			8. Cool the saturated solution	**1**	
			9. Filter and dry the crystal	**1**	
			10. $Zn(NO_3)_2 + Na_2CO_3 \rightarrow ZnCO_3 + 2NaNO_3$	**1**	**11**
			11. $ZnCO_3 + H_2SO_4 \rightarrow ZnSO_4 + H_2O + CO_2$		
				Total	**20**

10 (a)

Number of mole of lead(II) nitrate $= \frac{50 \times 2}{1000} = 0.1$ mol

or

Number of mole of sodium carbonate $= \frac{50 \times 2}{1000} = 0.1$ mol

1

Ratio of mole :

1 mol $Pb(NO_3)_2$ / Na_2CO_3 → 1 mol $PbCO_3$
∴ 0.1 mol $Pb(NO_3)_2$ / Na_2CO_3 → 0.1 mol $PbCO_3$ 1

Energy change/heat given off = (50+50) × 4.2 × 10
= 4200 J 1

Heat of precipitation of $PbCO_3$ = $\frac{4200}{0.1}$

= 42000 J mol-1 / 42 kJ mol-1
1 … 4

(b) (i) The heat given off when ***one*** mole of an alcohol is burnt ***completely*** in an excess of oxygen. 1

(ii) As the number of carbon atom increase, the value of heat combustion increase. 1
The greater the number of carbon atoms, the more products will be obtained. 1
More heat is released for the formation of bonds 1 … 3

(c) Procedure :

1. Measure [100 -250] cm^3 of water and pour it into the copper container /aluminium can 1
2. Measure and record the initial temperature of the water. 1
3. Fill the small lamp with alcohol* then weigh it and record the initial mass. 1
4. Light the wick of the lamp. 1
5. Place the lamp as ***near as possible*** to the copper container.// [Diagram : *Using wooden block*] 1
6. [The apparatus is ***protected by a wind shield***] // [Diagram] 1
7. Stir the water continuously. 1
8. Put out / blown out the flame when the temperature rises [10 – 30] ^oC and record the highest temperature of the water. 1
9. Weigh the lamp as ***quickly as possible*** and record the final mass. 1

Result :

Initial temperature of the water/ ^oC = T_1
Highest temperature of the water/ ^oC = T_2

Temperature rise of the water/ ^oC = $T_2 - T_1$

Initial mass of lamp + ethanol / g = m_1
Final mass of lamp + ethanol / g = m_2
Mass of ethanol that was burnt / g = $m_1 - m_2$ 1

Calculation :

Energy chage/heat given off $= 200 \times 4.2 \times (T_2 - T_1)$ 1

Number of mole of alcohol $= \dfrac{m_1 - m_2}{M_r \text{ of ethanol}}$ 1

Heat of combustion of alcohol*, $\mathbf{\Delta H} = \dfrac{\text{Energy}}{\text{Number of mole of}}$

$= \dfrac{200 \times 4.2 \times (T_2 - T_1)}{\dfrac{m_1 - m_2}{M_r \text{ of ethanol}}}$ 1

13…**12**

TOTAL **20**

SKEMA PEMARKAHAN TAMAT

4541/3
Chemistry 3
September
2010

PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA SEKOLAH MENENGAH MALAYSIA (PKPSM) CAWANGAN MELAKA DENGAN KERJASAMA JABATAN PELAJARAN MELAKA

PEPERIKSAAN PERCUBAAN SIJIL PELAJARAN MALAYSIA 2010

CHEMISTRY 3

PERATURAN PEMARKAHAN

SET 2

Skema Pemarkahan ini mengandungi 14 halaman bercetak

Question No.		Details	Score
1	(a)	*Able to state the observation before and after the end-point correctly* Sample answer The colour of the solution changes from pink to colourless	**3**
		[Able to state an observation] Sample answer The solution turns colourless	**2**
		Able to give an idea of observation Sample answer The solution change colour	**1**
		No response or wrong response	**0**
	(b)	*Able to record all the volumes accurately to two decimal places with unit* *Initial burette readings: 0.50 cm^3, 5.00 cm^3, 0.00 cm^3* *Final burette readings : 24.50 cm^3, 30.00 cm^3, 26.00 cm^3*	**3**
		Able to record all the volumes correctly to one decimal place wihout unit. *Initial burette readings: 0.5, 5.0, 0.0* *Final burette readings : 24.5, 30.0, 26.0*	**2**
		Able to write at least four readings of the volumes accurately.	**1**
		No response or wrong response	**0**

<table>
<tr><th colspan="2">Question No.</th><th>Details</th><th>Score</th></tr>
<tr><td></td><td>(c)</td><td>Able to construct a table correctly containing :
(i) three labelled columns with units.
(ii) record all the burette readings.
(iii) volume of acids used accurately.

Sample answer
<table>
<tr><td>Titration No.</td><td>I</td><td>II</td><td>II</td></tr>
<tr><td>Initial burette reading/cm^3</td><td>0.50</td><td>5.00</td><td>0.00</td></tr>
<tr><td>Final burette reading/cm^3</td><td>24.50</td><td>30.00</td><td>26.00</td></tr>
<tr><td>Volume of acid used/cm^3</td><td>24.00</td><td>25.00</td><td>26.00</td></tr>
</table></td><td>3</td></tr>
<tr><td></td><td></td><td>Able to construct a table correctly containing:

(i) three labelled columns without units
(ii) record all the burette readings
(iii) volume of acids used</td><td>2</td></tr>
<tr><td></td><td></td><td>Able to construct a table with at least three labels and four correct readings</td><td>1</td></tr>
<tr><td></td><td></td><td>No response or wrong response</td><td>0</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>(d)

(i)</td><td>Able to calculate the average volume of acid used correctly and with unit.

Sample answer:
Volume of acid used = $\frac{24.00 + 25.00 + 26.00}{3}$
= 25.00 cm^3</td><td>3</td></tr>
<tr><td></td><td></td><td>Able to calculate the average volume of acid correctly without unit.</td><td>2</td></tr>
<tr><td></td><td></td><td>Able to show the calculation of average volume of acid used but incorrect answer</td><td>1</td></tr>
<tr><td></td><td></td><td>No response or wrong response</td><td>0</td></tr>
</table>

Question No		Details	Score
	(ii)	*Able to calculate the concentration of potassium hydroxide with units correctly* Sample answer: $HCl + KOH \rightarrow KCl + H_2O$ .....1 1 mol 1 mol $M_aV_a = M_bV_b$ $0.1 \times 25.00 = M_b \times 25.00$ ..... 1 $M_b = 0.1$ mol dm^{-3} 1	**3**
		Able to calculate the concentration of potassium hydroxide correctly without unit Sample answer: $M_b = \frac{0.1 \times 25.0}{25.0}$ $= 0.1$	**2**
		Able to show the calculation ***or*** *the concentration of potassium hydroxide without unit* Sample answer: No of mole $= \frac{0.1 \times 25.0}{25.0}$ // 0.1	**1**
		No response or wrong response	**0**
	(e) (i)	*Able to predict the volume of sulphuric acid accurately to 2 decimal places with unit* Answer: 12.50 cm^3	**3**
		Able to predict the volume of sulphuric acid accurately without unit Answer: 12.50	**2**

Question No		Details	Score
		Able to predict the volume of sulphuric acid without units Answer: 12.5	**1**
		No response or wrong response	**0**
	(e) (ii)	*Able to state all the three following informations correctly* Sample answer: 1 Hydrochloric acid is a monoprotic acid 2 Sulphuric acid is a diprotic acid 3 The concentration of H^+ ions in sulphuric acid is twice than the concentration of H^+ ions in hydrochloric acid	**3**
		Able to state any two points correctly	**2**
		Able to state at least one point correctly	**1**
		No response or wrong response	**0**
	(f)	*Able to state the hypothesis accurately with direction* Sample answer: The higher/ the lower the concentration of OH^- ions, the higher / lower the pH value.	**3**
		Able to state the hypothesis without direction Sample answer: The pH value depends on the concentration of alkali / the higher the concentration of potassium hydroxide the lower the pH value	**2**
		Able to give an idea of the hypothesis of the experiment Sample answer: Different concentration affects pH value	**1**
		No response or wrong response	**0**

Question		Details	Score
	(g)	*Able to state all the three variables correctly* Answer: Manipulated variables: Concentration of potassium hydroxide solution Responding variables : pH value Controlled variables: Type of alkali	**3**
		[Able to state any two variables correctly]	**2**
		[Able to state at least one variable correctly]	**1**
		No response or wrong response	**0**
	(h)	*Able to predict the pH value correctly* Answer: pH value = 10.0	**3**
		Able to predict the pH range correctly Sample answer: Lower than 11.0	**2**
		Able to give an idea about the pH value Sample answer: The pH value change	**1**
		No response or wrong response	**0**
	(i)	*Able to classify all the five alkalis into strong alkalis and weak alkalis correctly* Sample answer: **Strong Alkali**: Sodium hydroxide solution, Calcium hydroxide solution, Potassium hydroxide solution **Weak Alkali**: Sodium hydrogen carbonate solution, Ammonia solution	**3**
		Able to classify the four alkalis into strong alkali and weak alkalis correctly	**2**

Question No		Details	Score
		Able to classify the three of alkalis into strong alkalis and weak alkalis correctly	**1**
		[No response or wrong response]	**0**

<u>Task1</u> Question No		**Details**	**Score**
2	(a)	*Able to give the problem statement accurately and in question form.* Sample answer: What is the differences in electrical conductivity between ionic compound and covalent compound?	**3**
		Able to give the statement of the problem correctly. Sample answer: How do different types of chemical compounds affect the electrical conductivity?	**2**
		Able to give an idea of statement of the problem correctly. Sample answer: To compare/investigate/study the electrical conductivity between different type of chemical compound	**1**
		No response or wrong response	**0**
	(b)	*Able to state all **the three** variables correctly.* Sample answer: Manipulated variable: Type of chemical compound Responding variable : Electrical conductivity / the light of the bulb Controlled variable : Mass of the substance	**3**

		*Able to state **any two** variables correctly*	**2**
		*Able to state **at least one** variable correctly*	**1**
		No response or wrong response	**0**
	(c)	*Able to state the relationship between the manipulated variable and the responding variable correctly.* Sample answer: Ionic / covalent compound conduct electricity, covalent compound / ionic does not conduct electricity	**3**
		Able to state the relationship between the manipulated variable and the responding variable . Sample answer: Covalent / ionic compound conduct / does not conduct electricity	**2**
		Able to state the idea of the hypothesis. Sample answer: Different compound gives different conductivity	**1**
		No response or wrong response	**0**
	(d)	*Able to give adequate list of materials and apparatus.* Sample answer: Materials 1 Any ionic compound 2 Any covalent compound Apparatus 1 Crucible 2 Batteries 3 Bulb 4 Switch 5 Carbon electrodes 6 Tripod stand 7 Bunsen Burner 8 Pipe-clay triangle 9 Crocodile wire	**3**

		Able to give a list of materials and apparatus. Sample answer: Materials 1 Any ionic compound 2 Any covalent compound Apparatus 1 Any container 2 Batteries 3 Bulb/voltmeter/ammeter 4 Electrodes 5 Bunsen Burner 6 Crocodile wire	**2**
		Able to give an idea of materials and apparatus. Sample answer: Material Any ionic/covalent compound Apparatus 1 Ammeter/bulb/voltmeter 2 Electrodes	**1**
		No response or wrong response	**0**
	(e)	*Able to state the following seven steps:* Sample answer: 1 Fill a crucible with a solid lead(II)bromide, $PbBr_2$ until it is half full. 2 Dip into the solid lead(II)bromide, $PbBr_2$ with carbon electrodes. 3 Connect the electrodes with bulb. 4 Heat the solid lead(II)bromide until it melts. 5 Turn on the switch. 6 Record the observation. 7 Repeat steps 1 to 6 / the experiment using naphthalene, $C_{10}H_8$	**3**
		Able to state at least the following steps: Sample answer: Steps 4 and 6	**2**

<table>
<tr><td></td><td></td><td>Able to state at least the following steps:

Sample answer:
Step 4</td><td>1</td></tr>
<tr><td></td><td></td><td>No response or wrong response</td><td>0</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>(f)</td><td>Able to tabulate the data that includes the following information:
1. Correct titles
2. Complete list of chemical compound

<u>Sample answer :</u>
<table><tr><td>Chemical compound</td><td>Observation</td></tr><tr><td>Lead(II)bromide</td><td></td></tr><tr><td>Naphthalene</td><td></td></tr></table></td><td>3</td></tr>
<tr><td></td><td></td><td>Able to construct a table with:
1. At least one title
2. Incomplete list of chemical compound

Sample answer :
<table><tr><td></td><td>Observation</td></tr><tr><td>lead(II)bromide/
Naphthalene</td><td></td></tr></table></td><td>2</td></tr>
<tr><td></td><td></td><td>Able to construct a table with:
1. Heading for observation

Sample answer :
<table><tr><td></td><td>Observation</td></tr><tr><td></td><td></td></tr></table></td><td>1</td></tr>
<tr><td></td><td></td><td>No response or wrong response</td><td>0</td></tr>
</table>

Task 2 Question No		**Details**	**Score**
2	(a)	*Able to give the statement of the problem accurately and response is in question form.* Sample answer: How do different types of metals in contact with iron affect rusting?	**3**
		Able to give the statement of the problem correctly. Sample answer: How do different types of metals affect rusting?	**2**
		Able to give an idea of statement of the problem correctly. Sample answer: Do metal affect rusting// To investigate/study the effect of other metal on the corrosion of iron.	**1**
		No response or wrong response	**0**
	(b)	*Able to state **the three** variables correctly.* Sample answer: Manipulated variable: Different metal in contact with iron Responding variable: Rusting of iron // Rate of rusting Controlled variable: Iron nails// medium in which the iron nails are kept // temperature	**3**
		*Able to state **any two** variables correctly*	**2**
		*Able to state **any one** variables correctly*	**1**
		No response or wrong response	**0**

Question No		Details	Score
	(c)	*Able to state the relationship between the manipulated variable and the responding variable correctly with direction.* <u>Sample answer:</u> When a more/less electropositive metal is in contact with iron, the metal inhibits/speeds up rusting.	**3**
		Able to state the relationship between the manipulated variable and the responding variable with direction. <u>Sample answer:</u> The metal inhibits/speeds up rusting when a more / less electropositive metal is in contact with iron.	**2**
		Able to state the idea of hypothesis. <u>Sample answer:</u> Different types of metals speeds up / inhibits rusting	**1**
		No response or wrong response	**0**
	(d)	*Able to give adequate list of materials and apparatus.* **Sample answer:** <u>Materials</u> 1 Iron nails 2 Magnesium ribbon, copper strip 3 Hot jelly solution with a little potassium hexacyanoferrate(III) and phenolphthalein 4 Sand paper <u>Apparatus</u> 10 Test tubes 11 Test tube rack	**3**

		Able to give a list of materials and apparatus. **Sample answer:** Materials 1 Iron nails 2 Magnesium/ copper strip 3 Hot jelly solution with a little potassium hexacyanoferrate(III) and phenolphthalein Apparatus Test tube/beaker/any container	**2**
		Able to give an idea of materials and apparatus. **Sample answer:** Material Any metal Apparatus Test tube/beaker/ any container	**1**
		No response or wrong response	**0**
	(e)	*Able to state the following five steps:* **Sample answer:** 1 Clean all the three iron nails, magnesium ribbon and copper strip with sand paper 2 Coil two iron nails tightly with magnesium ribbon and copper strip respectively 3 Place all the iron nails in the different test tubes. 4 Pour hot jelly solution containing potassium hexacyanoferrate(III) and phenolphthalein indicator into the test tubes until completely cover the nails. 5 Keep the test tubes in a test tube rack and leave them aside for a day. 6 Record the observations.	**3**
		Steps 2,3,4 and 6	**2**
		Step 3	**1**
		No response or wrong response	**0**

<table>
<tr><td></td><td>(f)</td><td>Able to tabulate the data that includes the following information :
1. Correct titles
2. Complete list of iron and the metals in contact with iron.

Sample answer :
<table><tr><td>Test tube</td><td>Observation // Intensity of blue colouration // presence of pink colouration</td></tr><tr><td>Fe</td><td></td></tr><tr><td>Fe + Mg</td><td></td></tr><tr><td>Fe + Cu</td><td></td></tr></table></td><td>3</td></tr>
<tr><td></td><td></td><td>Able to construct a table with:
1. At least one title
2. Incomplete list of iron and the metals in contact with iron.

Sample answer :
<table><tr><td>Test tube/ metal</td><td>Observation // Intensity of blue colouration // presence of pink colouration</td></tr><tr><td>Fe only</td><td></td></tr><tr><td>Fe + Mg / Cu</td><td></td></tr></table></td><td>2</td></tr>
<tr><td></td><td></td><td>Able to construct a table
1. Heading for observation

Sample answer :
<table><tr><td>Test tube/ metal</td><td>Observation // Intensity of blue colouration // presence of pink colouration</td></tr><tr><td>Fe</td><td></td></tr></table></td><td>1</td></tr>
<tr><td></td><td></td><td>No response or wrong response</td><td>0</td></tr>
</table>

END OF MARK SCHEME