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*

Kertas soalan ini mengandungi 25 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 jawapan yang baru.*

6. *Rajah yang mengiringi 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 substances undergoes sublimation process when heated?
Manakah antara bahan berikut mengalami proses pemejalwapan bila dipanaskan?

A Sodium chloride
Natrium klorida

B Ammonium chloride
Ammonium klorida

C Sodium nitrate
Natrium nitrat

D Ethanol
Etanol

2 Diagram 1 shows the set-up of the apparatus to study Process I.
Rajah 1 menunjukkan susunan radas bagi mengkaji Proses 1

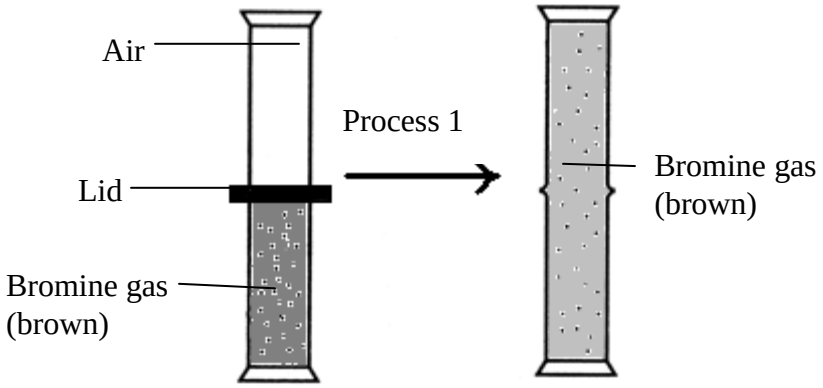


Diagram 1
Rajah 1

What is Process 1 ?
*A*pakah Proses *1 ?*

A Condensation
Kondensasi

B Evaporation
Penyejatan

C Diffusion
Resapan

D Sublimation
Pemejalwapan

3 Which of the following processes will decrease the kinetic energy of the particles of a substance?
Proses yang manakah akan mengurangkan tenaga kinetik zarah-zarah bagi suatu bahan?

A Melting
Peleburan

B Freezing
Pembekuan

C Boiling
Pendidihan

D Evaporation
Penyejatan

4 Which of the following substances consists of atoms?
Manakah antara bahan berikut mengandungi atom?

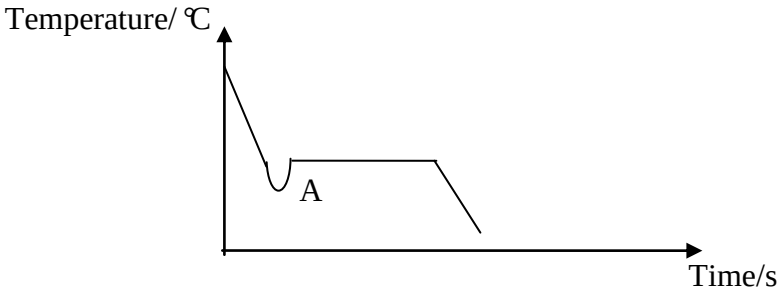
A Copper
Kuprum

B Nitrogen gas
Gas nitrogen

C Lead(II) iodide
Plumbum(II) iodida

D Naphthalene
Naftalena

5 The graph below shows the cooling curve of naphthalene.
Graf di bawah menunjukkan lengkung penyejukan bagi naftalena.



Why is curve A obtained in the graph?
Kenapakah lengkung A terjadi ?

A Impure naphthalene is cooled.
Naftalena tak tulen disejukkan.

B Naphthalene evaporates during cooling process
Naftalena meruap semasa proses penyejukan

C Naphthalene is not stirred during cooling process
Naftalena tidak dikacau semasa proses penyejukan

D Naphthalene freezes after achieving its freezing point
Naftalena membeku setelah mencapai takat beku

6

Electron moves around the nucleus in fixed orbital shells *Elektron bergerak mengelilingi nukleus dalam petala yang tetap*

Which of the following scientists proposed the atomic theory stated above ?
Ahli sains yang manakah mencadangkan teori atom di atas?

A J.J. Thomson
B Niels Bohr
C Ernest Rutherford
D James Chadwick

7 How many protons, neutrons and electrons does an atom of aluminium contain?
Berapakah bilangan proton, neutron dan elektron bagi atom aluminium ?

$^{27}_{13}Al$

	Number of protons *Bilangan proton*	Number of neutrons *Bilangan neutron*	Number of electrons *Bilangan elektron*
A	13	14	13
B	13	27	13
C	14	13	14
D	27	14	13

8 The following statements are true about lead-acid accumulator except
Pernyataan-pernyataan berikut adalah benar mengenai akumulator asid- plumbum kecuali

A lead plate is the negative terminal
kepingan plumbum adalah terminal negatifnya
B carbon plate is the positive terminal
kepingan karbon adalah terminal positifnya
C the accumulator can be recharged
akumulator ini boleh dicas semula
D the electrolyte in this accumulator is sulphuric acid
elektrolitnya ialah asid sulfurik

9 Table 1 shows the proton number and the nucleon number of atom X.
Jadual 1 menunjukkan nombor proton dan nombor nukleon bagi atom X

Proton number *Nombor proton*	11
Nucleon number *Nombor nukleon*	23

Table 1
Jadual 1

Which of the following is correct about the position of X in the Periodic Table of elements?
Yang manakah benar mengenai kedudukan X dalam Jadual Berkala Unsur?

	Group ***Kumpulan***	**Period** ***Kala***
A	1	2
B	2	1
C	1	3
D	5	2

10 Table 2 shows the electron arrangement of atoms P , Q , R and T
Jadual 2 menunjukkan susunan elektron atom-atom P, Q, R dan T

Atom ***Atom***	P	Q	R	T
Electron arrangement ***Susunan elektron***	2.1	2.4	2.8.2	2.8.7

Table 2
Jadual 2

Which of the following pairs of elements can combine to form a covalent compound?
Pasangan unsur yang manakah dapat berpadu membentuk sebatian kovalen ?

A Q and T
B P and R
C R and T
D Q and R

11 Which statement is true about the reaction of a sodium atom with oxygen atom to form sodium oxide ?
[Proton number: Na = 11, O = 8]
Pernyataan yang manakah benar bagi tindak balas antara atom natrium dengan atom oksigen untuk membentuk natrium oksida ?
[Nombor proton : Na = 11, O = 8]

A One sodium atom donates one electron to one oxygen atom
Satu atom natrium menderma satu elektron kepada satu atom oksigen
B One sodium atom shares one electron with one oxygen atom
Satu atom natrium berkongsi satu elektron dengan satu atom oksigen
C Two sodium atom share one electron with one oxygen atom
Dua atom natrium berkongsi satu elektron dengan satu atom oksigen
D Two sodium atoms donate one electron each to one oxygen atom
Dua atom natrium menderma satu elektron setiap satu kepada satu atom oksigen

12 Diagram 2 shows a simple cell made up of magnesium plate and copper plate as electrodes and copper(II) sulphate solution as the electrolyte.
Rajah 2 menunjukkan sebuah sel ringkas terdiri daripada kepingan magnesium dan kepingan kuprum sebagai elektrod dan larutan kuprum(II) sulfat sebagai elektrolit.

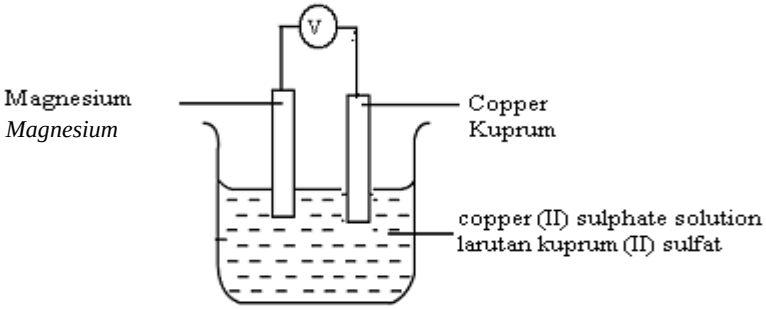


Diagram 2
Rajah 2

Which of the following statements is true for the above reaction ?
Yang manakah pernyataan berikut adalah benar bagi tindak balas di atas ?

A The blue colour of the copper(II) sulphate solution remains unchanged
Warna biru larutan kuprum(II) sulfat tidak berubah
B Copper electrode is the positive terminal
Elektrod kuprum adalah terminal positif
C Magnesium electrode becomes larger in size
Saiz elektrod magnesium bertambah besar
D Colourless gas bubbles are produced at the copper electrode
Gelembung gas tanpa warna terhasil di elektrod kuprum

13 Diagram 3 shows a set-up of apparatus of a redox reaction.
Rajah 3 menunjukkan susunan radas bagi tindak balas redoks.

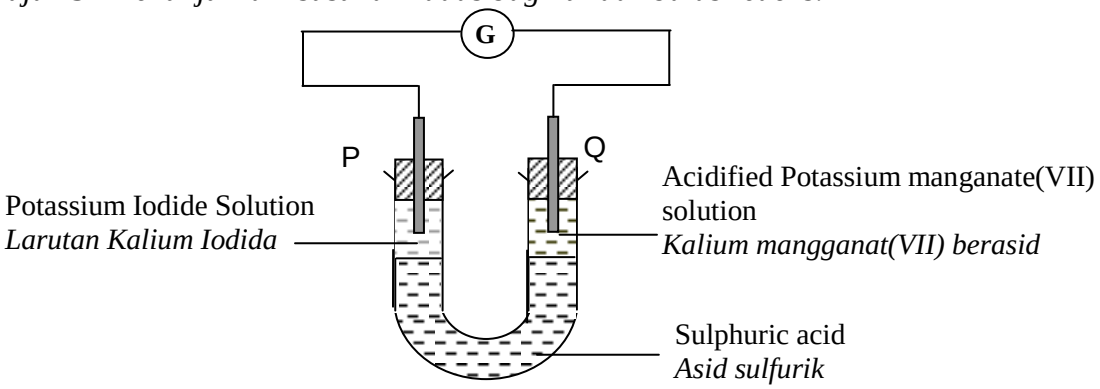


Diagram 3
Rajah 3

Which of the following statements are correct ?
Manakah antara pernyataan berikut adalah benar?

I Iodide ion , I^- is reduced
Ion Iodida, I^- mengalami penurunan

II Electrons flow from electrode P to Q
Elektron mengalir dari elektrod P ke Q

III The purple colour of acidified potassium manganate (VII) solution becomes colourless
Warna ungu larutan berasid kalium mangganat (VII) menjadi tanpa warna

IV Manganate(VII) ion, MnO_4^- acts as the reducing agent
Ion manganat(VII), MnO_4^- bertindak sebagai agen penurunan

A I and II only

B II and III only

C II and IV only

D I , II , III and IV

14 Half equation below represents a reaction.
Setengah persamaan di bawah mewakili satu tindak balas.

$$2\,I^- \longrightarrow I_2 + 2e$$

What is meant by oxidation reaction based on the equation ?
Apakah yang dimaksudkan dengan tindak balas pengoksidaan berdasarkan persamaan di atas?

A Electrons are received by iodine
Elektron diterima oleh iodin
B Electrons are received by iodide ions
Elektron diterima oleh ion iodida
C Electrons are released by iodine
Elektron dilepaskan oleh iodin
D Electrons are released by iodide ions
Elektron dilepaskan oleh ion iodida

15 Diagram 4 shows the set-up of apparatus for the electrolysis of molten lead(II) bromide.
Rajah 4 menunjukkan susunan radas bagi elektrolisis leburan plumbum(II) bromida.

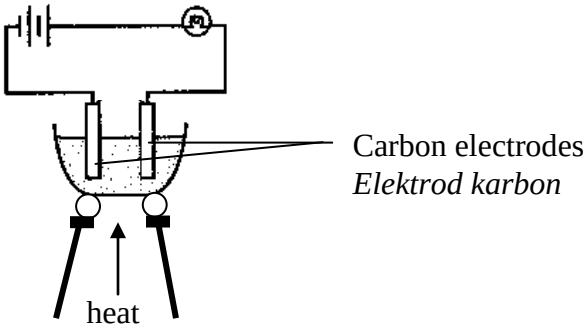


Diagram 4
Rajah 4

State the correct observation for the reaction.
Nyatakan pemerhatian yang betul bagi tindak balas ini

A Bromine is released at the anode
Bromin dibebaskan di anod
B Brown solid is deposited at the cathode
Pepejal perang terenap di katod
C Brown gas is released at the anode
Gas perang terbebas di anod
D The carbon electrode at anode is coated with grey metal
Elektrod karbon di anod disaluti dengan logam berwarna kelabu

16 Which of the following reagents can change iodide ion to iodine?
Yang manakah antara reagen berikut dapat menukarkan ion iodida kepada iodin?

I Acidified potassium dichromate(VI) solution
Larutan kalium dikromat(VI) berasid
II Iron(II) sulphate solution
Larutan ferum(II) sulfat
III Lead(II) nitrate solution
Larutan plumbum(II) nitrat
IV Bromine water
Air bromin

A I and II only
I dan II sahaja

B II and IV only
II dan IV sahaja

C I and IV only
I dan IV sahaja

D II and III only
II dan III sahaja

17 Lead(II) bromide is not able to conduct electricity in solid state but can conduct electricity in molten state because
Plumbum(II) bromida tidak boleh mengalirkan arus elektrik dalam keadaan pepejal tetapi boleh mengalirkan arus elektrik dalam keadaan lebur kerana

A bromide ions and lead(II) ions are able to move freely in the molten state
ion bromida dan ion plumbum(II) bebas bergerak dalam keadaan lebur

B the molecules in lead (II) bromide are able to move freely in the molten state
molekul plumbum(II) bromida bebas bergerak dalam keadaan lebur

C bromine and lead atoms are free to move
atom bromin dan plumbum bebas bergerak

D the bromide and lead(II) ions are held strongly together in the molten state
ion bromida dan ion plumbum(II) terikat kuat dalam keadaan leburan

18 Table 3 shows the voltage produced by different type of cells. Based on this table , the cell that can produce 2.00 V can be set up using
Jadual 3 menunjukkan bacaan voltan beberapa jenis sel. Berpandukan jadual ini, sel yang boleh membekalkan 2.00V boleh dibina dengan menggunakan

Cell *Sel*	Voltage / V *Voltan / V*
Magnesium // Copper *Magnesium // kuprum*	2.70
Zinc // Copper *Zink // kuprum*	1.15
Lead // Copper *Plumbum // Kuprum*	0.45
Iron // Copper *Ferum // Kuprum*	0.70

Table 3
Jadual 3

A Magnesium // zinc
Magnesium // zink

B Iron // lead
Ferum // plumbum

C Magnesium // iron
Magnesium // ferum

D Magnesium // lead
Magnesium // Plumbum

19 Which of the following is true about weak acid?
Pernyataan yang mana benar tentang asid lemah ?

A Unable to neutralize alkali
Tidak boleh meneutralkan alkali

B The pH value is more than 7.
Nilai pHnya lebih dari 7

C Able to change red litmus paper to blue.
Dapat menukarkan warna kertas litmus merah ke biru

D Ionizes partially in water to produce hydrogen ions.
Mengion separa dalam air untuk menghasilkan ion hidrogen

20 Diagram 5 shows the set-up of apparatus done by a student to coat tin plate with silver. The electroplating process is however unsuccesful because
Rajah 5 menunjukkan susunan radas yang disediakan oleh seorang pelajar untuk menyadurkan kepingan logam timah dengan argentum. Proses penyaduran didapati tidak berjaya dilakukan kerana

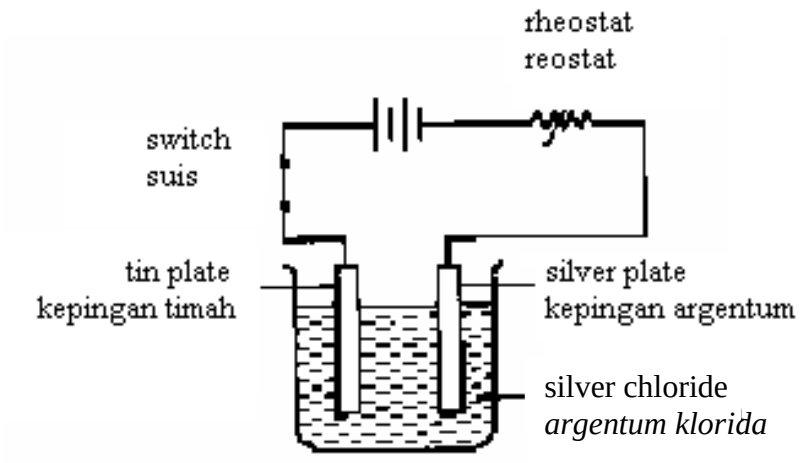


Diagram5
Rajah 5

A A rheostat is used instead of an ammeter
reostat digunakan dan bukannya ammeter

B silver chloride is used as the electrolyte
argentum klorida digunakan sebagai elektrolit

C silver plate is connected to the anode
kepingan argentum disambungkan ke anod

D silver plate used is impure
kepingan argentum yang digunakan tidak tulen

21 Which particle causes an aqueous solution of ammonia to exhibit alkaline properties?
Zarah yang manakah menyebabkan larutan ammonia memperlihatkan sifat-sifat alkali?

A H_3O^+

B OH^-

C NH_4^+

D NH_3

22 Which of the following methods is suitable to prevent rusting of iron?
Kaedah yang manakah sesuai untuk mencegah pengaratan besi?

A Painting the engine of a car
Mengecat enjin kereta
B Fixing bars of copper to the part of ship submerged in water
Menampal kepingan kuprum di bahagian kapal yang tenggelam dalam air
C Galvanizing the roof made of iron with tin
Menggalvani atap besi dengan logam timah
D Plating the metal surface with chromium
Menyadur permukaan logam dengan kromium

23 The equation shows the reaction between sulphuric acid and sodium hydroxide.
Persamaan di bawah menunjukkan tindakbalas di antara asid sulfurik dan natrium hidroksida.

$$\mathbf{H_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O}$$

What is the volume of 1.0 mol dm^{-3} sodium hydroxide solution which can neutralize 25.0 cm^3 of 1.0 mol dm^{-3} sulphuric acid?
Berapakah isipadu larutan natrium hidroksida 1.0 mol dm^{-3} yang diperlukan untuk meneutralkan 25.0 cm^3 1.0 mol dm^{-3} asid sulfurik ?

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

24 Both ethanoic acid and hydrochloric acid with concentration of 1 mol dm^{-3} have
Kedua-dua asid etanoik dan asid hidroklorik yang berkepekatan 1 mol dm^{-3} mempunyai
I the same concentration of hydrogen ions
kepekatan ion hidrogen yang sama
II different degree of ionisation in water
darjah pengionan dalam air yang berbeza
III different pH value
nilai pH yang berbeza
IV the same concentration of hydroxide ions
kepekatan ion hidroksida yang sama

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

25 When solid R is heated strongly, it produces a residue which is brown in colour when hot and turns yellow when cold. R may be
Apabila pepejal R dipanaskan dengan kuat, ia menghasilkan baki berwarna perang bila panas dan kuning bila sejuk. R mungkin

A Lead(II) carbonate
Plumbum(II) karbonat
B Zinc carbonate
Zink karbonat
C Copper(II) nitrate
Kuprum(II) nitrat
D Iron(II) nitrate
Ferum(II) nitrat

26 Which of the following compounds are needed to prepare ammonium sulphate fertiliser?
Antara sebatian berikut, yang manakah diperlukan untuk menyediakan baja ammonium sulfat?

A Ammonia solution and sodium sulphate
Larutan ammonia dan natrium sulfat
B Ammonium chloride and potassium chloride
Ammonium klorida dan kalium klorida
C Ammonia solution and sulphuric acid
Larutan ammonia dan asid sulfurik
D Ammonium nitrate solution and sulphuric acid
Larutan ammonium nitrat dan asid sulfurik

27 Which of the following salts is insoluble in water?
Antara garam berikut, yang manakah tidak larut dalam air?
A Silver nitrate
Argentum nitrat
B Calcium chloride
Kalsium klorida
C Ammonium sulphate
Ammonium sulfat
D Lead(II) carbonate
Plumbum(II) karbonat

28 The equation below shows thermal decomposition of 12.4 g of copper(II) carbonate.
Persamaan di bawah menunjukkan penguraian haba ke atas 12.4 g kuprum(II) karbonat.

$$CuCO_3\,(s) \rightarrow CuO\,(s) + CO_2\,(g)$$

What is the mass of copper(II) oxide formed ?
Apakah jisim kuprum(II) oksida yang terbentuk?

[Relative atomic mass : Cu=64, O=16, C=12]

A 4.4 g
B 8.0 g
C 44.0 g
D 80.0 g

29 Which of the following ions form a white precipitate which is insoluble in excess sodium hydroxide solution?
Antara ion-ion berikut, yang manakah membentuk mendakan putih yang tak larut dalam larutan natrium hidroksida berlebihan?

A Al^{3+}
B Mg^{2+}
C Pb^{2+}
D Zn^{2+}

30 Paracetamol is an example of
Parasetamol ialah satu contoh

A an antibiotic
antibiotik
B an analgesic
analgesik
C a traditional medicine
ubat tradisional
D a psychotherapeutic medicine
ubat psikoterapeutik

31 The chemical equation below shows the reaction between P and Q.
Persamaan kimia di bawah menunjukkan tindak balas di antara P dan Q.

$$P + Q \rightarrow \text{salt} + H_2O + CO_2$$
$$P + Q \rightarrow \textit{garam} + H_2O + CO_2$$

Which of the following could be P and Q?
Yang manakah antara berikut mungkin P dan Q?

A Zinc and hydrochloric acid
Zink dan asid hidroklorik
B Lead(II) oxide and nitric acid
Plumbum(II) oksida dan asid nitrik
C Sodium carbonate and sulphuric acid
Natrium karbonat dan asid sulfurik
D Magnesium carbonate and sodium hydroxide
Magnesium karbonat dan natrium hidroksida

32 The equation below shows the oxidation of sulphur dioxide to sulphur trioxide in the manufacturing of sulphuric acid.
Persamaan di bawah menunjukkan pengoksidaan sulfur dioksida kepada sulfur trioksida dalam pembuatan asid sulfurik.

$$\mathbf{2SO_2 + O_2 \rightarrow 2SO_3}$$

The reaction is catalysed by
Tindak balas ini dimangkinkan oleh
A Iron
Ferum
B Platinum
Platinum
C Vanadium(V) oxide
Vanadium(V) oksida
D Manganese(IV) oxide
Mangan(IV) oksida

33 Why are detergents more effective than soap?
Mengapakah detergen lebih berkesan daripada sabun?
A Detergents are soluble in grease, whereas soaps are insoluble in grease.
Detergen larut dalam gris, manakala sabun tidak larut dalam gris.
B Detergents reduce the surface tension of water whereas soaps do not.
Detergen mengurangkan ketegangan permukaan air manakala sabun tidak.
C Detergents are biodegradable whereas soaps are non-biodegradable.
Detergen boleh terurai secara biodegradasi manakala sabun tidak
D Detergents do not form scum in hard water, whereas soaps form scum in hard water.
Detergen tidak membentuk kekat dalam air liat manakala sabun membentuk kekat dalam air liat.

34 In the saponification process, concentrated sodium hydroxide solution is added to boiling vegetable oils to produce X and soap. What is X?
Dalam proses saponifikasi, larutan natrium hidroksida pekat ditambahkan kepada minyak sayuran yang mendidih untuk menghasilkan X dan sabun. Apakah X?

A Glycerol
Gliserol
B Ethanol
Etanol
C Propanoic acid
Asid propanoik
D Ethyl methanoate
Etil metanoat

35 Which of the following statements explains why ceramic is suitable to make an engine block?
Yang manakah antara pernyataan berikut menerangkan mengapa seramik sesuai untuk membina blok enjin?

A Ceramic is chemically inert
Seramik adalah lengai secara kimia
B Ceramic is an electric conductor
Seramik adalah konduktor elektrik
C Ceramic can withstand high temperature
Seramik boleh tahan suhu yang tinggi
D Ceramic has a low specific heat capacity
Seramik mempunyai muatan haba tentu yang rendah

36 Which of the following food additives can be used to make food stay fresh longer and taste better?
Antara bahan tambah makanan berikut yang manakah boleh digunakan untuk mengekalkan kesegaran makanan dan meningkatkan rasanya?

A Tartrazine and sodium benzoate
Tartrazina dan natrium benzoat
B Ascorbic acid and sodium benzoate
Asid askorbik dan natrium benzoat
C Monosodium glutamate and tartrazine
Mononatrium glutamat dan tartrazina
D Monosodium glutamate and ascorbic acid
Mononatrium glutamat dan asid askorbik

37 Diagram 6 shows an energy level diagram
Rajah 6 menunjukkan gambar rajah aras tenaga.

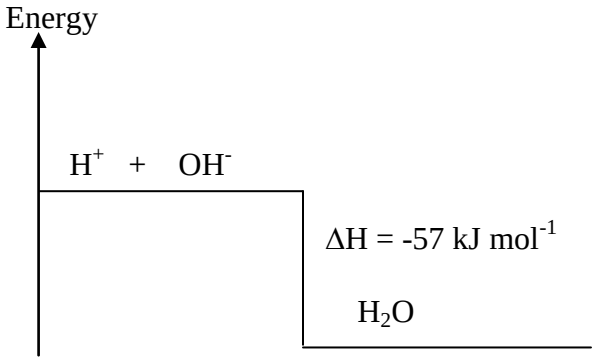


Diagram 6
Rajah 6

Based on Diagram 6, it can be concluded that
Berdasarkan rajah di atas, dapat disimpulkan bahawa

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

38 Which of the following changes can increase the amount of product formed in a chemical reaction?
Antara perubahan berikut, yang manakah dapat meningkatkan jumlah hasil dalam suatu tindakbalas kimia?

A Increase the concentration of the reactant
Meningkatkan kepekatan bahan tindak balas
B Reduce the mass of catalyst
Mengurangkan jisim mangkin
C Increase the size of a solid reactant
Meningkatkan saiz bahan tindakbalas
D Decrease the volume of reactant
Mengurangkan isipadu larutan bahan tindakbalas

39 Diagram 7 shows the energy level diagram of a reaction.
Rajah 7 menunjukkan gambarajah aras tenaga bagi suatu tindak balas

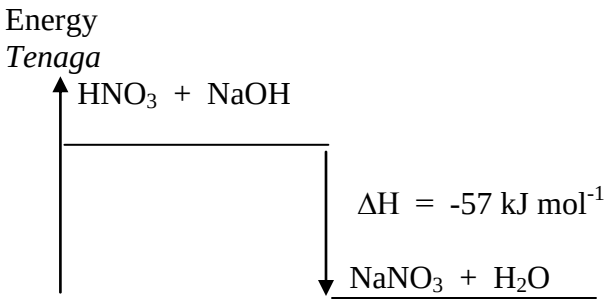


Diagram 7
Rajah 7

Which of the following acids is suitable to replace nitric acid, HNO_3 to obtain the same ΔH value?
Asid yang manakah sesuai untuk menggantikan asid nitrik, HNO_3 bagi mendapatkan nilai ΔH yang sama?

A Ethanoic acid, CH_3COOH
Asid etanoik, CH_3COOH
B Hydrochloric acid, HCl
Asid hidroklorik, HCl
C Carbonic acid, H_2CO_3
Asid karbonik, H_2CO_3
D Sulphuric acid, H_2SO_4
Asid sulfurik, H_2SO_4

40 The following is the thermochemical equation for a reaction.
Berikut adalah persamaan termokimia bagi satu tindak balas.

$$\mathbf{Zn + CuSO_4 \longrightarrow ZnSO_4 + Cu \quad \Delta H = -210\ kJ\ mol^{-1}}$$

Calculate the heat change when 50 cm^3 of 1.0 mol dm^{-3} copper(II) sulphate solution reacts with excess zinc.
Hitung perubahan haba apabila 50 cm^3 larutan kuprum(II) sulfat 1.0 mol dm^{-3} bertindak balas dengan zink yang berlebihan.

A 10.5 kJ
B 105 kJ
C 420 kJ
D 4200 kJ

41 Diagram 8 shows the set-up of the apparatus to determine the heat of precipitation of silver chloride.
Rajah 8 menunjukkan gambar rajah susunan radas untuk menentukan haba pemendakan bagi argentum klorida.

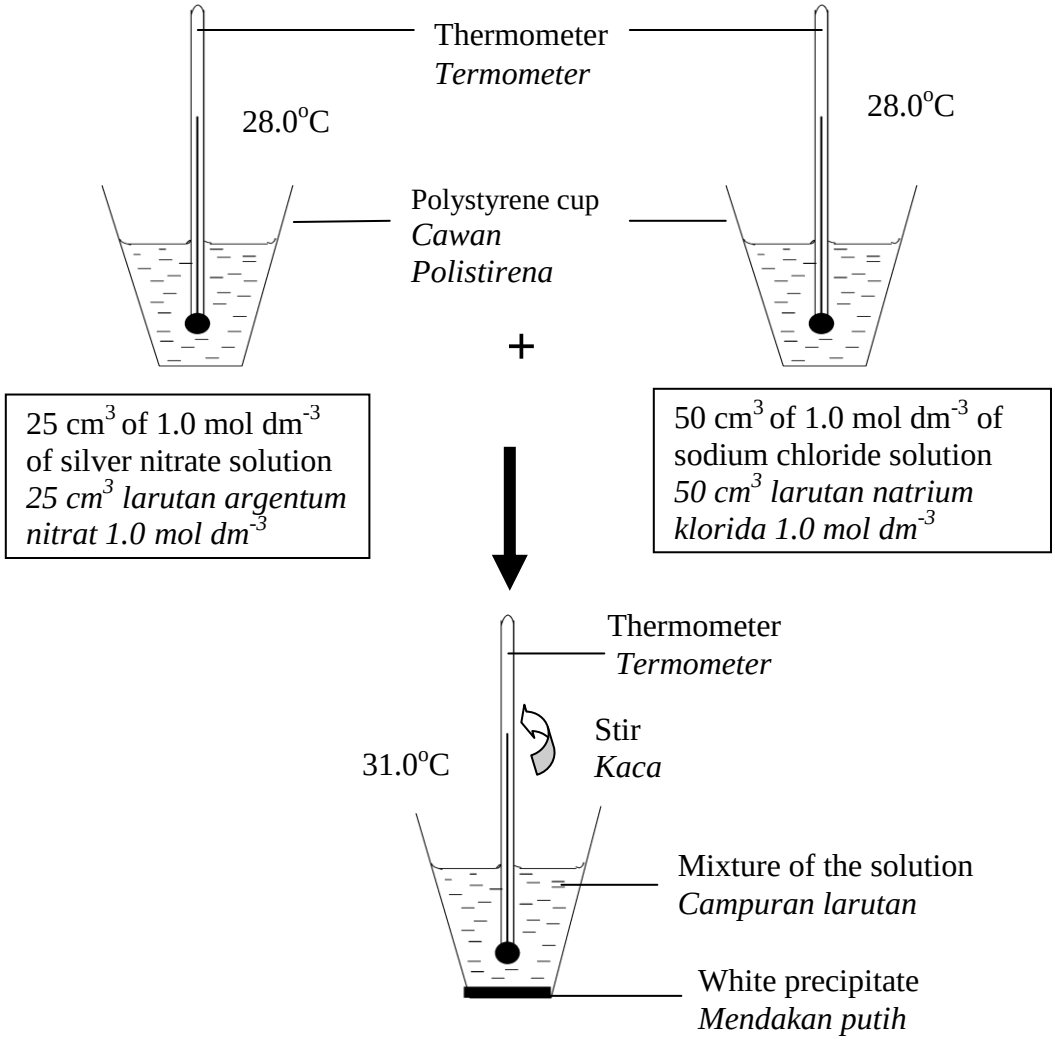


Diagram 8
Rajah 8

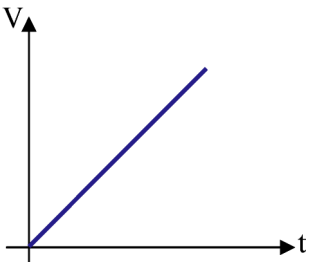
What is the heat of precipitation of silver chloride?
Berapakah haba pemendakan bagi argentum klorida?
[Specific heat capacity of solution = 4.2 $Jg^{-1o}C^{-1}$, density of solution = 1 g cm^{-3}]
[Muatan haba tentu larutan = 4.2 $Jg^{-1o}C^{-1}$, ketumpatan larutan = 1 g cm^{-3}]

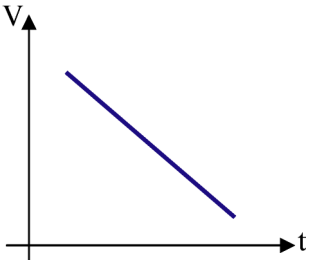
A 37800 kJ mol^{-1}
B 18900 kJ mol^{-1}
C 18.9 kJ mol^{-1}
D 37.8 kJ mol^{-1}

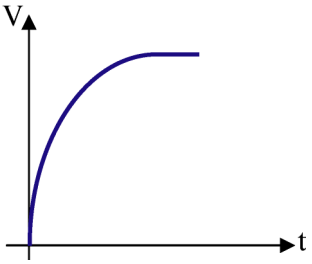
42 The following equation shows the reaction between excess zinc powder and dilute hydrochloric acid:
Persamaan berikut menunjukkan tindak balas antara serbuk zink berlebihan dengan asid hidroklorik cair:

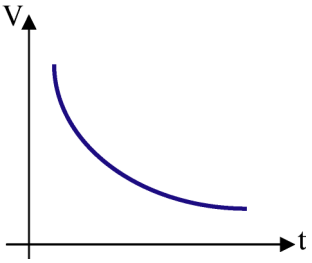
$$Zn + 2HCl \rightarrow ZnCl_2 + H_2$$

Which of the following graphs represents the volume of hydrogen gas (V) released against time (t)?
Antara graf berikut yang manakah mewakili isipadu gas hidrogen (V) yang dibebaskan melawan masa (t)?

A


B


C


D


43 Diagram 9 shows the set-up of apparatus used to study the rate of reaction of marble chips and nitric acid.
Rajah 9 menunjukkan susunan radas yang digunakan untuk mengkaji kadar tindak balas antara ketulan marmar dengan asid nitrik

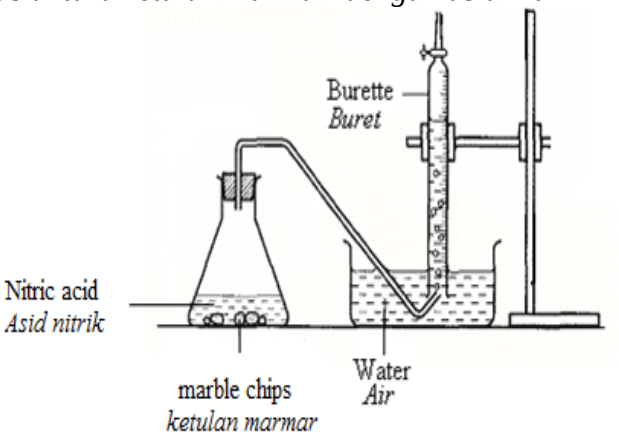


Diagram 9
Rajah 9

.

The rate of reaction in this experiment can be increased by
Kadar tindak balas bagi eksperimen ini boleh ditingkatkan dengan

A using the smaller sizes of marble chips
menggunakan saiz ketulan marmar yang lebih kecil
B using a larger conical flask.
menggunakan kelalang kon yang lebih besar
C adding water to the nitric acid.
menambahkan air ke dalam asid nitrik
D decreasing the temperature of the nitric acid
merendahkan suhu asid nitrik

44 Effective collision is the collision where
Perlanggaran berkesan ialah perlanggaran yang
A its energy is less than the activation energy and with correct orientation
tenaganya kurang daripada tenaga pengaktifan dan dalam orientasi yang betul.
B has a low energy
mempunyai tenaga yang rendah
C its energy is equal to the activation energy
tenaganya sama dengan dengan tenaga pengaktifan
D its energy is greater than the activation energy with the correct orientation
tenaganya lebih besar daripada tenaga pengaktifan dan dalam orientasi yang betul

45 Excess zinc granules are added to 50 cm^3 of 0.1 mol dm^{-3} hydrochloric acid. The hydrogen gas evolved is collected at 30 second intervals. The results are tabulated in Table 4.
Butiran zink yang berlebihan ditambahkan kepada 50 cm^3 asid hiroklorik 0.1 mol dm^{-3}. Keputusan dicatatkan di dalam Jadual 4.

Time /s *Masa/s*	0	30	60	90	120	150
Total volume of H_2 /cm^3 *Jumlah isipadu H_2 /cm^3*	0	11	18	22	24	24

Table 4
Jadual 4

What information can you obtain from the results of this experiment?
Apakah maklumat yang boleh diperolehi daripada keputusan eksperimen ini?

I No hydrogen gas is released after 120 seconds
Tiada gas hidrogen dibebaskan selepas 120 saat
II The average rate of reaction is 0.16 cm^3 s^{-1}
Purata kadar tindak balas ialah 0.16 cm^3 s^{-1}
III The total volume of hydrogen gas collected is 99 cm^3
Jumlah isipadu gas yang terkumpul ialah 99 cm^3
IV The rate of hydrogen gas released decreases with time
Kadar pembebasan gas berkurang dengan masa
A IV only
B I and IV
C I, II and IV
D I, III and IV

46 The following chemical equation shows a reaction for ethanol.
Persamaan kimia berikut menunjukkan satu tindak balas bagi etanol .

$$C_2H_5OH \rightarrow C_2H_4 + H_2O$$

What is the name of the reaction?
Apakah nama bagi tindak balas itu?
A Oxidation
Pengoksidaan
B Reduction
Penurunan
C Dehydration
Pendehidratan
D Fermentation
Penapaian

47 Hexene is classified as an unsaturated hydrocarbon because
Heksena dikelaskan sebagai hidrokarbon tidak tepu kerana

A it contains only carbon and hydrogen .
ia mengandungi karbon dan hidrogen sahaja.

B it is a liquid at room temperature.
ia adalah cecair pada suhu bilik.

C it is less dense than water.
ia kurang tumpat daripada air

D it has a double bond between carbon atoms.
ia mempunyai ikatan ganda dua di antara atom karbon

48 Diagram 10 shows the structural formula of a compound.
Rajah 10 menunjukkan formula struktur bagi suatu sebatian..

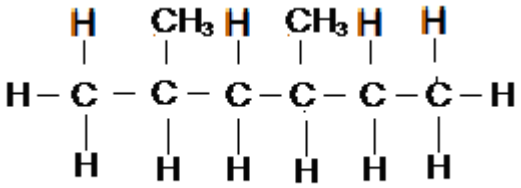


Diagram 10
Rajah 10

Name the compound using IUPAC nomenclature.
Namakan sebatian tersebut menggunakan penamaan IUPAC.

A 2,4-dimethylhexane
2,4-dimetilheksana

B 3,5-dimethylhexane
3,5-dimetilheksana

C 1,1,3-trimethylpentane
1,1,3-trimetilpentana

D 3,5,5-trimethylpentane
3,5,5-trimetilpentana

49 Which chemical formulae represent saturated hydrocarbon?
Formula kimia yang manakah mewakili hidrokarbon tepu?

I $CH_3CH(CH_3)CH_3$

II $CH_3CH_2CH_2CH_3$

III $CH_2CHCH_2CH_3$

IV $CH_3CHCHCH_3$

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

50 The molecular formulae of two molecules P and Q are as follows.
Formula molekul bagi molekul P dan Q adalah seperti berikut

CH_3CH_2OH	$CH_3CH_2CH_2OH$
P	Q

Which of the following statements is true for both molecules P and Q?
Di antara pernyataan berikut yang manakah benar bagi kedua – dua molekul P dan Q?

A They have different functional groups
Kedua – duanya mempunyai kumpulan berfungsi yang berlainan
B All their physical properties are similar
Semua sifat fiziknya sama
C All their chemical properties are different
Semua sifat kimianya berbeza
D They can be represented by the same general formula
Kedua – duanya boleh diwakili oleh satu formula am yang sama

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 B*** *dan* ***Bahagian C*** *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

[Lihat halaman sebelah

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' (examination pad)
   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 (kertas jawapan). 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 Table 1.1 shows the proton number and nucleon number of atom for the elements carbon, oxygen, magnesium and sulphur.
Jadual 1.1 menunjukkan nombor proton dan nombor nukleon bagi atom unsur karbon, oksigen, magnesium dan sulfur.

Elements *Unsur*	Carbon *Karbon*	Oxygen *Oksigen*	Magnesium *Magnesium*	Sulphur *Sulfur*
Proton number *Nombor proton*	6	8	12	16
Nucleon number *Nombor nukleon*	12	16	24	32

Table 1.1
Jadual 1.1

(a) What is meant by proton number ? 1(a)
Apakah yang dimaksudkan dengan nombor proton ?

..... 1
[1 mark]

(b) State the type of particles consists in magnesium metal. 1(b)
Nyatakan jenis zarah yang terdapat dalam logam magnesium.

…… 1
[1 mark]

(c) (i) Write the electron arrangement for sulphur atom . 1(c)(i)
Tuliskan susunan elektron bagi atom sulfur.

……... 1
[1 mark]

(ii) State the valence electron for sulphur atom. 1(c)(ii)
Nyatakan elektron valen bagi atom sulfur.

……... 1
[1 mark]

(d) Carbon-12 and Carbon-14 are the isotopes of carbon.
Karbon-12 dan Karbon-14 adalah isotop karbon.

(i) What is meant by isotopes ? 1(d)(i)
Apakah yang dimaksudkan dengan isotop ?

.....
[1 mark] 1

(ii) State the use of carbon-14 in archeology field. 1(d)(ii)
Nyatakan kegunaan karbon-14 dalam bidang arkeologi

……...
[1 mark] 1

(e) Figure 1.1 shows the set-up of apparatus to study the heating of copper(II) carbonate.
Rajah 1.1 menunjukkan susunan radas bagi mengkaji pemanasan kuprum(II) karbonat.

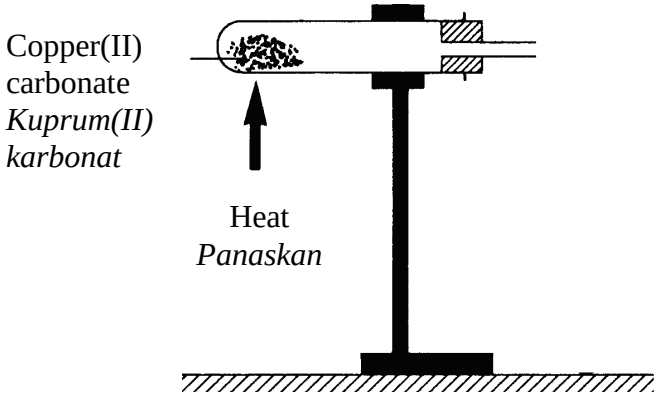


Figure 1.1
Rajah 1.1

(i) Complete the set-up of apparatus in Figure 1.1 to test the gas liberated when copper(II) carbonate is heated. 1(e)(i)
Lengkapkan susunan radas dalam Rajah 1.1 bagaimana menguji gas yang terbebas apabila kuprum(II) karbonat dipanaskan
[2 marks] 2

(ii) Write the chemical equation for the reaction that takes place. 1(e)(ii)
Tuliskan persamaan kimia bagi tindak balas yang berlaku.

……...
[2 marks] 2

Total A1
10

2 Diagram 2.1 shows part of the Periodic Table of the Elements.
Rajah 2.1 menunjukkan sebahagian Jadual Berkala Unsur.

1	2		13	14	15	16	17	18
				A		**B**		**C**
D			**E**				**F**	
		G					**H**	

Diagram 2.1
Rajah 2.1

A, B, C, D, E , F , G and H are **not** the actual symbols of the elements.
*A, B, C, D, E , F , G dan H **bukan** simbol sebenar bagi unsur.*

Use these letters to answer the following questions.
Gunakan huruf-huruf ini bagi menjawab soalan yang berikut.

(a) (i) State which two elements have similar chemical properties.
Nyatakan dua unsur yang mempunyai sifat kimia yang serupa.

……...
[1 mark]

2(a)(i) 1

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

……
[1 mark

2(a)(ii) 1

(b) Which element forms an amphoteric oxide ?
Unsur yang manakah menghasilkan oksida amfoterik?

…….....
[1 mark]

2(b) 1

(c) (i) Which element is chemically unreactive ?
Unsur yang manakah adalah lengai secara kimia?

……
[1 mark]

2(c)(i) 1

(ii) Give a reason for your answer in (c)(i).
Berikan satu sebab bagi jawapan anda di (c)(i).

…….
[1 mark]

2(c)(ii) 1

(d) Arrange the elements A, B, C, D, E and F in the order of increasing atomic size.
Susunkan unsur-unsur A, B, C, D, E, dan F mengikut tertib saiz atom menaik.

……...
[1 mark]

2(d) 1

(e) (i) State one physical property of the compound formed when A reacts with F.
Nyatakan satu sifat fizik bagi sebatian yang terbentuk apabila A bertindak balas dengan F.

……
[1 mark]

2(e)(i) 1

(ii) Draw the electron arrangement of the compound formed in(e)(i).
Lukiskan susunan elektron bagi sebatian yang terbentuk di (e)(i).

[2 marks]

2(e)(ii) 2

(iii) Name the type of chemical bond formed in the compound.
Namakan jenis ikatan kimia yang terbentuk dalam sebatian ini.

……
[1 mark]

2(e)(iii) 1

Total A2 10

3 Table 3.1 shows the results of two tests done to hydrogen chloride in solvent X and solvent Y.
Jadual 3.1 menunjukkan keputusan bagi dua ujian yang dijalankan ke atas hidrogen klorida di dalam pelarut X dan pelarut Y.

Test *Ujian*	Hydrogen chloride in *Hydrogen klorida dalam*	
	Solvent X *Pelarut X*	Solvent Y *Pelarut Y*
A small piece of marble chip is added into hydrogen chloride *Ketulan kecil marmar di tambahkan ke dalam hidrogen klorida*	No change *Tiada perubahan*	Effervescence occurs. A colourless gas is liberated *Pembuakan berlaku. Gas tidak berwarna dibebaskan.*
Reaction with blue litmus paper *Tindakbalas dengan kertas litmus biru*	No change *Tiada perubahan*	The colour of blue litmus paper turns red. *Warna kertas litmus biru bertukar merah*

Table 3.1

(a) Name the type of particles of hydrogen chloride found in
Namakan zarah hidrogen klorida yang terdapat dalam

(i) Solvent X:
PelarutX : …….....
[1 mark]

(a)(i) 1

(ii) Solvent Y
PelarutY :.....
[1 mark]

(a)(ii) 1

(b) Suggest a name for solvent Y.
Cadangkan nama bagi larutan Y.

.....
[1 mark]

(b) 1

(c) Explain why hydrogen chloride in solvent Y produce colourless gas while no change is observed when hydrogen chloride is in solvent X.
Terangkan mengapa hidrogen klorida dalam pelarut Y menghasilkan gas tanpa warna manakala tiada perubahan diperhatikan apabila hidrogen klorida dalam pelarut X.

(c) 2

.....

.....

[2 marks]

(d) Flow chart in diagram 3.2 shows a series of chemical changes of salt Q .
Carta alir dalam rajah3.2 menunjukkan siri perubahan kimia garam Q

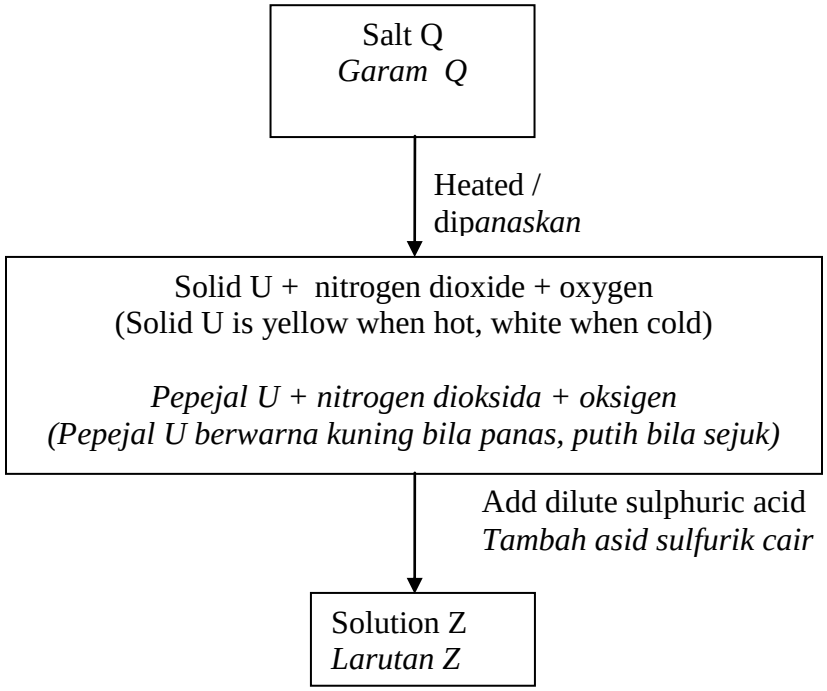


Diagram 3.2
Rajah 3.2

(i) Name solid U.
Namakan pepejal U.

(d)(i) 1

.....……...

[1mark]

(ii) Write the chemical equation to represent the reaction when salt Q is heated
Tuliskan persamaan kimia bagi mewakili tindak balas pemanasan garam Q

d(ii)

……

2

[2 marks]

(e) Solution Z is produced when solid U is reacted with dilute sulphuric acid.
Larutan Z terhasil apabila pepejal U bertindakbalas dengan asid sulfurik cair.

Describe the confirmatory test for the cation presents in solution Z.
Huraikan ujian pengesahan bagi kation yang hadir dalam larutan Z.

.....

.....

.....

(e)

2

[2 marks]

Total A3

10

4 Diagram 4.1 shows the set-up of apparatus for two types of cells.
Rajah 4.1 menunjukkan susunan radas bagi dua jenis sel.

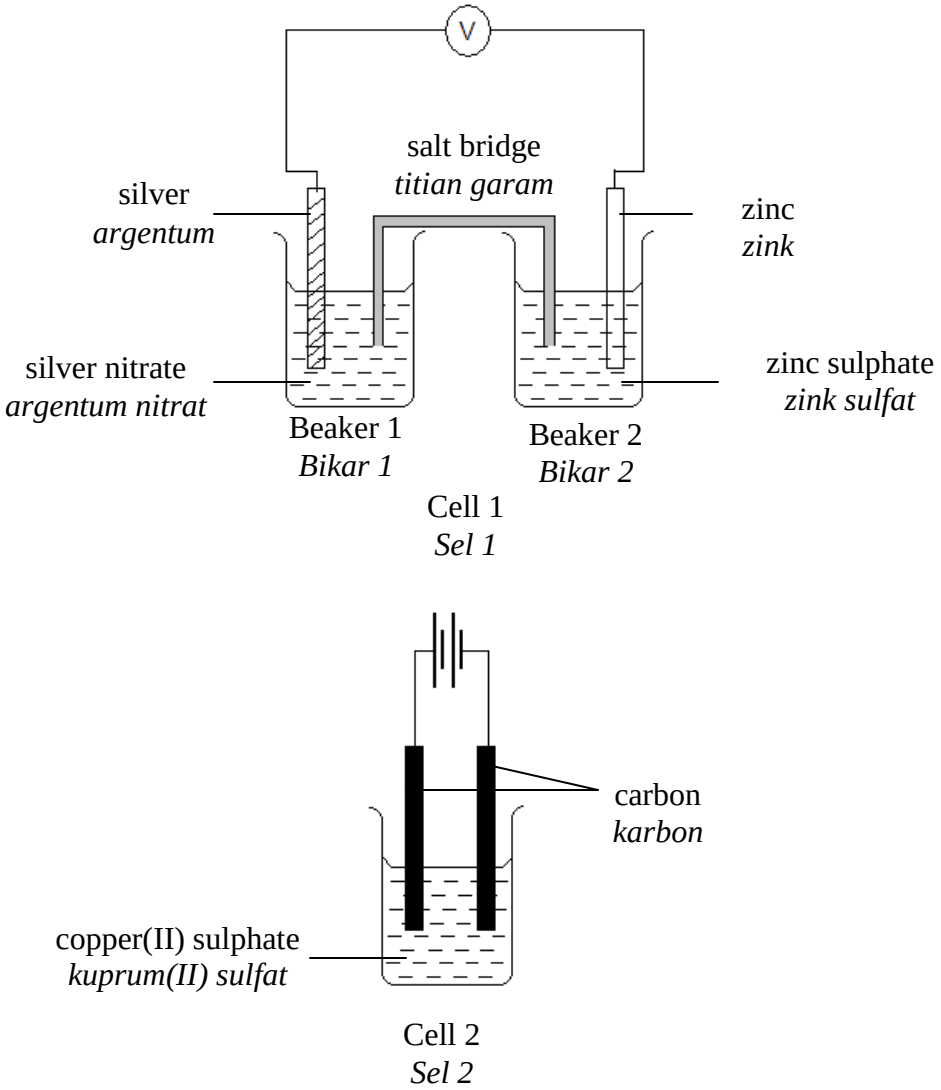


Diagram 4.1
Rajah 4.1

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

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

[2 marks]

4(a) 2

(b) State the energy change that takes place in cell 2.
Nyatakan perubahan tenaga yang berlaku dalam sel 2.

……...

[1 mark]

4(b) 1

(c) (i) State the product formed at the negative terminal of Cell 1.
Nyatakan hasil yang terbentuk di terminal negatif Sel 1.

……
[1 mark]

4(c)(i) 1

(ii) Write the half equation for the reaction at the negative terminal.
Tuliskan persamaan setengah bagi tindak balas berlaku di terminal negatif .

……
[1 mark]

4(c)(ii) 1

(d) Draw the direction of the flow of electron in Cell 1 in the diagram above.
Lukiskan arah pengaliran elektron pada Sel 1 dalam rajah di atas.
[1 mark]

4(d) 1

(e) State all the ions present in the electrolyte in Cell 2.
Nyatakan semua ion yang hadir di dalam elektrolit Sel 2 .

…… . .
[1 mark]

4(e) 1

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

(i) State the observation at the cathode of this cell.
Nyatakan pemerhatian pada katod sel ini.

……
[1 mark]

4(f)(i) 1

(ii) Explain your answer in f(i) above.
Terangkan jawapan anda di f(i) di atas.

……
[1 mark]

4(f) (ii) 1

(g) What is the difference between Cell 1 and Cell 2 in terms of their structures?
Apakah perbezaan struktur yang terdapat pada Sel 1 dan Sel 2?

……

……

[1 mark]

4(g)

1

Total A4

10

5 (a) Table 5.1 shows the stages and reactions in the manufacture of sulphuric acid in industry.
Jadual 5.1 menunjukkan peringkat dan tindak balas dalam pembuatan asid sulfurik secara industri.

Stage *Peringkat*	Reactions *Tindak balas*
1	$S + O_2 \rightarrow SO_2$
2	…… + ……. $\xrightleftharpoons[]{\text{Cataylst X / Mangkin X}}$ $2SO_3$
3	$SO_3 + H_2SO_4 \rightarrow H_2S_2O_7$
4	$H_2S_2O_7 + H_2O \rightarrow 2\,H_2SO_4$

Table 5.1
Jadual 5.1

(i) Name the process to manufacture sulphuric acid.
Namakan proses pembuatan asid sulfurik.

……..
[1 mark]

5(a)(i) 1

(ii) Complete the chemical equation in stage 2.
Lengkapkan persamaan kimia dalam peringkat 2.

[2 marks]

5(a)(ii) 2

(iii) Name the catalyst X used for the reaction in stage 2 .
Namakan mangkin X yang digunakan dalam tindak balas peringkat 2.

.....
[1 mark]

5(a)(iii) 1

(iv) State one use of sulphuric acid.
Nyatakan satu kegunaan asid sulfurik.

.....
[1 mark]

5(a)(iv) 1

(b) The equation below shows how a cleaning agent X can be prepared.
Persamaan di bawah menunjukkan bagaimana agen pencuci X disediakan

Palm oil + Sodium hydroxide → cleaning agent X + Glycerol
Minyak sawit + Natrium hidroksida → agen pencuci X + Gliserol

(i) What is the name of this reaction ?
Apakah nama tindakbalas ini ?

……. [1 mark]

5(b)(i) 1

(ii) State the name of cleaning agent X.
Nyatakan nama agen pencuci X.

……... [1 mark]

5(b)(ii) 1

(iii) Sodium chloride is added to the mixture to complete the preparation of the cleaning agent X. Explain why.
Natrium klorida ditambahkan ke dalam campuran untuk melengkapkan penyediaan agen pencuci X. Terangkan mengapa.

……... [1 mark]

5(b)(iii) 1

(iv) Two cleaning agents, J and K, are used to wash clothes in sea water and tap water. Table 6.2 shows the result obtained.
Dua agen pencuci , J dan K digunakan untuk mencuci kain dalam air laut dan air paip. Jadual 6.2 menunjukkan keputusan yang diperolehi

Cleaning agent *Agen pencuci*	Sea water *Air laut*	Tap water *Air paip*
J	Forms scum *Skum terbentuk*	Does not form scum *Skum tidak terbentuk*
K	Does not form scum *Skum tidak terbentuk*	Does not form scum *Skum tidak terbentuk*

State the type of cleaning agents J and K.
Nyatakan jenis agen pencuci J dan K.

J: ……

K: …… [2 marks]

5(b)(iv) 2

Total A5 10

6 Diagram 6.1 shows the flow chart of a series of conversion of compounds starting from propene.
Rajah 6.1 menunjukkan carta alir bagi suatu siri penukaran sebatian bermula dari propena.

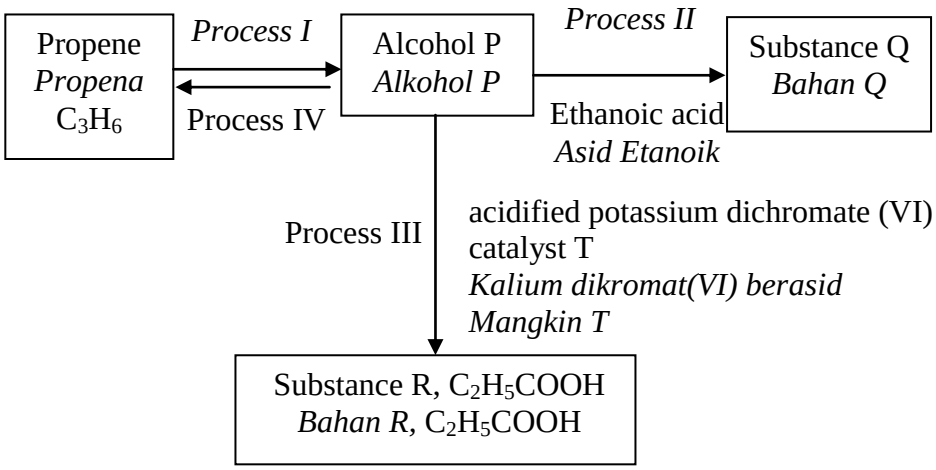


Diagram 6.1
Rajah 6.1

Based on Diagram 6.1, answer the following questions:
B*erdasarkan Rajah 6.1,jawab soalan berikut:*

(a) Name alcohol P.
Namakan alkohol P.

.....
[1 mark]

6(a) 1

(b) Write a chemical equation for the conversion reaction in *Process I.*
Tuliskan persamaan kimia untuk tindakbalas yang berlaku dalam Proses I.

.....
[1 mark]

6(b) 1

(c) Alcohol P undergoes Process IV to form propene.
Alkohol P menjalani Proses IV untuk membentuk propena.

(i) Name Process IV.
Namakan Proses IV.

.....
[1 mark]

6(c)(i) 1

(ii) Draw a labelled diagram to show how Process IV can be carried out in the laboratory.
Lukiskan gambarajah berlabel bagaimana Proses IV dapat dijalankan di dalam makmal.

[2 marks]

6(c)(ii) 2

(d) (i) What is the role of acidified potassium dichromate (VI) solution in Process III?
Apakah peranan larutan kalium dikromat(VI) berasid dalam Proses III?.

.....
[1 marks]

6(d)(i) 1

(ii) Name the type of reaction that has taken place in *Process III*
Namakan jenis tindakbalas yang berlaku dalam Proses III.

.....
[1 mark]

6(d)(ii) 1

(iii) State the observation that occurs in Process III.
Nyatakan pemerhatian yang diperolehi dalam Proses III.

.....
[1 mark]

6(d)(iii) 1

(e) Substance Q is produced when alcohol P is reacted with ethanoic acid in the presence of concentrated sulphuric acid in Process II .
Bahan Q dihasilkan apabila alkohol P bertindak balas dengan etanoik asid dalam kehadiran asid sulfurik pekat dalam Proses II.

(i) Name the reaction that takes place in Process II.
Namakan tindak balas yang berlaku dalam Proses II.

.....
[1 mark]

6(e)(i) 1

(ii) Write the chemical formula for substance Q.
Tuliskan formula kimia bagi Q.

.....
[1 mark]

6(e)(ii) 1

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 to investigate the effect of concentration of sodium thiosulphate solution on the rate of reaction when reacted with an acid

Jadual 7.1 menunjukkan data yang diperolehi daripada satu eksperimen yang dijalankan untuk mengkaji kesan kepekatan larutan natrium tiosulfat ke atas kadar tindak balas apabila bertindak balas dengan asid

Experiment *Eksperimen*	1	2	3	4	5	6
Concentration of sodium thiosulphate solution / mol dm $^{-3}$ *Kepekatan larutan natrium tiosulfat / mol dm $^{-3}$*	0.20	0.16	0.12	0.08	0.04	0.02
Time for 'X' to disappear from sight / s *Masa untuk tanda 'X' tidak kelihatan / s*	17	21	30	45	80	100

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?

(ii) Name the precipitate formed in the reaction.
Namakan mendakan yang terbentuk dalam tindak balas yang berlaku.

(iii) Write the ionic equation for the reaction in (a)(ii).
Tuliskan persamaan ion bagi tindak balas di (a)(ii).

[3 marks]

(b) (i) Plot the graph of concentration of sodium thiosulphate solution against time on a piece of graph paper.
Lukiskan graf kepekatan larutan natrium tiosulfat melawan masa di atas kertas graf.

[3 marks]

(ii) Based on the graph obtained and using the collision theory, explain how concentration of sodium thiosulphate solution affects the rate of reaction.
Berdasarkan graf yang diperolehi dan menggunakan teori perlanggaran , terangkan bagaimana kepekatan larutan natrium tiosulfat mempengaruhi kadar tindak balas.

[5 marks]

(c) (i) State three characteristics of catalysts.
Nyatakan tiga ciri bagi mangkin.

(ii) Name two examples of catalysts and the reactions that are catalysed by them.
Namakan dua contoh mangkin dan tindak balas yang dimangkinkan oleh mangkin-mangkin tersebut.

(iii) Sketch an energy profile diagram of an exothermic reaction showing the effect of catalyst on the activation energy.
Lakarkan gambar rajah profil tenaga bagi suatu tindak balas eksotermik yang menunjukkan kesan mangkin ke atas tenaga pengaktifan.

[9 marks]

8 (a) Table 8.1 shows some of the physical properties of group 17 elements.
Jadual 8.1 menunjukkan sebahagian daripada sifat fizik unsur kumpulan 17.

Group 17 Elements *Unsur Kumpulan 17*	Physical Properties *Sifat Fizik*			
	Electronegativity *Keelektronegatifan*	Melting Points / ^oC *Takat Lebur /^oC*	Boiling Points /^oC *Takat Didih/ ^oC*	Densities / gcm^{-3} *Ketumpatan/ gcm^{-3}*
Flourine *Flourin*	4.0	-220	-188	0.0017
Chlorine *Klorin*	3.0	-101	-35	0.0032
Bromine *Bromin*	2.8	-7	59	3.13
Iodine *Iodin*	2.5	114	184	4.94

Table 8.1
Jadual 8.1

(i) By referring to the table, explain the trend of change in the physical properties of the group 17 elements as we down the group in the Periodic Table.

Dengan merujuk kepada jadual ini, terangkan pola perubahan sifat fizik unsur-unsur kumpulan 17 apabila kita menuruni kumpulan ini dalam Jadual Berkala.

[10 marks]

(ii) Compare the reactivity of the reactions of chlorine, bromine and iodine when heated with iron. Give the observations for these reactions.

Bandingkan kereaktifan tindak balas klorin, bromin dan iodin dengan besi. Berikan pemerhatian bagi tindak balas-tindak balas ini.

[4 marks]

(b) The statement below refers to the reaction of chlorine with sodium.
Pernyatan di bawah merujuk kepada tindak balas klorin dengan natrium .

When heated, sodium reacts rapidly with chlorine to form sodium chloride compound ***Apabila dipanaskan, natrium bertindak balas secara pantas dengan klorin menghasilkan sebatian natrium klorida***

Based on the above statement,
Berdasarkan pernyataan di atas ,

(i) Name the type of chemical bond formed in this compound.
Namakan jenis ikatan kimia yang terbentuk di dalam sebatian ini.

(ii) Draw the electron arrangement of the formation for this compound.
Lukiskan susunan elektron bagi pembentukan sebatian ini.

(iii) Predict the electrical conductivity of this compound in the solid and molten state and give reasons for your prediction.
[Proton Number : Na ; 11 , Chlorine ; 17]
Ramalkan kekonduksian elektrik sebatian ini dalam keadaan pepejal dan leburan dan berikan sebab-sebab bagi ramalan anda.
[Nombor Proton : Na ; 11, Klorin : 17]

[6 marks]

Section C
[20 *marks*]

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

9 (a) (i) What is meant by salt?
Apakah yang dimaksudkan dengan garam?

[1 mark]

The table shows the names for two type of salts.
Jadual berikut menunjukkan nama bagi dua jenis garam.

Lead(II) chloride *Plumbum(II) klorida*	Copper(II) sulphate *Kuprum(II) sulfat*

(ii) Which of the salts given is an insoluble salt?
Name the reaction used to prepare insoluble salt.
Di antara garam yang diberikan di atas, yang mana merupakan garam yang tak terlarutkan?
Namakan tindak balas bagi menyediakan garam yang tak terlarutkan.

[2 marks]

(iii) Describe how you would prepare the insoluble salt above in the laboratory. In your answer, write the ionic equation to represent the reaction.
Huraikan bagaimana anda boleh menyediakan garam tak terlarutkan yang disebutkan di atas dalam makmal. Dalam jawapan anda, tuliskan persamaan ion bagi mewakili tindakbalas tersebut.

[7 marks]

(b) You are given solid potassium chloride salt. Describe how you would prepare potassium chloride solution of concentration 0.5 mol dm^{-3} using a 250 cm^3 volumetric flask in laboratory
[Relative atomic mass ; K= 39 , Cl = 35.5]
Anda diberikan pepejal garam kalium klorida. Huraikan bagaimana anda boleh menyediakan larutan kalium klorida dengan kepekatan 0.5 mol dm^{-3} menggunakan kelalang volumetrik berisipadu 250 cm^3 di dalam makmal
[Jisim atom relatif ; K=39, Cl = 35.5]

[10 marks]

10 (a) What is meant by heat of neutralisation?
Apakah yang dimaksudkan dengan haba peneutralan?

[2 marks]

(b) Two experiments were carried out to determine heat of neutralisation between two different acids and an alkali. Table 10.1 shows the results of the experiments.
Dua experimen telah dijalankan untuk menentukan haba peneutralan antara dua asid yang berbeza dan suatu alkali. Jadual 10.1 menunjukkan keputusan eksperimen tersebut

(Specific heat capacity of water; 4.2 J g^{-1} $^{o}C^{-1}$; Density of water : 1 g cm^{-3})
(Muatan haba tentu air; 4.2 J g^{-1} $^{o}C^{-1}$; Ketumpatan air : 1 g cm^{-3})

Experiment *Eksperimen*	Substance *Bahan*	Volume *Isipadu* / cm^3	Concentration *Kepekatan* / mol dm^{-3}	Heat of neutralisation, *Haba Peneutralan,* ΔH (kJ/mol)
I	Hydrochloric acid *Asid hidroklorik*	25.0	2.0	-57
	Sodium hydroxide *Natrium hidroksida*	25.0	2.0	
II	Ethanoic acid *Asid etanoik*	25.0	2.0	-55
	Sodium hydroxide *Natrium hidroksida*	25.0	2.0	

Table 10.1
Jadual 10.1

(i) Write a chemical equation for the reaction in experiment I .
Tuliskan persamaan kimia bagi tindak balas dalam eksperimen 1.

[2 marks]

(ii) Calculate the heat change in experiment I .
Hitungkan perubahan haba dalam eksperimen I.

[2 marks]

(iii) Draw an energy level diagram for experiment I .
Lukiskan gambarajah aras tenaga bagi eksperimen 1.

[2 marks]

(iv) Based on the data provided in Table 10.1, explain why heat of neutralisation for Experiment II is lower than in Experiment I.
Berdasarkan data dalam Jadual 10.1, terangkan mengapa haba peneutralan bagi eksperimen II lebih rendah berbanding eksperimen 1.

[2 marks]

(c) Describe a laboratory experiment to determine the heat of neutralisation between ethanoic acid and sodium hydroxide. Your answer should contain of the following:
Huraikan satu eksperimen makmal bagi menentukan haba peneutralan antara asid etanoik dengan natrium hidroksida. Jawapan anda mestilah mengandungi perkara berikut:

- List of materials and apparatus
  Senarai bahan dan radas
- Procedures of the experiment
  Kaedah eksperimen
- Precautionary steps
  Langkah berjaga-jaga

[10 marks]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

PERIODIC TABLE OF ELEMENTS

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

* - Not exist naturally

* - elements not yet discovered

Lanthanide Series	58 Ce Cerium 140	59 Pr Praseodimium 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 162.5	67 Ho Holmium 165	68 Er Erbium 167	69 Tm Tulium 169	70 Yb Ytterbium 173	71 Lu Lutetium 175
Actinide Series	90 Th Thorium 232	91 Pa Protactinium 231	92 U Uranium 238	93* Np Neptunium 237	94* Pu Plutonium 242	95* Am Americium 243	96* Cm Kurium 247	97* Bk Berkelium 247	98* Cf Californium 251	99* Es Einsteinium 254	100* Fm Fermium 253	101* Md Mendelevium 256	102* No Nobelium 254	103* Lr Lawrencium 260

Nama

Kelas

4541/3
Chemistry
Kertas 3
September 2010
1 ½ jam

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

PEPERIKSAAN PERCUBAAN

SIJIL PELAJAR AN 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 11 halaman bercetak

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 .
   *Tulis jawapan anda bagi **Soalan 2** pada kertas tulis.*

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 Table 1 shows the data collected by a student to determine a relationship between the concentration of nitric acid with pH value. 250 cm^3 of 0.1 mol dm^{-3} standard solution is prepared. The acid solution is then diluted to produce four solutions with different concentrations. pH value for each solution is determined by using pH meter.
Jadual 1 menunjukkan data yang dikumpul oleh seorang pelajar bagi menentukan hubungan antara kepekatan asid nitrik dengan nilai pH. 250 cm^3, 0.1 mol dm^{-3} larutan piawai telah disediakan. Larutan asid itu kemudian dicairkan untuk mendapatkan empat larutan yang berbeza kepekatan. Nilai pH bagi setiap larutan ditentukan menggunakan meter pH.

Concentration / mol dm^{-3} ***Kepekatan / mol dm^{-3}***	0.1	0.01	0.001	0.0001	0.00001
pH value ***Nilai pH***	1.1	2.2	3.1	4.3	5.1

Table 1
Jadual 1

(a) Based on data in Table 1, complete the table below.
Berdasarkan data dalam Jadual 1, lengkapkan jadual di bawah.

Variables	**Action to be taken**
Manipulated variable *Pembolehubah dimanipulasi* …….. ……..	Method to manipulate variable *Kaedah memanipulasikan pemboleh ubah* ..... ……..
Responding variable *Pembolehubah bergerak balas* …….. ……..	What to observe in the responding variable *Perkara yang perlu diperhati dalam pembolehubah bergerak balas* ....
Constant variable *Pembolehubah dimalarkan* …….. ……..	Method to maintain constant variable *Kaedah untuk menetapkan pemboleh ubah dimalarkan* ....

[3 + 3 *marks*]

1*(a)*
6

For Examiner's Use

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

.....

.....

[3 *marks*]

1*(b)* 3

(c) Predict the concentration of nitric acid solution if the pH value is 6.2
Ramalkan kepekatan larutan asid nitrik jika nilai pH adalah 6.2

.....

[3 *marks*]

1*(c)* 3

(d) Calculate the volume of the standard solution needed to prepare 250cm^3 of 0.001 mol dm^{-3} nitric acid solution.
Hitungkan isipadu larutan piawai yang diperlukan untuk menyediakan 250cm^3, 0.001 mol dm^{-3} larutan asid nitrik.

[3 *marks*]

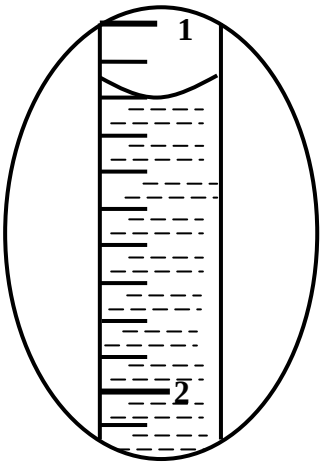
1*(d)* 3

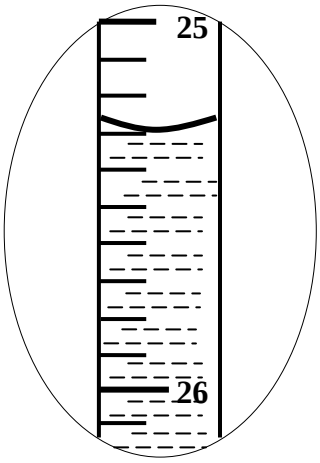
(e) The student then carry out an experiment to determine the end point for neutralisation reaction between the standard solution of nitric acid and sodium hydroxide solution. Two drops of phenolphthalein indicator is added to sodium hydroxide solution in a conical flask. The nitric acid is added carefully from the burette into the conical flask until the mixture changes in colour. The titration is repeated three times using the same volume and concentration of sodium hydroxide solution.
Pelajar tersebut seterusnya menjalankan eksperimen untuk menentukan takat akhir tindak balas peneutralan antara larutan piawai asid nitrik dan larutan natrium hidroksida. Dua titis penunjuk fenoftalin ditambah ke dalam kelalang kon yang berisi larutan natrium hidroksida. Asid nitrik dalam buret ditambahkan ke dalam kelalang kon sehingga campuran berubah warna. Pentitratan diulang tiga kali menggunakan isipadu dan kepekatan larutan natrium hidroksida yang sama.

For Examiner's Use

Figure 1 shows the initial and final burette readings for the experiment.
Rajah 1 menunjukkan bacaan awal dan bacaan akhir buret bagi eksperimen tersebut.

First titration
Titratan pertama





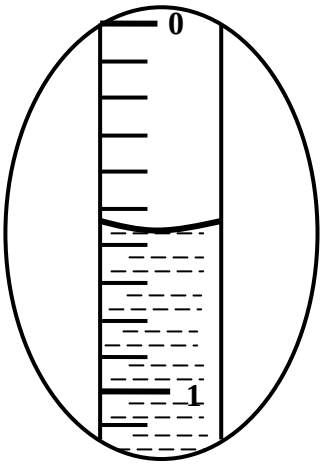
Initial burette reading :
Bacaan awal buret :

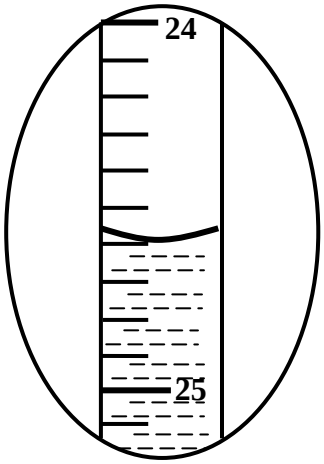
……..

Final burette reading :
Bacaan akhir buret :

……

Second titration
Titratan kedua





Initial burette reading :
Bacaan awal buret :

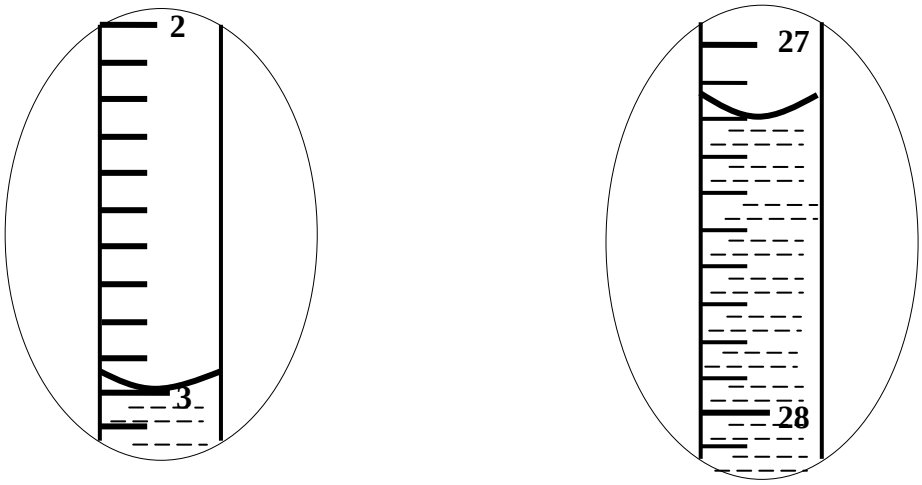
……..

Final burette reading :
Bacaan akhir buret :

……

Third titration
Titratan ketiga

For Examiner's Use



Initial burette reading :
Bacaan awal buret :

……..

Final burette reading :
Bacaan akhir buret :

……

Figure 1
Rajah 1

Record all the burette readings for the experiment in Figure 1.
Catatkan semua bacaan buret bagi eksperimen tersebut dalam Rajah1.

[3 *marks*]

1 *(e)*

3

(f) Construct a table to record the initial burette readings, final burette readings and the volume of nitric acid used in the experiment.
Bina satu jadual bagi merekodkan bacaan awal buret, bacaan akhir buret dan isipadu asid nitrik yang digunakan dalam eksperimen tersebut.

[3 *marks*]

1*(f)*

3

For Examiner's Use

(g) State the colour change of phenolphthalein in the titration.
Nyatakan perubahan warna fenolftalin dalam titratan tersebut.

.....

[3 *marks*]

1*(g)*

3

(h) Based on the experiment, give the operational definition for the end point of neutralization.
Berdasarkan eksperimen, berikan definasi secara operasi bagi takat akhir tindak balas peneutralan.

.....

.....

.....

[3 *marks*]

1*(h)*

3

(i) If the nitric acid is replaced with sulphuric acid of the same concentration, it is found that the volume of the sulphuric acid used in the titration is half of the volume of nitric acid. Explain why.
Jika asid nitrik digantikan dengan asid sulfurik yang sama kepekatan , didapati isipadu asid sulfurik yang digunakan dalam titratan adalah separuh daripada isipadu asid nitrik. Terangkan.

……

……

……

[3 *marks*]

1*(i)*

3

(j) Below are some example of acids.
Berikut adalah contoh beberapa asid.

Sulphuric acid, nitric acid and hydrochloric acid
Asid sulfurik, asid nitrik dan asid hidroklorik

Classify the acids given into monoprotic acid and diprotic acid.
Kelaskan asid yang diberi kepada asid monobes dan asid dwibes.

[3 *marks*]

For Examiner's Use

1(j)

3

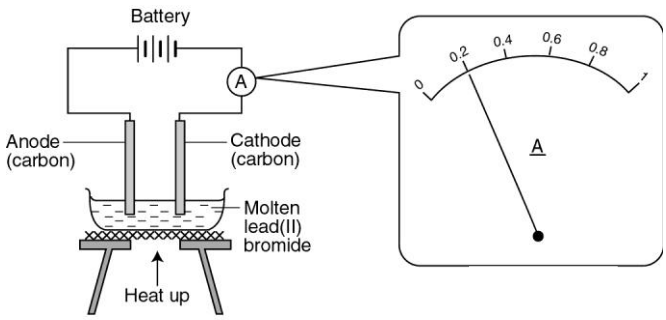
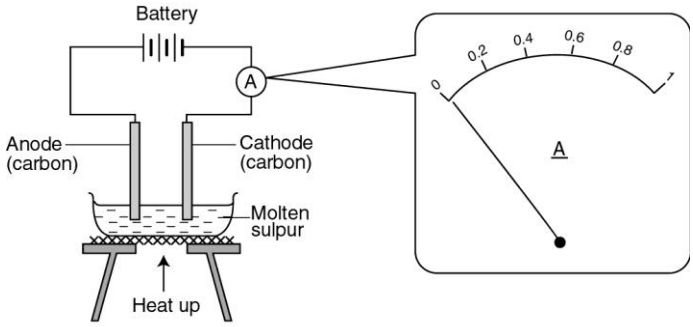
Total 1

33

For Examiner's Use

2 Answer **one** of the following questions.
*Jawab **satu** daripada dua soalan berikut.*

Question A
Soalan A

Experiment ***Eksperimen***	**Apparatus arrangement** ***Susunan radas***
Electric current is flow through the molten lead(II) bromide. *Arus elektrik dialirkan menerusi leburan plumbum(II) bromida.*	
Electric current is flow through the molten sulphur. *Arus elektrik dialirkan menerusi leburan sulfur.*	

Based on the information given, plan a laboratory experiment to investigate the difference in electrical conductivity between an ionic compound and a covalent compound.
Berdasarkan maklumat yang diberi, rancang satu eksperimen dalam makmal untuk mengkaji perbezaan sifat kekonduksian elektrik di antara sebatian ionik dan sebatian kovalen.

For Examiner's Use

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

(a) Problem of 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

2*(A)*

[17 *marks*] 17

Question B
Soalan B

For Examiner's Use

A more electropositive metal acts as a sacrificial metal which corrodes itself to protect iron from rusting.

Logam yang lebih elektropositif bertindak sebagai logam korban yang akan terkakis untuk melindungi besi daripada berkarat.

You are given iron nails, magnesium ribbon and copper strip. Referring to the situation above, plan a laboratory experiment to investigate the effect of other metals on the rusting of iron.
Anda diberi paku besi, pita magnesium dan kepingan kuprum. Berdasarkan situasi di atas, rancang satu eksperimen dalam makmal untuk mengkaji kesan logam lain ke atas pengaratan besi.
Your planning should include the following aspects:
Perancangan anda hendaklah mengandungi aspek-aspek berikut:

(a) Statement of problem
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

2*(B)*

[17 *marks*]

17

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

SULIT **4541/1 dan 2**

4541/1 dan 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 1

Skema Pemarkahan ini mengandungi 11 halaman bercetak.

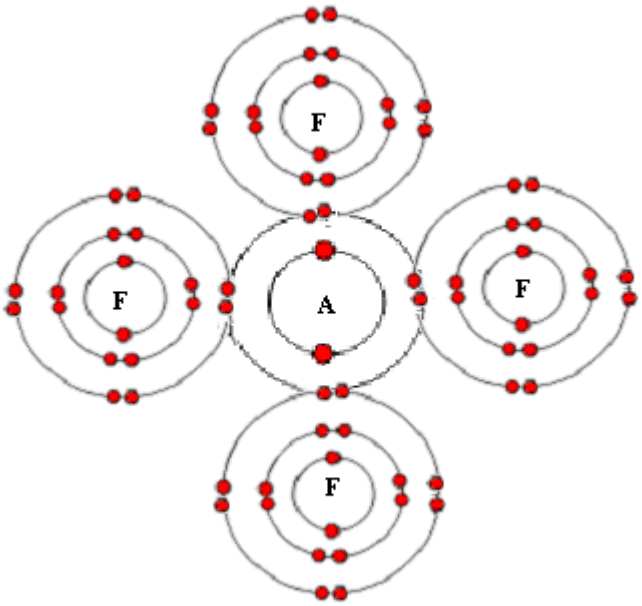
ANSWERS FOR CHEMISTRY PAPER 1
(SET 1)

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

SECTION A

1	(a)		Number of proton in an atom		1
	(b)		Atom		1
	(c)	(i)	2.8.6		1
		(ii)	6		1
	(d)	(i)	Atoms of the same element with different numbers of neutrons// Atoms of the same element with different nucleon number // Atoms that has the same number of proton but different number of neutron		1
		(ii)	Estimate the age of fossils/artefacts		1
	(e)	(i)	1. Functional diagram	1	
			2. Labeled $CaCO_3$	1	2
		(ii)	1. Correct formula of reactant 2. Correct formula of products 3. Balance the equation		
			$CuCO_3 \rightarrow CuO + CO_2$		2
			Total		**10**

2	(a)	(i)	F ,H	1
		(ii)	They have same valence electron	1
	(b)		E/Aluminium	1
	(c)	(i)	C	1
		(ii)	Achieved stable /octate electron arrangement	1
	(d)		C, B, A, F ,E ,D	1
	(e)	(i)	Low boiling point // insoluble in water// soluble in inorganic solvent// cannot conduct electricity (any other acceptable physical properties	1
		(ii)	[1. correct number of occupied electron shells and correct electrons in each shells for all the atoms, nuclei shown]	1
			[2. four atoms of F combine covalently (sharing a pair of electrons)with one atom of A]	1



(iii) Covalent bond 1

Total **10**

3	(a)	(i)	Molecule		1
		(ii)	Ions		1
	(b)	Water			1
	(c)	1.	In solvent X hydrogen chloride exists as molecules// in solvent Y hydrogen chloride ionize to produce hydrogen ions	1	
		2.	Hydrogen ions react with marble chips to produce carbon dioxide gas	1	2
	(d)	(i)	Zinc oxide		1
		(ii)	1. Correct formula for reactants and products	1	
			2. Balance the equation	1	2
			$2Zn(NO_3)_2 \rightarrow 2ZnO + 4NO_2 + O_2$		
	(e)		-add sodium hydroxide/ ammonia solution to solution Z until excess	1	
			-white precipitate soluble in excess sodium hydroxide/ soluble in excess ammonia solution	1	2
					10

4	(a)		Cell 1 : Chemical cell /Voltaic cell Cell 2 : Electrolytic Cell	2
	(b)		Electrical energy to Chemical energy	1
	(c)	(i)	zinc ions	1
		(ii)	$Zn \longrightarrow Zn^{2+} + 2e$	1
	(d)		[arrow from the zinc electrode to the silver electrode through the external circuit]	1
	(e)		Cu^{2+}, SO_4^{2-}, H^+, OH^-	1
	(f)	(i)	Brown solid deposited at the cathode	1
		(ii)	Cu^{2+} in the electrolyte accepts electron and forms copper atoms	1
	(g)			1

Cell1	Cell 2
No dry cells Electrodes are made up of different metals Has two different electrolytes Presence of salt bridge	Has dry cells Electrodes are made up of carbon Only one electrolyte No salt bridge [any 1 pair]

Total **10**

5	(a)	(i)	Contact Process		1
		(ii)	1. Correct formula of reactants	1	
			2. Balance the equation	1	2
			$2SO_2 + O_2 \rightarrow 2SO_3$		
		(iii)	Vanadium(V) oxide/ Vanadium pentoxide		1
		(iv)	Any suitable correct uses		1
			Manufacture of paint/electrolyte		
	(b)	(i)	Saponification		1
		(ii)	Soap		1
		(iii)	Reduce solubility of soap in mixture		1
		(iv)	J : Soap	1	
			K : Detergent	1	2

Total **10**

6	(a)		Propanol	1
	(b)		$C_3H_6 + H_2O \rightarrow C_3H_7OH$	1
	(c)	(i)	Dehydration	1
		(ii)	-functional apparatus	1
			-labeled diagram : glass wool soaked with alcohol P/ propanol, Porcelain chips, delivery tube, a test tube invert in a basin of water to collect propene.	1
	(d)	(i)	Oxidizing agent	1
		(ii)	Oxidation	1
		(iii)	Orange to green	1
	(e)	(i)	Esterification	1
		(ii)	$CH_3COOC_3H_7OH$	1
				10

SECTION B

7	(a)	(i)	Fixed mass of sulphur produced per time	1	
		(ii)	Sulphur	1	
		(iii)	$S_2O_3^{2-} + 2H^+ \longrightarrow S + SO_2 + H_2O$	1	3
	(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 and smooth curve drawn	1	3
		(ii)	1. As concentration of sodium thiosulphate increases, the time taken for the reaction decreases	1	
			2. Increase in concentration of sodium thiosulphate will increase the number of thiosulphate ions/ions per unit volume	1	
			3. Frequency of collision between thiosulphate ions and hydrogen ions increases	1	
			4. Frequency of effective collision increases	1	5
			5. Increase in concentration of sodium thiosulphate increases the rate of reaction		
	(c)	(i)	1. Only a small amount of catalyst is needed to increase the rate of reaction.		
			2. Catalyst remained chemically unchanged		
			3. Catalyst undergoes physical changes during a chemical reaction.		
			4. Catalyst changes only the rate of reaction but not the amount of product.		
			5. Catalyst is specific in its reaction		
			6. Increase the catalyst will increase the rate of reaction [Any 3]	3	

(ii)

Catalyst	Reaction
Nickel	-Manufacture of margarine -Hydrogenation of alkene to form alkane
Vanadium (V) oxide	-Contact Process / sulphur dioxide reacts with oxygen to form sulphur trioxide
	[or any correct examples of catalysts and their responding reactions]

2+2

(iii)	1. Y-axis labelled energy , X-axis labelled progress of reaction .	1	
	2. Activation energy with catalyst is drawn lower than the activation energy without catalyst for an exothermic reaction	1	9

Total **20**

8 (a) (i)

1. Electronegativity decreases down the group 1
2. atomic radius /size becomes larger down the group 1
3. the force of attraction between nucleus and electrons become weaker 1
4. Melting points and boiling points increases down the group because 1
5. molecular size increases down the group, 1
6. attraction forces between molecules become stronger // intermolecular forces become stronger 1
7. more heat is needed to overcome this force of attraction 1
8. The density of halogens increases down the group because 1
9. even though both atomic mass and volume(size) of halogens increases down the group 1
10. The increase in atomic mass is bigger than volume (size). 1 10

(ii)

1. Reaction of chlorine , bromine and iodine with iron : Reactivity of chlorine > bromine>iodine 1

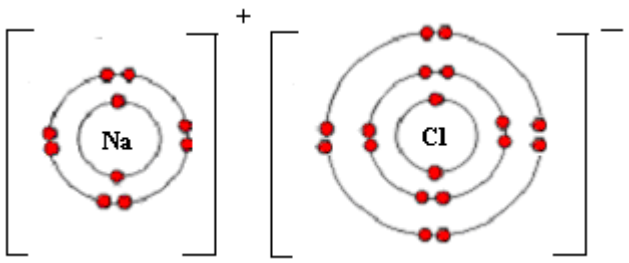
Halogen	Observation	
Chlorine	Iron (wool) ignites rapidly with bright flame, brown solid formed.	1
Bromine	Iron (wool) glows brightly , brown solid formed	1
Iodine	Iron (wool) glows dimly, brown solid formed.	1 4

(b) (i)

1. Ionic bond 1 1

(ii)

1. [correct number of occupied electron shells, correct electrons in each shell and nuclei shown for both ions] 1
2. [one sodium ions combine with one chloride ions, charges of ions shown] 1



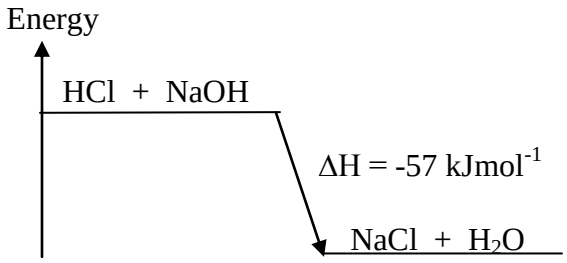
3. can conduct electricity in the molten state 1
4. cannot conduct in the solid state 1
5. in molten state the ions are free to move 1
6. in solid state ions are not free to move but held fixed in lattice 1 Max 5

Total **20**

SECTION C

9	(a)	(i)	Compound formed when hydrogen ion from an acid is replaced by metal ions or ammonium ions	1
		(ii)	Lead(II) chloride	1
			Double decomposition	1
		(iii)	1. Pour [50-100 cm^3] [0.5-2.0 mol dm^{-3}] lead(II) nitrate solution in a beaker	1
			2. Add [50-100 cm^3] [0.5-2.0 mol dm^{-3}] sodium chloride / any soluble salts solution contain chloride ions into the beaker	1
			3. Stir the mixture	1
			4. filter the mixture	1
			5. Rinse the residue with distilled water	1
			6. dry the salt with filter paper	1
			7. Equation:	1
			$Pb^{2+} + Cl^- \rightarrow PbCl_2$	
	(b)		[Calculate the molar mass of KCl required]	1
			1. Molar mass of KCl = 39 + 35.5 = 74.5 g mol^{-1}	
			[Calculate number of mole of KCl require]	1
			2. No. of mole = (MV)/1000 = (0.5 x 250)/1000 = 0.125 mol	
			[Calculate mass of KCl required]	1
			3. Mass = 0.125 x 74.5 = 9.3125 g	
			4. Weigh out 9.3125 g of KCl	1
			5. Dissolve the solid KCl with a little distilled water in a beaker	1
			6. Transfer the solution into 250 cm^3 volumetric flask using filter funnel.	1
			7. Rince the beaker and filter funnel with distilled water and add the washing to the flask	1
			8. Add distilled water into the flask slowly until the graduation mark.	1
			9. Closed the flask with stopper	1
			10. Shake well//invert several time until the solution mixed well	1
				10
			Total	**20**

10	(a)	Heat change/release when 1 mol of water formed from the reaction between an acid and alkali.		1
	(b)(i)	1. Correct formula of reactants 2. Correct formula of product $HCl + NaOH \rightarrow NaCl + H_2O$		2
	(ii)	1. No. of mole = (2.0x 25.0)/1000 = 0.05	1	
		2. Heat change = 0.05 x 57 = 2.85 kJ /2,850 J	1	2
	(iii)	1. Vertical exes labeled energy with two energy level	1	
		2. Energy level of reactants is higher than products and $\Delta H = -57\ kJmol^{-1}$	1	2



	(iv)	1. Ethanoic acid is weak acid// Ethanoic acid ionize partially in water	1	
		2. Heat absorbed to ionized ethanoic acid	1	2
	(c)	1. Materials: sodium hydroxide, hydrochloric acid	1	
		2. 50 cm^3 of 2 mol dm^{-3} sodium hydroxide solution is measured using a measuring cylinder and poured into a plastic cup.	1	
		3. 50 cm^3 of 2 mol dm^{-3} hydrochloric acid is measured using another measuring cylinder and poured into a plastic cup.	1	
		4. The initial temperature of the solutions are measured after a few minutes.	1	
		5. The hydrochloric acid is then poured quickly and carefully into the sodium hydroxide solution	1	
		6. The mixture is stirred using a thermometer and the highest temperature reached is recorded.	1	
		7. <u>Results:</u>	1	

Initial temperature of sodium hydroxide solution = $T_1\ ^0C$.
Initial temperature of hydrochloric acid = $T_2\ ^0C$
Highest temperature = $T_3\ ^0C$

Calculations

8. Average temperature of acid and alkali $= \frac{T_1 + T_2}{2}$ 1

$= T_x\ ^0C$

9. Increase in temperature = $(T_3 - T_x)$ = Ø ^0C 1

10. Heat released in the reaction = (50 +50) (C) Ø

= P Joule 1

11. Number of mole of sodium hydroxide and hydrochloric acid

$= \frac{50 \times 2}{1000}$ 1

= 0.1 mol

12. Heat of neutralisation, ΔH = P /(0.1x1000) $kJmol^{-1}$ 1

Max **10**

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

Skema Pemarkahan ini mengandungi 15 halaman bercetak

<table>
<tr><th>Question</th><th></th><th>Details</th><th>Score</th></tr>
<tr><td>1.</td><td>(a)</td><td>Able to state all the three variables and all the three actions correctly.

<u>Sample answer:</u>
<table>
<tr><th>Name of variable</th><th>Action to be taken</th></tr>
<tr><td>(i) Manipulated variable:
Concentration of acid</td><td>(i) Method to manipulate variable:
Use different concentration of acid / dilute the acid</td></tr>
<tr><td>(ii) Responding variable:
pH value</td><td>(ii) What to observe in the responding variable:
pH meter reading</td></tr>
<tr><td>(iii) Controlled variable:
Type of acid / Nitric acid</td><td>(iii) Method to maintain constant variable:
Use same type of acid</td></tr>
</table></td><td>3 + 3</td></tr>
<tr><td></td><td></td><td>Able to state any two variables and any two actions correctly.</td><td>2 + 2</td></tr>
<tr><td></td><td></td><td>Able to state any one variable and any one action correctly.</td><td>1 + 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>(b)</td><td>Able to state the relationship correctly between the manipulated variable and the responding variable with direction.

<u>Sample answer:</u>
The higher the concentration of nitric acid, the lower the pH value.</td><td>3</td></tr>
<tr><td></td><td></td><td>Able to state the relationship between the manipulated variable and the responding variable without direction.

<u>Sample answer:</u>
Concentration of acid affect the pH value.</td><td>2</td></tr>
</table>

Question		Details	Score
		Able to state the idea of hypothesis Sample answer: Acid have pH value	1
		No response or wrong response	0
	(c)	*Able to predict the concentration correctly with unit.* Sample answer: 0.000001 $moldm^{-3}$ / 1.0 X 10^{-6} mol dm^{-3}	3
		Able to predict the concentration correctly without unit. Sample answer: 0.000001 / 1.0 X 10^{-6}	2
		Able to predict the concentration in range form. Sample answer: Lower than 0.000001	1
		No response or wrong response	0
	(d)	*Able to show how to calculate the volume correctly and answer with unit.* Sample answer: $M_1V_1 = M_2V_2$ $(0.1)\ V_1 = (0.001)\ (250)$ $V_1 = 0.250 / 0.1$ $= 2.5\ cm^3$	3
		Able to give the volume correctly with unit. Sample answer: 2.5 cm^3	2

<table>
<tr><th>Question</th><th></th><th>Details</th><th>Score</th></tr>
<tr><td></td><td></td><td>Able to give the volume correctly without unit.

Sample answer:
2.5</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>(e)</td><td>Able to record all readings accurately to two decimal point with unit.

<u>Sample answer:</u>
<table>
<tr><th></th><th>Initial burette readings</th><th>Final burette readings</th></tr>
<tr><td>First titration</td><td>1.20 cm^3</td><td>25.30 cm^3</td></tr>
<tr><td>Second titration</td><td>0.55 cm^3</td><td>24.60 cm^3</td></tr>
<tr><td>Third titration</td><td>3.00 cm^3</td><td>27.20 cm^3</td></tr>
</table></td><td>3</td></tr>
<tr><td></td><td></td><td>Able to record all readings correctly.
readings to one decimal point with unit
readings to two decimal point without unit

<u>Sample answer:</u>
<table>
<tr><th></th><th>Initial burette readings</th><th>Final burette readings</th></tr>
<tr><td>First titration</td><td>1.2 cm^3</td><td>25.3 cm^3</td></tr>
<tr><td>Second titration</td><td>0.5 / 0.6 cm^3</td><td>24.6 cm^3</td></tr>
<tr><td>Third titration</td><td>3.0 cm^3</td><td>27.2 cm^3</td></tr>
</table>
Or
<table>
<tr><th></th><th>Initial burette readings</th><th>Final burette readings</th></tr>
<tr><td>First titration</td><td>1.20</td><td>25.30</td></tr>
<tr><td>Second titration</td><td>0.55</td><td>24.60</td></tr>
<tr><td>Third titration</td><td>3.00</td><td>27.20</td></tr>
</table></td><td>2</td></tr>
</table>

<table>
<tr><th colspan="2">Question</th><th>Details</th><th>Score</th></tr>
<tr><td></td><td></td><td>Able to record three to five readings correctly.</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 construct a table that contains:
1. Correct titles
2. Readings and unit

<u>Sample answer:</u>

<table>
<tr><td>Titration number</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Final burette reading / cm^3</td><td>25.30</td><td>24.60</td><td>27.20</td></tr>
<tr><td>Initial burette reading / cm^3</td><td>1.20</td><td>0.55</td><td>3.00</td></tr>
<tr><td>Volume of nitric acid / cm^3</td><td>24.10</td><td>24.05</td><td>24.20</td></tr>
</table></td><td>3</td></tr>
<tr><td></td><td></td><td>Able to construct a less accurate table that contains the following:
1. Titles
2. Readings

<u>Sample answer:</u>

<table>
<tr><td>Titration number</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Final burette reading</td><td>25.30</td><td>24.60</td><td>27.20</td></tr>
<tr><td>Initial burette reading</td><td>1.20</td><td>0.55 / 0.60</td><td>3.00</td></tr>
<tr><td>Volume of nitric acid</td><td>24.10</td><td>24.05</td><td>24.20</td></tr>
</table></td><td>2</td></tr>
<tr><td></td><td></td><td>Able to construct a table with at least one title / reading.

<u>Sample answer:</u>

<table>
<tr><td>Final burette readings</td><td></td><td></td><td></td></tr>
<tr><td>Initial burette readings</td><td></td><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>

Question		Details	Score
	(g)	*Able to state the colour change accurately.* <u>Sample answer:</u> The colour of phenolphthalein change from pink to colourless.	3
		Able to state the the colour change inaccurately. <u>Sample answer:</u> Change to colourless.	2
		Able to state an idea about the observation. <u>Sample answer:</u> The colour changes // pink	1
		No response or wrong response	0
	(h)	*Able to give the operational definition **accurately** by stating the following **three** information.* 1. *Volume of sulphuric acid added* 2. *Neutralize sodium hydroxide solution completely* 3. *Phenolphthalein change from pink to colourless* <u>Sample answer:</u> Volume of sulphuric acid added to neutralize the sodium hydroxide solution completely and the colour of phenolphthalein change from pink to colourless.	3
		*Able to give the operational definition **correctly** by stating any **two** of the information above.* <u>Sample answer:</u> The end point of neutralization is the volume of sulphuric acid added to neutralize the sodium hydroxide solution completely. Or The end point of neutralization is the volume of sulphuric acid added and the phenolphthalein colour change from pink to colourless.	2

<table>
<tr><th colspan="2">Question</th><th>Details</th><th>Score</th></tr>
<tr><td></td><td></td><td>Able to give the operational definition correctly by stating any one of the information above.

<u>Sample answer:</u>
volume of sulphuric acid added.
Or

sodium hydroxide solution being neutralize completely.
Or

phenolphthalein change from pink to colourless.</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>(i)</td><td>Able to give all two explanations correctly.

<u>Sample answers:</u>
1. Sulphuric acid is diprotic acid, nitric acid is monoprotic acid,
2. The volume of sulphuric acid is half the volume of nitric acid to produce the same concentration of hydrogen ions.</td><td>3</td></tr>
<tr><td></td><td></td><td>Able to give any one correct explanations.</td><td>2</td></tr>
<tr><td></td><td></td><td>Able to give incomplete explanation.

<u>Sample answer:</u>
Sulphuric acid is diprotic acid / nitric acid is monoprotic acid</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>(j)</td><td>Able to classify all the three acids correctly.

<u>Sample answer:</u>
<table><tr><th>Monoprotic acid</th><th>Diprotic acid</th></tr><tr><td>Nitric acid</td><td>Sulphuric acid</td></tr><tr><td>Hydrochloric acid</td><td></td></tr></table></td><td>3</td></tr>
</table>

<table>
<tr><th>Question</th><th></th><th>Details</th><th>Score</th></tr>
<tr><td></td><td></td><td>Able to classify any two acids correctly.

<u>Sample answer:</u>
<table><tr><th>Monoprotic acid</th><th>Diprotic acid</th></tr><tr><td>Nitric acid</td><td>Sulphuric acid</td></tr><tr><td></td><td>Hydrochloric acid</td></tr></table></td><td>2</td></tr>
<tr><td></td><td></td><td>Able to classify any one acid correctly.

<u>Sample answer:</u>
<table><tr><th>Monoprotic acid</th><th>Diprotic acid</th></tr><tr><td>Hydrochloric acid</td><td>Nitric acid</td></tr><tr><td>Sulphuric acid</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>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>2(A)</td><td>(a)</td><td>Able to give the statement of the problem accurately and response is in question form.

<u>Sample answer:</u>
What is the difference in electrical conductivity between ionic compound and covalent compound?</td><td>3</td></tr>
<tr><td></td><td></td><td>Able to give the statement of the problem correctly.

<u>Sample answer:</u>
How does type of compound affect electrical conductivity?</td><td>2</td></tr>
<tr><td></td><td></td><td>Able to give an idea of statement of the problem correctly.

<u>Sample answer:</u>
To investigate the difference in electrical conductivity between ionic compound and covalent compound.</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>
</table>

Question		Details	Score
	(b)	*Able to state **the three** variables correctly.* <u>Sample answer:</u> Manipulated variable: Ionic compound and covalent compound / lead(II) bromide and sulphur. Responding variable: Ammeter reading / electrical conductivity Constant variable: mass of lead(II) bromide and mass of sulphur / state of ionic compound and covalent compound.	3
		*Able to state **any two** variables correctly*	2
		*Able to state **any one** variables correctly*	1
		No response or wrong response	0
	(c)	*Able to state the relationship between the manipulated variable and the responding variable correctly with direction.* <u>Sample answer:</u> Molten ionic compound can conduct electricity while molten covalent compound cannot conduct electricity. / Molten lead(II) bromide can conduct electricity while molten sulphur cannot conduct electricity.	3
		Able to state the relationship between the manipulated variable and the responding variable with direction. <u>Sample answer:</u> Ionic compound can / cannot conduct electricity // Covalent compound cannot / can conduct electricity.	2
		Able to state the idea of hypothesis. <u>Sample answer:</u> Different compound have different properties in electrical conductivity.	1
		No response or wrong response	0

Question		Details	Score
	(d)	*Able to give adequate list of materials and apparatus.* <u>Sample answer:</u> <u>Materials</u> 1. Lead(II) bromide 2. Sulphur <u>Apparatus</u> 1. Crucible 2. Batteries 3. Ammeter 4. Carbon electrodes 5. Tripod stand 6. Bunsen burner 7. wire gauze 8. connecting wire	3
		Able to give a list of materials and apparatus. <u>Sample answer:</u> <u>Materials</u> 1. Lead(II) bromide / any ionic compound 2. Sulphur / any covalent compound <u>Apparatus</u> 1. Any container 2. Batteries 3. Ammeter / bulb / voltmeter 4. Electrodes 5. Bunsen burner 6. connecting wire	2
		Able to give an idea of materials and apparatus. <u>Sample answer:</u> <u>Material</u> Any ionic **or** covalent compound <u>Apparatus</u> 1. Ammeter / bulb / voltmeter 2. Electrodes	1

<table>
<tr><th colspan="2">Question</th><th>Details</th><th>Score</th></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>(e)</td><td>Able to state the following six steps:

<u>Sample answer:</u>
1. Fill a crucible with solid lead(II) bromide until it is half full.
2. Connect the circuit.
3. Heat the solid lead(II) bromide until it melts.
4. Observe whether the needle of ammeter deflect or not / observe the ammeter reading.
5. Record the observation.
6. Repeat steps 1 to 5 using solid sulphur.</td><td>3</td></tr>
<tr><td></td><td></td><td>Steps 1, 2, 3, and 6</td><td>2</td></tr>
<tr><td></td><td></td><td>Step 2 and 3</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 completely

<u>Sample answer:</u>

<table><tr><td>Type of compound</td><td>Observation</td></tr><tr><td>Ionic compound</td><td></td></tr><tr><td>Covalent compound</td><td></td></tr></table></td><td>2</td></tr>
<tr><td></td><td></td><td>Able to tabulate the data incompletely

<u>Sample answer:</u>

<table><tr><td>Compound</td><td>Observation</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table></td><td>1</td></tr>
</table>

Question		Details	Score
		No response or wrong response	0
2(B)	(a)	*Able to give the statement of the problem accurately and response is in question form.* <u>Sample answer:</u> How do different types of metals in contact with iron affect rusting?	3
		Able to give the statement of the problem correctly. <u>Sample answer:</u> How do different types of metals affect rusting?	2
		Able to give an idea of statement of the problem correctly. <u>Sample answer:</u> 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.* <u>Sample answer:</u> 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		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.* <u>Sample answer:</u> <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> 1 Test tubes 2 Test tube rack	3

Question		Details	Score
		Able to give a list of materials and apparatus. <u>Sample answer:</u> <u>Materials</u> 1 Iron nails 2 Magnesium/ copper strip 3 Hot jelly solution with a little potassium hexacyanoferrate(III) and phenolphthalein <u>Apparatus</u> Test tube/beaker/any container	2
		Able to give an idea of materials and apparatus. <u>Sample answer:</u> <u>Material</u> Any metal <u>Apparatus</u> Test tube/beaker/ any container	1
		No response or wrong response	0
	(e)	*Able to state the following six steps:* <u>Sample answer:</u> 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><th colspan="2">Question</th><th>Details</th><th>Score</th></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 iron and the metals in contact with iron.

<u>Sample answer :</u>
<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>2</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>1</td></tr>
<tr><td></td><td></td><td>No response or wrong response</td><td>0</td></tr>
</table>

END OF MARK SCHEME