4541/1
Percubaan
SPM
Chemistry
Paper 1
Ogos/Sept.
2012
1¼ hours

YAYASAN PERAK

JABATAN PELAJARAN NEGERI PERAK

PEPERIKSAAN PERCUBAAN SIJIL PELAJARAN MALAYSIA NEGERI PERAK 2012

CHEMISTRY

PAPER 1

Satu jam lima belas minit

DO NOT OPEN THE QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO
JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

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

Kertas soalan ini mengandungi 20 halaman bercetak.

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 represent the arrangement of particles in Diagram 1?
Antara berikut, yang manakah mewakili susunan zarah dalam Rajah 1?

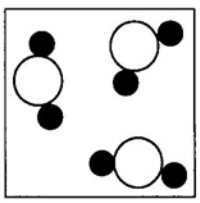


Diagram 1
Rajah 1

A Carbon dioxide
Karbon dioksida
B Sodium chloride
Natrium klorida
C Zinc
Zink
D Helium
Helium

2 Diagram 2 shows a model of an atom. Who proposed this model?
Rajah 2 menunjukkan model suatu atom. Siapakah yang mencadangkan model ini?

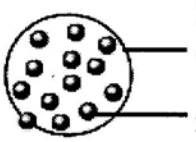


Diagram 2
Rajah 2

A Dalton
Dalton
B Thompson
Thompson
C Bohr
Bohr
D Chadwick
Chadwick

3 Given the formulae for copper (II) ion is Cu^{2+} and nitrate ion is NO_3^-. Choose the correct chemical formula of copper (II) nitrate.
Diberi formula ion kuprum (II) ialah Cu^{2+} dan ion nitrat ialah NO_3^-. Pilih formula kimia yang betul bagi kuprum (II) nitrat.

A $Cu(NO_3)_3$
B $Cu_2(NO_3)_3$
C $Cu(NO_3)_2$
D $CuNO_3$

4 Table 4 shows the electron arrangement for atoms P, Q, R and S.
Jadual 4 menunjukkan susunan elektron bagi atom P, Q, R dan S.

Element *Unsur*	Electron arrangement *Susunan elektron*
P	2.8.1
Q	2.8.2
R	2.4
S	2.7

Table 4 / *Jadual 4*

Which element is situated in Period 3 and Group 2 of the Periodic Table?
Unsur yang manakah terletak dalam Kala 3 dan Kumpulan 2 Jadual Berkala Unsur?

A P
B Q
C R
D S

5 Neon gas does **not** react with other elements because
Gas neon tidak bertindak balas dengan unsur lain kerana

A neon exists as monoatomic gases
neon wujud sebagai gas monoatom
B neon always combines with itself
neon sentiasa bergabung dengan diri sendiri
C atom has stable octet electron arrangement
atom mempunyai susunan elektron octet yang stabil
D atom has stable duplet electron arrangement
atom mempunyai susunan elektron duplet yang stabil

6 Which of the following is an insoluble salt?
Antara yang berikut, manakah merupakan garam takterlarutkan?

A Calcium nitrate
Kalsium nitrat
B Potassium nitrate
Kalium nitrat
C Potassium sulphate
Kalium sulfat
D Calcium sulphate
Kalsium sulfat

7 Which statement about chemical bonds is true?
Pernyataan yang manakah benar mengenai ikatan kimia?

A A covalent bond is formed when metal atoms share electrons to achieve a stable electron arrangement
Ikatan kovalen terbentuk apabila atom logam berkongsi elektron untuk mencapai susunan elektron yang stabil

B A metal reacts with a non-metal to form particles which are bonded together by inter-molecular forces
Satu logam bertndak balas dengan satu bukan logam untuk membentuk zarah yang diikat bersama oleh daya tarikan antara molekul

C An ionic bond is formed when a metal atom share electron with a non-metal atom
Satu ikatan ionik terbentuk apabila satu atom logam berkongsi satu elektron dengan satu atom bukan logam.

D An ionic bond is formed when a metal atom transfers electron to a non-metal atom
Satu ikatan ionik terbentuk apabila satu atom logam memindahkan elektron kepada satu atom bukan logam

8 Table 8 shows the electron arrangement of atom E and atom F.
Jadual 8 menunjukkan susunan elektron atom E dan atom F.

Element *Unsur*	Electron arrangement *Susunan elektron*
E	2.4
F	2.6

Table 8
Jadual 8

What is the formula of the compound and the bond formed between element E and F?
Apakah formula dan jenis ikatan bagi sebatian yang terbentuk antara E dan F?

	Formula of compound *Formula sebatian*	Bond *Ikatan*
A	EF_2	Covalent
B	E_2F	Ionic
C	EF_2	Ionic
D	E_2F	Covalent

9 Diagram 9 shows the apparatus set-up of an experiment.
Rajah 9 menunjukkan set alat radas bagi satu eksperimen.

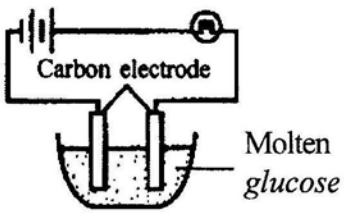


Diagram 9
Rajah 9

When the circuit is completed, the bulb does not light up because
Apabila litar dilengkapkan, didapati mentol tidak menyala kerana

A the molten glucose is easily vaporize.
Leburan glukosa mudah meruap

B the molten glucose is too concentrated.
leburan glukosa terlalu pekat.

C glucose exists as ions in the molten state.
dalam keadaan leburan, glukosa wujud sebagai ion.

D glucose exists as molecules in the molten state.
dalam keadaan leburan, glukosa wujud sebagai molekul.

10 Which of the following is true about a strong alkali?
Antara berikut, yang manakah benar tentang alkali kuat?

A Unable to neutralise an acid
Tidak boleh meneutralkan asid
B The pH value is less than 7
Nilai pH lebih kecil daripada 7
C Able to change blue litmus paper to red
Boleh menukarkan warna kertas litmus biru kepada merah
D Ionises completely in water to produce hydroxide ions
Mengion lengkap dalam air untuk menghasilkan ion-ion hidroksida

11 A solution P when added into calcium carbonate, releases a gas that turns limewater cloudy. Which of the following is P?
Suatu larutan P apabila ditambahkan kepada kalsium karbonat membebaskan gas yang mengeruhkan air kapur. Yang manakah berikut adalah P?

A Ammonia solution
Larutan ammonia
B Copper(II) sulphate solution
Larutan kuprum(II) sulfat
C Dilute nitric acid
Asid nitrik cair
D Sodium hydroxide solution
Larutan natrium hidroksida

12 What is the product of Haber process?
Apakah hasil Proses Haber?

A Margarine
Majerin
B Sulphuric acid
Asid sulfurik
C Ammonia
Ammonia
D Ammonium sulphate
Ammonium sulfat

13 Which factor does **not** affect the rate of reaction?
*Faktor manakah yang **tidak** mempengaruhi kadar tindak balas?*

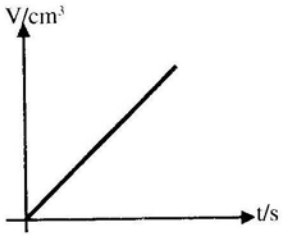
A Volume of reactant
Isipadu bahan tindak balas
B Concentration of reactant
Kepekatan bahan tindak balas
C Temperature of reactant
Suhu bahan tindak balas
D Size of solid reactant
Saiz pepejal bahan tindak balas

14 Magnesium reacts with hydrochloric acid according to the equation below:
Magnesium bertindak balas dengan asid hidroklorik berdasarkan persamaan di bawah:

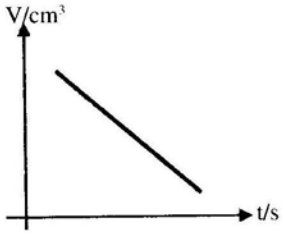
$$Mg\ (s) + 2HCl\ (aq) \longrightarrow MgCl_2\ (aq) + H_2\ (g)$$

Which of the following graphs of volume (V) of hydrogen gas against time (t) is correct?
Manakah antara graf isipadu(V) gas hydrogen melawan masa(t) berikut adalah betul?

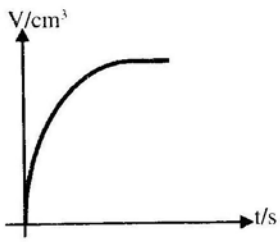
A



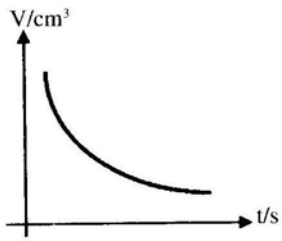
C



B



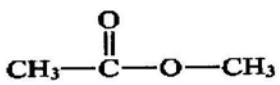
D



15 Which of the following is the molecular formula for butanol?
Antara berikut, yang manakah merupakan formula molekul bagi butanol?

A C_4H_8
B C_4H_{10}
C $C_4H_{10}O$
D $C_4H_{10}O_2$

16 The structural formula of an organic compound is shown below.
Formula struktur satu sebatian organik adalah seperti ditunjukkan di bawah.



What is the name of this compound?
Apakah nama sebatian ini?

A Ethyl methanoate
Etil metanoat
B Methyl methanoate
Metil metanoat
C Ethyl ethanoate
Etil etanoat
D Methyl ethanoate
Metil Etanoat

17 What is the oxidation number of vanadium in NH_4VO_3?
Apakah nombor pengoksidaan vanadium dalam NH_4VO_3?

A +3
B +4
C +5
D +6

18 The heat of precipitation determined in the laboratory is less than theoretical value. Why?
Haba pemendakan yang ditentukan dalam makmal adalah kurang daripada nilai teori. Mengapa?

A Some heat is absorbed by the thermometer.
Sebahagian haba diserap oleh termometer.
B Chemicals that are used contain impurities.
Bahan kimia yang digunakan mengandungi bendasing.
C Chemicals react with oxygen in the surrounding.
Bahan kimia bertindakbalas dengan oksigen di persekitaran.
D Heat is loss to the surrounding.
Haba dibebas ke persekitaran

19 Diagram 19 is the energy level diagram for the decomposition of calcium carbonate.
Rajah 19 adalah gambar rajah aras tenaga bagi penguraian kalsium karbonat.

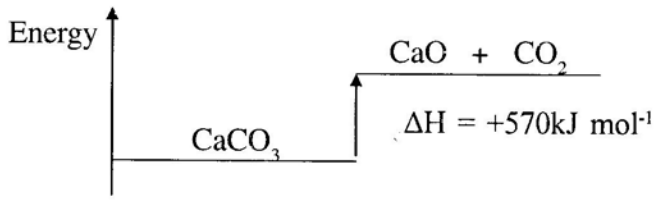


Diagram 19
Rajah 19

Which statement can be deduced from Diagram 19?
Pernyataan manakah yang boleh dirumuskan daripada Rajah 19?

A Heat is absorbed in the reaction
Haba diserap dalam tindak balas tersebut
B The reaction is exothermic
Tindak balas tersebut adalah eksotermik
C Total energy of the reactant and the products is 570 kJ
Jumlah tenaga bagi bahan tindak balas dan hasil tindak balas adalah 570 kJ
D The reactant has more energy than the products
Bahan tindak balas mempunyai lebih tenaga daripada hasil tindak balas

20 Which of the following is the function of analgesic?
Manakah antara berikut adalah fungsi analgesik?

A To relieve pain
Melegakan kesakitan
B To treat asthma
Merawat asma
C To destroy bacteria
Membunuh bakteria
D To calm down the emotion of the patient
Menenangkan emosi pesakit

21 The mass of one atom of element X is three times heavier than an atom of nitrogen. What is the relative atomic mass of element X? [Relative atomic mass: N = 14)
Jisim 1 atom unsur X adalah tiga kali lebih berat dari satu atom nitrogen. Berapakah jisim atom relatif bagi unsur X? [Jisim atom relatif: N = 14)

A 14
B 28
C 42
D 56

22 Diagram 22 shows the symbol of carbon atom.
Rajah 22 menunjukkan simbol bagi atom karbon.

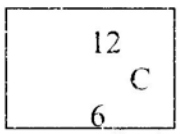


Diagram 22
Rajah 22

Which of the following is true about the symbol?
Antara yang berikut, yang manakah benar tentang simbol ini?

	Proton number ***Bilangan proton***	**Nucleon number** ***Nombor nukleon***
A	*12*	*6*
B	*6*	*12*
C	*6*	*6*
D	*12*	*12*

23 The following statement is about the arrangement of the elements in the Periodic Table.
Pernyataan berikut adalah mengenai susunan unsur di dalam Jadual Berkala Unsur.

> Elements are arranged in order of increasing atomic mass in The Periodic Table
> *Unsur-unsur disusun mengikut jisim atom menaik dalam Jadual Berkala*

Which of the following scientists made the above statement?
Antara saintis berikut siapakah yang membuat pernyataan di atas?

A Newlands
B Meyer
C Mendeleev
D Dobereiner

24 Ammonia, carbon dioxide, methane and ethanol can be classified as
Ammonia, karbon dioksida, metana dan ethanol boleh dikelaskan sebagai

A ionic compound
sebatian ion
B organic compound
sebatian organik
C covalent compound
sebatian kovalen
D hydrocarbon
hidrokarbon

25 Impure copper can be purified by using electrolysis.
Which of the following pair of electrodes is correct?
Kuprum tak tulen boleh ditulenkan dengan menggunakan elektrolisis.
Antara pasangan elektrod berikut, yang manakah betul?

	Anode ***Anod***	**Cathode** ***Katod***
A	Pure copper *Kuprum tulen*	Impure copper *Kuprum tak tulen*
B	Impure copper *Kuprum tak tulen*	Pure copper *Kuprum tulen*
C	Carbon *Karbon*	Pure copper *Kuprum tulen*
D	Carbon *Karbon*	Impure copper *Kuprum tak tulen*

26 Which of the following solution has the lowest pH value?
Antara larutan berikut, yang manakah mempunyai nilai pH paling rendah?

A Ethanoic acid 0.1 mol dm^{-3}
Asid etanoik 0.1 mol dm^{-3}
B Hydrochloric acid 0.1 mol dm^{-3}
Asid hidroklorik 0.1 mol dm^{-3}
C Ammonia solution 0.1 mol dm^{-3}
Larutan ammonia 0.1 mol dm^{-3}
D Sodium hydroxide solution 0.1 mol dm^{-3}
Larutan natrium hidroksida 0.1 mol dm^{-3}

27 What is the volume of 2.0 mol dm^{-3} potassium hydroxide solution is needed to prepare 500 cm^3 of 0.1 mol dm^{-3} potassium hydroxide solution.
Berapakah isipadu larutan kalium hidroksida 2.0 mol dm^{-3} *yang diperlukan untuk menyediakan* 500 cm^3 *larutan kalium hidroksida* 0.1 mol dm^{-3}

A 25 cm^3
B 50 cm^3
C 100 cm^3
D 500 cm^3

28 Diagram 28 shows the stages I, II, III and IV in the Contact Process during the preparation of sulphuric acid.
Rajah 28 menunjukkan peringkat I, II, III *dan* IV *bagi penyediaan asid sulfurik melalui Proses Sentuh.*

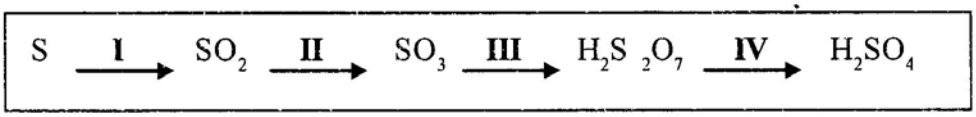


Diagram 28
Rajah 28

Which of the following chemicals is used at stage I and IV?
Antara bahan kimia berikut, yang manakah digunakan pada peringkat I dan IV?

	Stage I ***Peringkat I***	**Stage IV** ***Peringkat IV***
A	O_2	H_2O
B	O_2	SO_2
C	H_2O	O_2
D	H_2O	SO_2

29 Diagram 29 shows a method of preparing insoluble salt by mixing solution X and solution Y.
Rajah 29 menunjukkan suatu kaedah penyedian garam tak terlarutkan melalui campuran larutan X dan larutan Y.

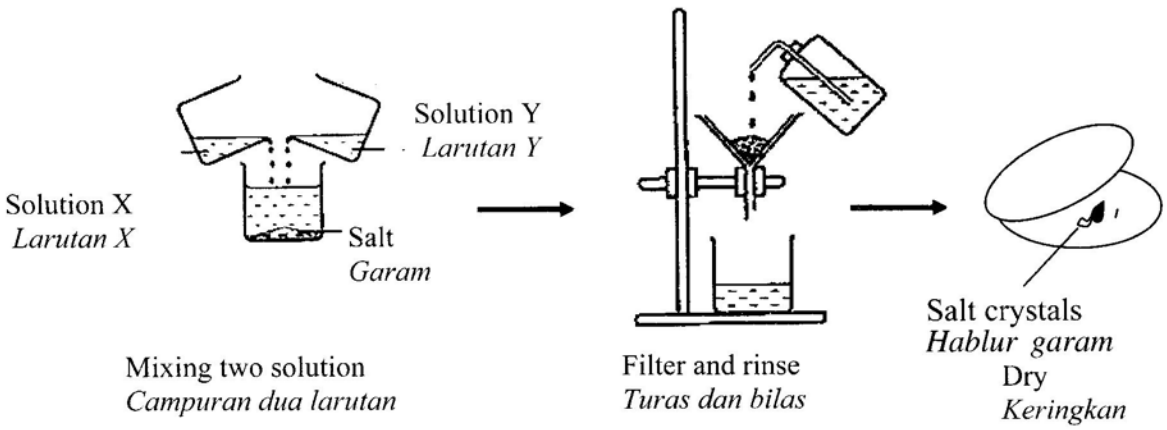


Diagram 29
Rajah 29

What is the type of the reaction shown in Diagram 29.
Apakah jenis tindak balas ditunjukkan dalam Rajah 29

A Neutralisation reaction
Tindak balas peneutralan

B Substitution reaction
Tindak balas penukar gantian

C Precipitation reaction
Tindak balas pemendakan

D Addition reaction
Tindak balas penambahan

30 Which of the following explain the meaning of effective collision?
Antara pernyataan berikut, yang manakah menjelaskan maksud perlanggaran berkesan?

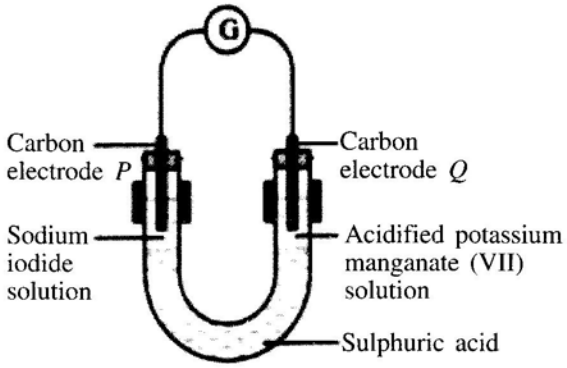
A The collision where its energy is less than activation energy
Tindak balas yang tenaganya kurang daripada tenaga pengaktifan

B The collision that has low energy
Perlanggaran yang mempunyai tenaga yang rendah

C The collision that produces the product
Perlanggaran yang menghasilkan hasil tindak balas

D The collision which take place before a reaction
Perlanggaran yang berlaku sebelum sesuatu tindak balas

31 Diagram 31 shows a set-up of apparatus of a redox reaction
Rajah 31 menunjukkan susunan radas suatu tindak balas redoks



Which of these statements are correct?
Pernyataan-pernyataan yang manakah betul?

I Electron flows from electrode P to Q
Elektron mengalir dari elektrod P ke Q
II Iodide ion acts as reducing agent
Ion iodida bertindak sebagai agen penurunan
III Manganate(VII) ion lose electrons to form manganese(II) ion
Ion manganat(VII) kehilangan elektron membentuk ion mangan(II)
IV Acidified potassium manganate(VII) solution turns from purple to colourless
Larutan kalium manganat(VII) berasid berubah daripada ungu kepada tidak berwarna

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

32 Diagram 32 shows the structure of Rubber U and Rubber V.
Rajah 32 menunjukkan struktur Getah U dan Getah V.

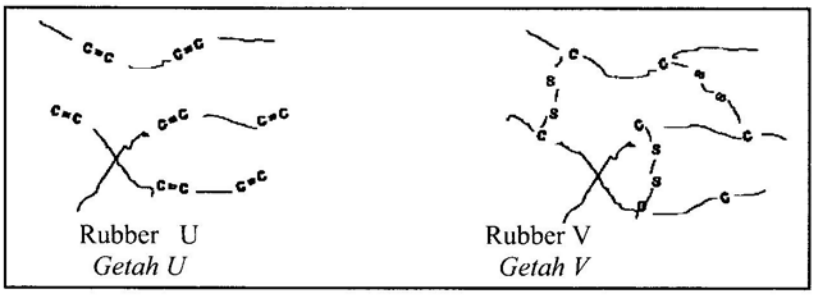


Diagram 32
Rajah 32

Choose the correct match between Rubber U and Rubber V.
Pilih padanan yang betul mengenai Getah U dan Getah V.

	Rubber U ***Getah U***	**Rubber V** ***Getah V***
A	More elastic *Lebih kenyal*	Less elastic *Kurang kenyal*
B	Stronger and harder *Kuat dan keras*	Weaker and softer *Lemah dan lembut*
C	High melting point *Takat lebur tinggi*	Low melting point *Takat lebur rendah*
D	Easily oxidized *Mudah teroksida*	Difficult to oxidize *Tidak mudah teroksida*

33

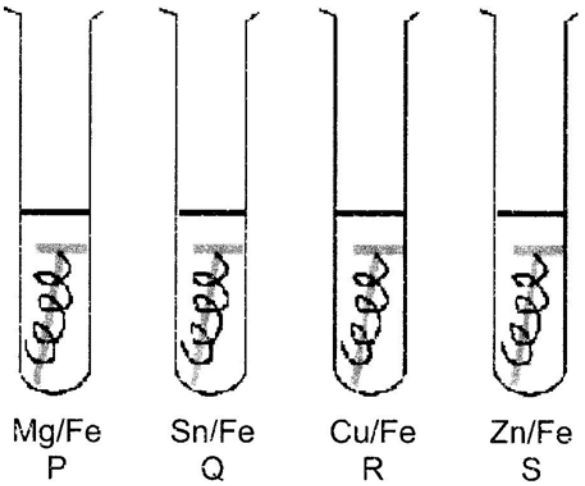


Diagram 33
Rajah 33

Based on Diagram 33 above, magnesium ribbon, tin foil, copper foil and zinc foil are coiled around four iron nails separately. The metal pairs are then placed in a test tube containing aqueous sodium chloride solution. Which of the test tubes will contain the highest concentration of iron(II) ions after 2 days?

Merujuk kepada gambarajah 33 di atas, pita magnesium, kepingan stanum, kepingan ferum dan kepingan zink diikat pada empat paku besi secara berasingan. Pasangan logam itu kemudian diletakkan di dalam tabung uji yang mengandungi larutan natrium klorida. Antara tabung uji berikut yang manakah mengandungi kepekatan ion ferum(II) yang paling tinggi selepas 2 hari.

A P
B Q
C R
D S

34 Detergent is effective in hard water because
Detergen berkesan dalam air liat kerana

A Detergent cannot dissolve in hard water
Detergen tidak larut dalam air liat
B Detergent ionised partially in hard water
Detergen mengion separa dalam air liat
C Detergent react with chloride ion in hard water
Detergen bertindakbalas dengan ion klorida dalam air liat
D Detergent do not form scum in hard water
Detergen tidak membentuk kekat di dalam air liat

35 Statement below shows a part of a food label. What is the function of pectin in this food?
Pernyataan di bawah menunjukkan sebahagian dari label makanan. Apakah fungsi pectin dalam makanan ini?

Ingredient *Kandungn*	: Pectin, Syrup, Glucose, Yellow azo and Aspartame. : *Pectin, sirap, Gulukosa, pewarna azo dan Aspartam*
Weight *Berat*	: 100 g :
Product by *Dihasilkan oleh*:	: KH Lee Company , Ujong Pasir, Melaka.

A Stabiliser
Penstabil

B Flavouring
Perasa

C Thickeners
Pemekat

D Preservative
Pengawet

36 Diagram 36 shows a balloon containing helium gas.
Rajah 36 memumjukkan sebiji belon yang mengandungi gas helium

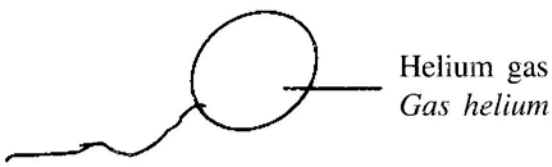
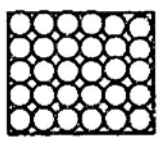
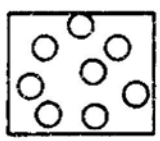
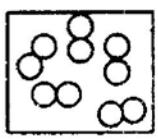


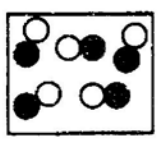
Diagram 36
Rajah 36

Which of the following diagrams shows the arrangement of particles in the balloon?
Antara rajah berikut yang manakah menunjukkan susunan zarah dalam belon itu?

A 

B 

C 

D 

37 Diagram 37 shows the atomic structure for atoms of two elements, K and L.
Rajah 37 menunjukkan struktur atom bagi atom dua unsur, K dan L.

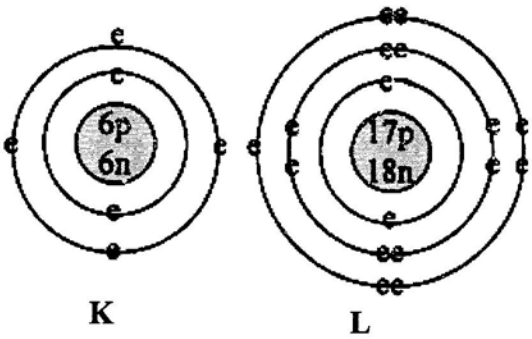


Diagram 37
Rajah 37

When these two elements react to form a compound, what is the relative molecular mass of the compound? [Relative atomic mass K=12, L=35.5)
Apabila dua unsur tersebut bertindak balas untuk membentuk satu sebatian, berapakah jisim molekul relatif sebatian itu? [Jisim atom relatif K=12, L=35.5)

A 74
B 83
C 117
D 154

38 Magnesium reacts with oxygen to form magnesium oxide.
Magnesium bertindak balas dengan oksigen membentuk magnesium oksida.

$$2Mg + O_2 \rightarrow 2MgO$$

What is the mass of magnesium oxide formed when 2.4 g of magnesium reacts with excess oxygen? [Relative atomic mass: Mg=24, O=16]
Berapakah jisim magnesium oksida yang terbentuk apabila 2.4 g magnesium bertindak balas dengan oksigen berlebihan?
[*Jisim atom relatif*: Mg=24, O=16]

A 1.6 g
B 3.6 g
C 4.0 g
D 8.0 g

39 The following statement is about P^{3+} ion.
Pernyataan berikut adalah berkaitan ion P^{3+}.

P^{3+} ion has 14 neutrons and 10 electrons. *Ion P^{3+} mempunyai 14 neutron dan 10 elektron*

Which of the following is the proton number and nucleon numbers for atom P?
Yang manakah antara berikut menunjukkan nombor proton dan nombor nukleon bagi atom P?

	Proton number ***Bilangan proton***	**Nucleon number** ***Nombor nukleon***
A	*10*	*27*
B	*13*	*27*
C	*13*	*14*
D	*27*	*13*

40 Table 40 shows information about three simple voltaic cells.
Jadual 40 menunjukkan maklumat tentang tiga sel ringkas.

Voltaic cell	Electrodes used	Potential difference (V)
P	Iron and Zinc	0.2
Q	Zinc and magnesium	1.6
R	Copper and magnesium	2.6

Table 40
Jadual 40

What is the potential difference of the voltaic cell which consists of copper and iron electrodes?
Apakah nilai voltan bagi sel yang mengandungi elektrod kuprum dan ferum?

A 0.4
B 0.6
C 0.8
D 2.4

41 The graph in Diagram 41 shows the heating curve for substance P. The melting point of substance P is 120°C.
Graf dalam Rajah 41 menunjukkan lengkungan pemanasan bagi bahan P. Takat lebur bagi bahan P adalah 120 °C.

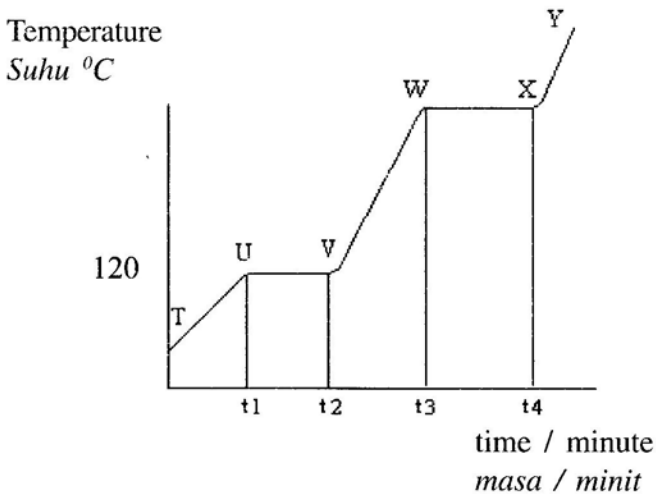


Diagram 41
Rajah 41

Which of the graph labeled does the substance X exist as solid and liquid?
Bahagian manakah pada graf yang menunjukkan, bahan X wujud dalam keadaan pepejal dan cecair?

A Between T and U
Di antara T *dan* U
B Between U and V
Di antara U *dan* V
C Between V and W
Di antara V *dan* W
D Between W and X
Di antara W *dan* X

42 Which of the following undergoes oxidation process when added to dilute hydrochloric acid?
Antara berikut, yang manakah melalui proses pengoksidaan apabila ditambah asid hidroklorik cair?

A Copper
Kuprum
B Magnesium
Magnesium
C Lead(II) oxide
Plumbum(II) oksida
D Silver nitrate
Argentum nitrat

43 Table 43 shows the result of an experiment for three simple voltaic cells.
Jadual 43 menunjukkan keputusan suatu eksperimen bagi tiga sel ringkas.

Positive terminal	Negative terminal	Voltage (V)
W	X	0.4
Y	X	0.9
X	Z	1.3

Table 43
Jadual 43

Which of the following is the arrangement of metals in descending order of electropositivity?
Manakah antara berikut adalah susunan logam-logam mengikut keelektropositifan mengikut urutan menurun?

A W, Z, X, Y
B Y, W, X, Z
C Y, W, Z, X
D Z, X, W, Y

44 The following equation represents the reaction between sodium hydroxide solution and dilute sulphuric acid.
Persamaan berikut mewakili tindak balas antara larutan natrium hidroksida dengan asid sulfurik cair.

$$H_2SO_4 + 2NaOH \longrightarrow Na_2SO_4 + 2H_2O$$

What is the volume of 0.5 mol dm^{-3} sulphuric acid needed to neutralise 50 cm^3 of 0.5 mol dm^{-3} sodium hydroxide?
Apakah isipadu 0.5 mol dm^{-3} asid sulfurik yang diperlukan untuk meneutralkan 50 cm^3 0.5 mol dm^{-3} natrium hidroksida?

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

45 What is the percentage of carbon by mass in the molecule of hexane.
[Relative atomic mass : C = 12, H = 1]
Apakah peratus karbon dalam molekul heksana mengikut jisim.
[Jisim atom relative : C = 12, H = 1]

A 70.59 %
B 83.72 %
C 85.71 %
D 92.31 %

46 Diagram 46 shows a series of chemical tests carried out on solution Y.
Rajah 46 menunjukkan satu siri ujian kimia telah dijalankan ke atas larutan Y.

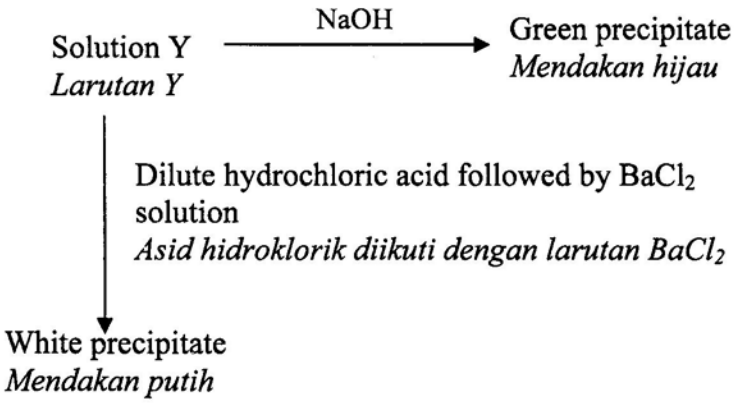


Diagram 46
Rajah 46

Which of the following is most likely to be solution Y.
Antara berikut manakah kemungkinan larutan Y.

A Iron(II) sulphate
Ferum(II) sulfat

B Lead(II) sulphate
Plumbum (II) sulfat

C Iron(II) chloride
Ferum(II) klorida

D Iron(II) iodide
Ferum(II) iodida

47 Which of the following are made in the industry using sulphuric acid as one of the raw material?
Manakah antara berikut dihasilkan dalam industry menggunakan asid sulfurik sebagai salah satu bahan mentah?

I Soaps.
sabun

II Detergents.
Detergen.

III Fertiliser
Baja

IV Ammonia
Ammonia.

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

48 The reaction between sodium thiosulphate solution and dilute sulfuric acid in a conical flask produce solid sulphur. The time for solid sulfur cover the mark X was taken.
Diagram 48 shows the graph of temperature against 1/time for this reaction.
Tindak balas antara larutan natrium tiosulfat dan asid sulfurik cair di dalam sebuah kelalang kon menghasilkan pepejal sulfur. Masa yang diambil untuk pepejal sulfur ini menutupi tanda X dicatatkan. Rajah 48 menunjukkan graf suhu melawan 1/masa bagi tindak balas tersebut.

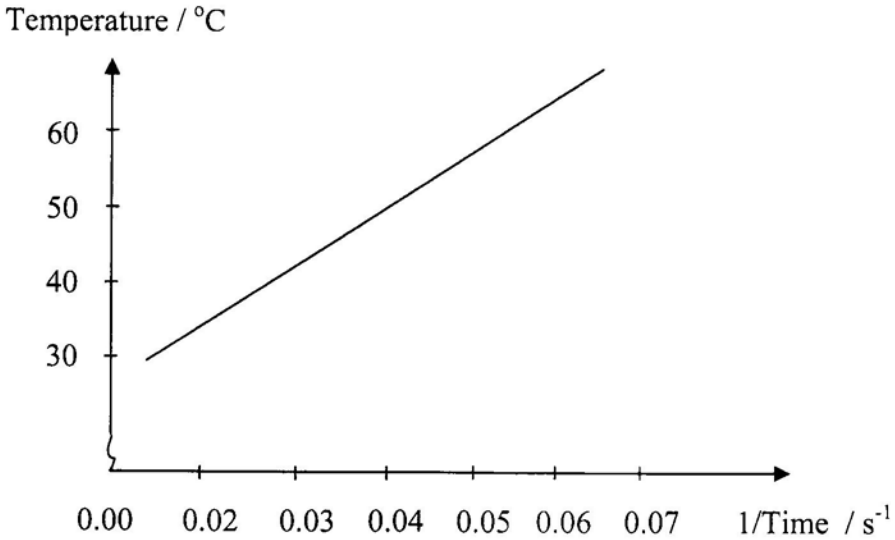


Diagram 48
Rajah 48

By referring to the graph above, determine the time taken for mark X to disappear from sight when the temperature of the reaction is 50 °C.
Merujuk kepada graf di atas tentukan masa yang diambil untuk tanda X hilang dari pandangan bila suhu bahan tindak balas ialah 50 °C.

A 0.04 s
B 4.0 s
C 25.0 s
D 28.2 s

49 100 cm^3 of water is heated by the burning of a sample of ethanol. The temperature of the water increases by 25 °C. Calculate the heat released by the complete combustion of the ethanol.
[Specific heat capacity of water = 4.2 $Jg^{-1}{}^oC^{-1}$]
100cm^3air dipanaskan oleh pembakaran suatu sampel etanol. Suhu air meningkat sebanyak 25 °C. Hitungkan haba yang dibebaskan daripada pembakaran lengkap etanol tersebut.
[Muatan haba tentu air = 4.2 $Jg^{-1}{}^oC^{-1}$]

A 10.5 J
B 16.8 J
C 595.2 J
D 10500 J

50 The following thermochemical equation shows the reaction between zinc and copper(II) sulphate solution.
Persamaan termokimia berikut menunjukkan tindak balas antara zink dan larutan kuprum(II) sulfat.

$$Zn + CuSO_4 \longrightarrow ZnSO_4 + Cu \qquad \Delta H = -105 \text{ kJmol}^{-1}$$

Calculate the temperature change if 50 cm^3 of 0.2 mol dm^{-3} copper(II) sulphate solution react with excess zinc powder.
[Specific heat capacity of water = 4.2 $Jg^{-1}{}^oC^{-1}$]
Hitungkan perubahan suhu apabila 50 cm^3 larutan kuprum(II) sulfat 0.2 $moldm^{-3}$ bertindak balas dengan serbuk zink berlebihan.
[Muatan haba tentu air = 4.2 $Jg^{-1}{}^oC^{-1}$]

A 0.5 °C
B 5.0 °C
C 10.0 °C
D 50.0 °C

END OF THE QUESTION PAPER
KERTAS SOALAN TAMAT

4541/2
Percubaan
SPM
Chemistry
Paper 2
Ogos/Sept.
2012
2½ hours

NAMA : .....

ANGKA GILIRAN | | | | | | | | | | | |

JABATAN PELAJARAN NEGERI PERAK

PEPERIKSAAN PERCUBAAN SIJIL PELAJARAN MALAYSIA NEGERI PERAK 2012

CHEMISTRY

Paper 2

Two hours and thirty minutes

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. Tuliskan Nama dan Angka Giliran anda pada ruangan yang disediakan.
2. Kertas soalan ini adalah dalam dwibahasa.
3. Soalan dalam Bahasa Inggeris mendahului soalan yang sepadan dalam Bahasa Melayu.
4. Calon dibenarkan menjawab keseluruhan atau sebahagian soalan samada dalam Bahasa Inggeris atau Bahasa Melayu.
5. Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.

Untuk Kegunaan Pemeriksaan			
Kod Pemeriksa :			
Bahagian	Soalan	Markah Penuh	Markah Diperolehi
A	1	9	
	2	9	
	3	10	
	4	10	
	5	11	
	6	11	
B	7	20	
	8	20	
C	9	20	
	10	20	
		Jumlah	

Kertas soalan ini mengandungi 20 halaman bercetak.

Section A
Bahagian A

[60 *marks*]
[60 *markah*]

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

1 (a) Table 1 shows the number of proton and neutron for atom V, W, X and Y.
Jadual 1 menunjukkan bilangan proton dan neutron bagi atom V, W, X dan Y.

Atom	**Number of proton** ***Bilangan proton***	**Number of neutron** ***Bilangan neutron***
V	17	18
W	12	12
X	17	20
Y	19	20

Table 1
Jadual 1

(i) State the name of the three subatomic particles in an atom.
Nyatakan nama bagi tiga zarah subatom dalam suatu atom.

.....

[1 *mark*]
[1 *markah*]

(ii) What is meant by nucleon number?
Apakah yang dimaksudkan dengan nombor nukleon?

.....

[1 *mark*]
[1 *markah*]

(iii) State the nucleon number of atom V and W?
Nyatakan nombor nukleon bagi atom V dan W?

V : .....

W: .....

[2 *marks*]
[2 *markah*]

(iv) Write the electron arrangement of the ion formed from X atom.
Tulis susunan elektron bagi ion yang terhasil daripada atom X.

.....

[1 *mark*]
[1 *markah*]

(v) Draw the electron arrangement of Y atom.
Lukis susunan elektron bagi atom Y.

[2 *marks*]
[2 *markah*]

(b) Diagram1 show the graph of temperature against time for the cooling process of liquid **T.**
*Rajah 1 menunjukkan graf suhu melawan masa bagi penyejukan sebatian **T**.*

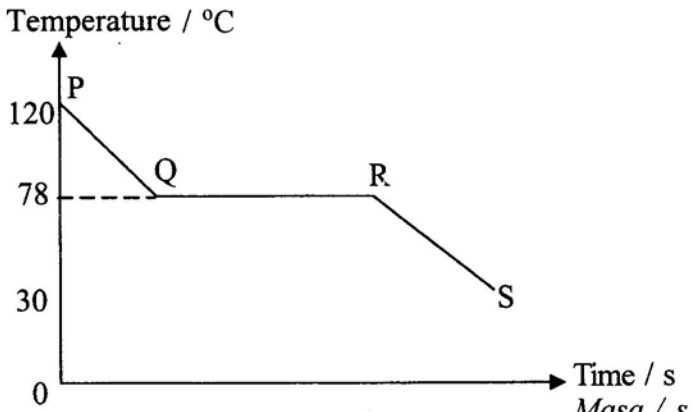


Diagram 1
Rajah 1

(i) State the freezing point of T.
Nyatakan takat beku T.

.....

[1 *mark*]
[1 *markah*]

(ii) Explain why the temperature remains constant from point Q to R.
Terangkan mengapa suhu tidak berubah dari titik Q ke R.

.....

[1 *mark*]
[1 *markah*]

2 (a) Diagram 2 shows the flow chart to produce fertilizer Z.
Rajah 2 menunjukkan carta alir untuk menghasilkan baja Z.

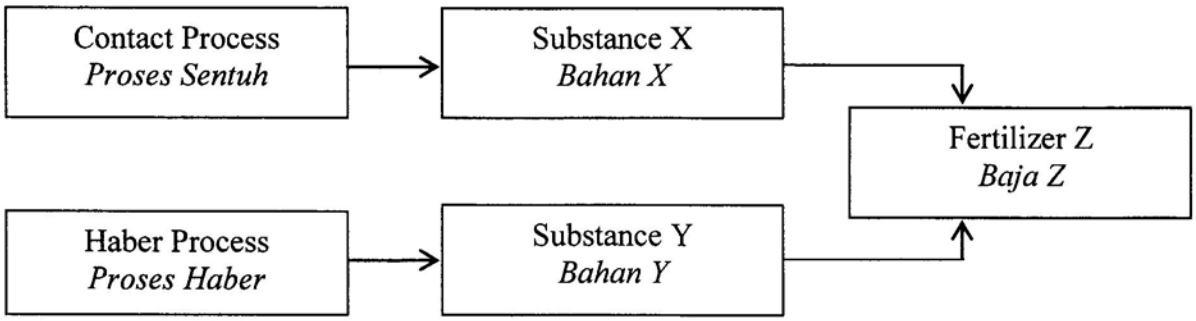


Diagram 2
Rajah 2

(i) Name substance X and Y
Namakan bahan X dan Y

X : .....

Y : .....

[2 *marks*]
[2 *markah*]

(ii) Fertilizer Z is ammonium sulphate.
Baja Z ialah ammonium sulfat.
Write the formula of ammonium sulphate.
Tuliskan formula ammonium sulfat.

.....

[1 *mark*]
[1 *markah*]

(iii) Calculate the percentage of nitrogen by mass in ammonium sulphate.
[Relative atomic mass : N; 14, S; 32, O; 16, H; 1]
Hitungkan peratus nitrogen mengikut jisim dalam ammonium sulfat.
[*Jisim atom relative : N; 14, S; 32, O; 16, H; 1*]

[1 *mark*]
[1 *markah*]

(b) Table 2 shows the examples of food additives and their function.
Jadual 2 menunjukkan contoh-contoh bahan tambah makanan dan fungsinya.

Examples of food additives *Contoh bahan tambah makanan*	Function *Fungsi*
Sodium nitrite *Natrium nitrit*	To prevent or slow down spoilage of food caused by microorganisms *Untuk menghalang atau melambatkan kerosakan makanan disebabkan oleh mikroorganisma*
Acacia gum *Gam akasia*	To give a firm texture that is smooth and uniform *Untuk memberikan tekstur yang licin dan seragam*
Monosodium glutamate (MSG) *Mononatrium glutamat (MSG)*	To enhance the flavour of food *Untuk meningkatkan rasa makanan*

Table 2
Jadual 2

(i) State the types of food additives of.
Nyatakan jenis bahan tambah makanan bagi.

Sodium nitrite :
Natrium nitrit .....

Monosodium glutamate :
Mononatrium glutamat .....

[2 *marks*]
[2 *markah*]

(ii) What is the effect on health of consuming excessive monosodium glutamate?
Apakah kesan akibat pengambilan mononatrium glutamat yang berlebihan ke atas kesihatan?

.....

[1 *mark*]
[1 *markah*]

(iii) Give other example of substance which has the same function as acacia gum.
Berikan satu contoh lain bagi bahan yang mempunyai fungsi yang sama dengan gam akasia.

.....

[1 *mark*]
[1 *markah*]

(iv) Name one natural food additives.
Namakan satu contoh bahan tambah makanan.

.....

[1 *mark*]
[1 *markah*]

3 Diagram 3 shows part of the Periodic Table of elements.
T, U, V, W, X and Y do not represent the actual symbol of the elements.
Rajah 3 menunjukkan sebahagian daripada Jadual Berkala Unsur.
T, U, V, W, X dan Y tidak mewakili simbol sebenar unsur itu.

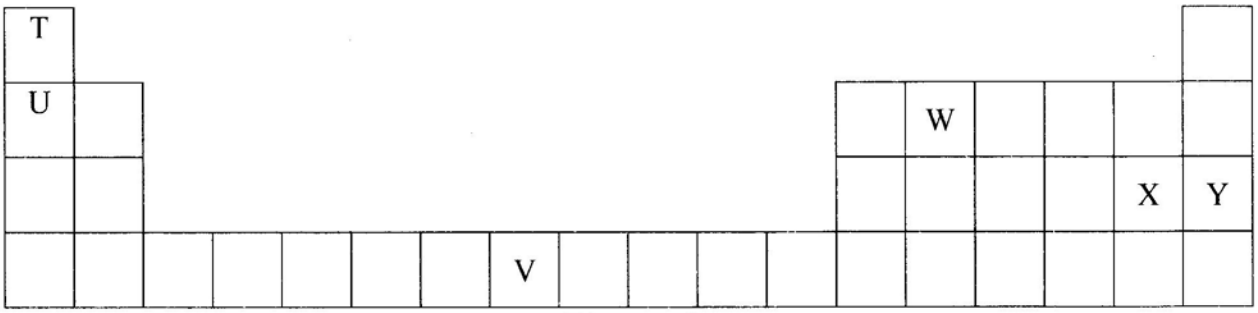


Diagram 3
Rajah 3

(a) State one special characteristic of element V.
Nyatakan satu ciri istimewa bagi unsur V.

.....

[1 *mark*]
[1 *markah*]

(b) Both element U and X can react with water.
Kedua-dua unsur U dan X boleh bertindak balas dengan air.

(i) Which element, U or X, produce alkaline solution?
Unsur yang manakah U atau X yang menghasilkan larutan bersifat alkali?

.....

[1 *mark*]
[1 *markah*]

(ii) Write the chemical equation for the reaction based on your answer in (*b*) (i)
Tulis persamaan kimia bagi tindak balas berdasarkan jawapan anda di (b) (i)

.....

[2 *marks*]
[2 *markah*]

(c) State which element is chemically unreactive. Explain your answer.
Nyatakan unsur yang manakah tidak reaktif secara kimia. Terangkan jawapan anda

.....

.....

.....

[3 *marks*]
[3 *markah*]

(d) Element W reacts with element T to form a compound with a formula WT_4.
Unsur W bertindak balas dengan unsur T untuk membentuk satu sebatian dengan formula WT_4.

(i) State **one** physical property of this compound.
Nyatakan **satu** *sifat fizikal bagi sebatian ini.*

.....

[1 *mark*]
[1 *markah*]

(ii) Draw the electron arrangement of the compound WT_4.
Lukis susunan elektron bagi sebatian WT_4.

[2 *marks*]
[2 *markah*]

4 Diagram 4 shows the set-up of apparatus to investigate the electrolysis of dilute copper(II) sulphate solution by using carbon electrodes.
Rajah 4 menunjukkan susunan radas untuk mengkaji elektrolisis larutan kuprum(II) sulfat cair dengan menggunakan elektrod carbon.

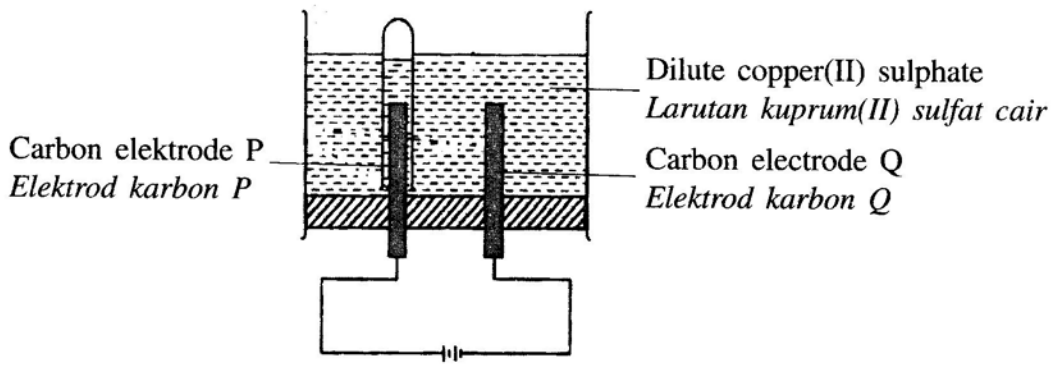


Diagram 4
Rajah 4

(a) (i) State all the ions in the electrolyte.
Nyatakan semua ion yang terdapat dalam elektrolit.

.....

[1 *mark*]
[*1 markah*]

(ii) Write the ions which move to electrodes P and Q.
Tuliskan ion-ion yang bergerak ke elektrod P dan Q.

Electrode P :
Elektrod P .....

Electrod Q:
Elektrod Q .....

[2 *marks*]
[*2 markah*]

(iii) What is the observation at electrode Q?
Apakah pemerhatian pada elektrod Q?

.....

[1 *mark*]
[*1 markah*]

(iv) What is the colour change of the electrolyte?
Apakah perubahan warna pada elektrolit?

.....

[1 *mark*]
[*1 markah*]

(v) Name the gas collected in the test tube at electrode P.
Namakan gas yang terkumpul di dalam tabung uji pada elektrod P.

.....

[1 *mark*]
[*1 markah*]

(vi) Describe a chemical test to confirm the gas produced in (a)(v).
Huraikan satu ujian kimia untuk mengesahkan gas yang terhasil di (a)(v).

.....

.....

.....

[2 *marks*]
[*2 markah*]

(*b*) If the carbon electrodes are replaced with copper electrodes, write the half equation at the anode and the cathode.
Jika elektrod karbon digantikan dengan elektrod kuprum, tuliskan persamaan setengah dianod dan katod.

Anode :
Anod : .....

Cathode :
Katod : .....

[2 marks]
[2 *markah*]

5 An experiment is carried out to determine the rate of reaction between calcium carbonate powder and dilute hydrochloric acid. The volume of carbon dioxide gas produced at fixed intervals are recorded. Table 5 shows the results of the experiment.
Satu eksperimen telah dijalankan untuk mengukur kadar tindak balas antara serbuk kalsium karbonat dengan asid hidroklorik cair. Isipadu gas karbon dioksida yang terhasil dalam tindak balas tersebut ditentukan pada satu sela masa tertentu. Jadual 5 menunjukkan keputusan eksperimen tersebut.

Time / s *Masa* / s	0	30	60	90	120	150	180	210	240	270
Volume of carbon dioxide gas /cm^3 *Isipadu gas karbon dioksida* / cm^3	0.0	16.00	25.00	30.00	34.00	36.00	38.00	39.00	39.00	39.00

Table 5
Jadual 5

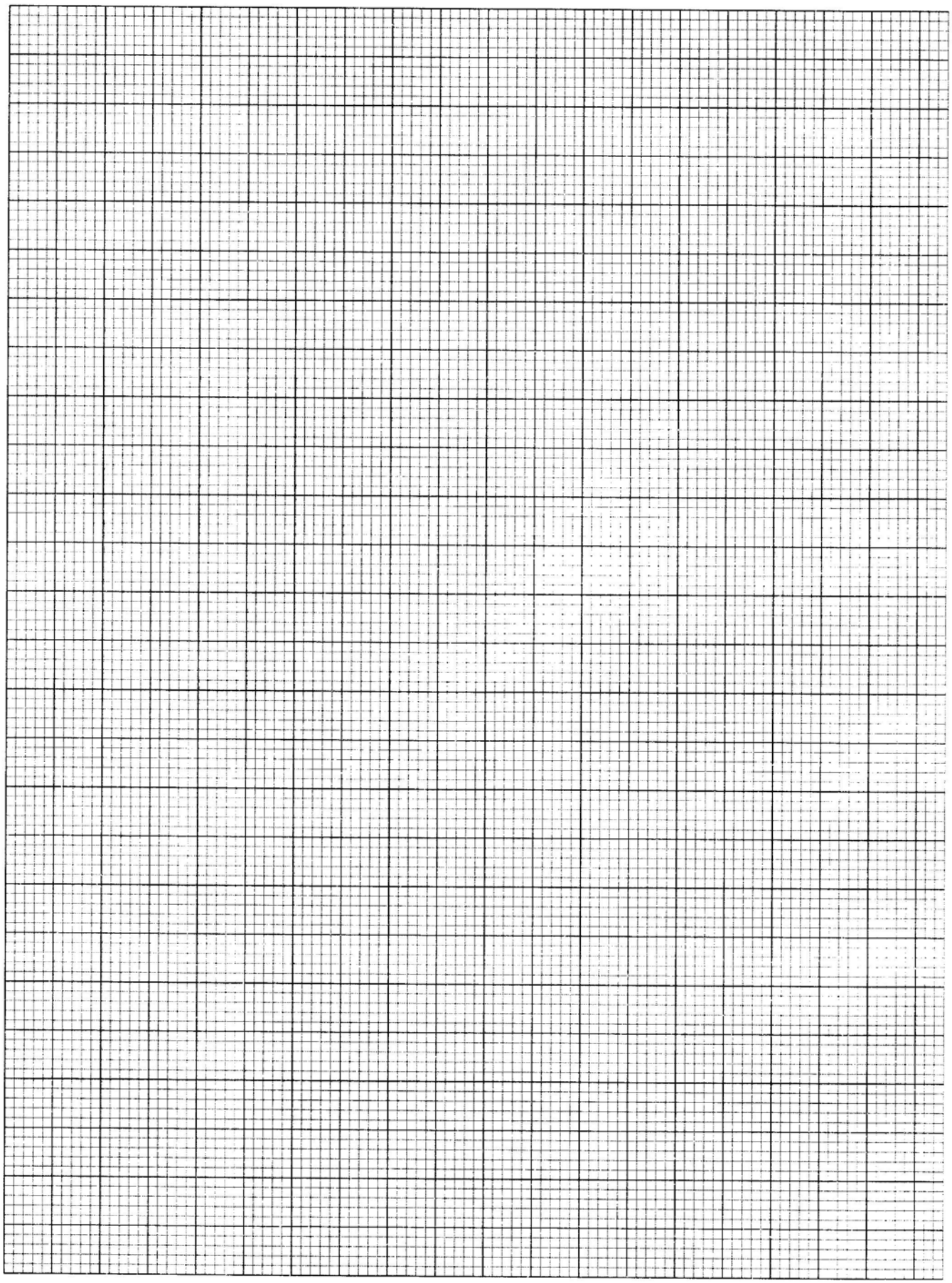
(a) Write a balanced chemical equation for the above reaction.
Tuliskan persamaan kimia seimbang bagi tindak balas yang berlaku.

.....

[2 *marks*]
[2 *markah*]

(b) (i) Based on the results in Table 5, draw a graph of volume of gas against time on the graph paper provided.
Berdasarkan keputusan dalam Jadual 5, lukiskan graf isipadu gas melawan masa bagi eksperimen tersebut pada kertas graf yang disediakan.

[3 *marks*]
[3 *markah*]



(ii) By referring to the graph in (*b*)(i) calculate the rate of reaction for experiment at 120s.
Berdasarkan graf dalam (b)(i) hitungkan kadar tindak balas pada saat ke 120.

[2 *marks*]
[2 *markah*]

(c) (i) On the graph in b(i), sketch the curve that would be obtained if the experiment is repeated by replacing calcium carbonate powder with granulated calcium carbonate. (Other conditions of the experiment remains the same).
Pada graf di b(i), lakarkan lengkung yang akan diperolehi jika eksperimen ini diulangi dengan menggantikan serbuk kalsium karbonat dengan ketulan kalsium karbonat. (Keadaan lain dalam eksperimen adalah sama). [1 *mark*]
[1 *markah*]

(ii) Based on the graph in (*b*) (i) and the curve in (*c*) (i), explain why there is a difference in the rate of reaction by using collision theory.
Berdasarkan graf dalam (b) (i) dan lengkung dalam (c) (i), terangkan mengapa terdapat perbezaan dalam kadar tindak balas dengan menggunakan teori perlanggaran

.....

.....

.....

[3 *marks*]
[3 *markah*]

6 Table 6 shows the relationship between heat of combustion of certain alcohols and the number of carbon atoms per molecule.
Jadual 6 menunjukkan perhubungan antara haba pembakaran beberapa alkohol dengan bilangan atom karbon per molekul.

Number of carbon atoms per molecule of alcohols *Bilangan atom karbon per molekul alkohol*	Heat of combustion (kJ mol^{-1}) *Haba pembakaran (kJ mol^{-1})*
1	-726
2	-1376
3	-2026
4	-2679

Table 6
Jadual 6

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

.....

.....

[1 *mark*]
[*1 markah*]

(b) Give the general formula of an alcohol.
Berikan formula am bagi alkohol.

.....

[1 *mark*]
[*1 markah*]

(c) Based on Table 6, as the number of carbon atoms per molecule increases, the value of the heat of combustion increases. Explain why.
Berdasarkan pada Jadual 6, apabila bilangan atom karbon dalam molekul bertambah, nilai haba pembakaran bertambah. Terangkan mengapa.

.....

.....

[2 *marks*]
[*2 markah*]

(d) Write the chemical equation for the complete combustion of the alcohol which has **two** carbon atoms in the molecule.
*Tuliskan persamaan kimia bagi tindak balas pembakaran lengkap bagi alkohol yang mempunyai **dua** atom karbon dalam satu molekul.*

.....

[2 *marks*]
[*2 markah*]

(e) Draw the energy level diagram for the complete combustion of alcohol which has **three** carbon atoms in the molecule.
Lukiskan gambar rajah aras tenaga bagi pembakaran lengkap alkohol yang mempunyai tiga atom karbon dalam satu molekul.

[2 *marks*]
[*2 markah*]

(f) Calculate the heat released when 4.6 g of ethanol is completely burnt in air.
[Relative atomic mass : C;12, H;1, O;16]
Hitungkan haba yang dibebaskan apabila 4.6 g etanol terbakar lengkap dalam udara.
[Jisim atom relatif : C;12, H;1, O;16]

[3 *marks*]
[3 *markah*]

Section B
Bahagian B

[20 *marks*]
[20 *markah*]

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

7 (a) Table 7 show the concentration and pH value of two types of acids.
Jadual 7 menunjukkan kepekatan dan nilai pH dua jenis asid.

Type of acid *Jenis asid*	Concentration *Kepekatan*	pH value *Nilai pH*
Ethanoic acid *Asid etanoik*	0.1 mol dm^{-3}	5.0
Hydrochloric acid *Asid hidroklorik*	0.1 mol dm^{-3}	1.0

Table 7
Jadual 7

The two acids have the same concentration but give different pH value. Explain.
Kedua-dua asid mempunyai kepekatan yang sama tetapi nilai pH yang berbeza. Jelaskan.

[4 *marks*]
[4 *markah*]

(b) Diagram 7 shows the set up of apparatus and the observation of the experiment in Set I and Set II.
Rajah 7 menunjukkan susunan radas dan pemerhatian bagi eksperimen dalam Set I dan Set II.

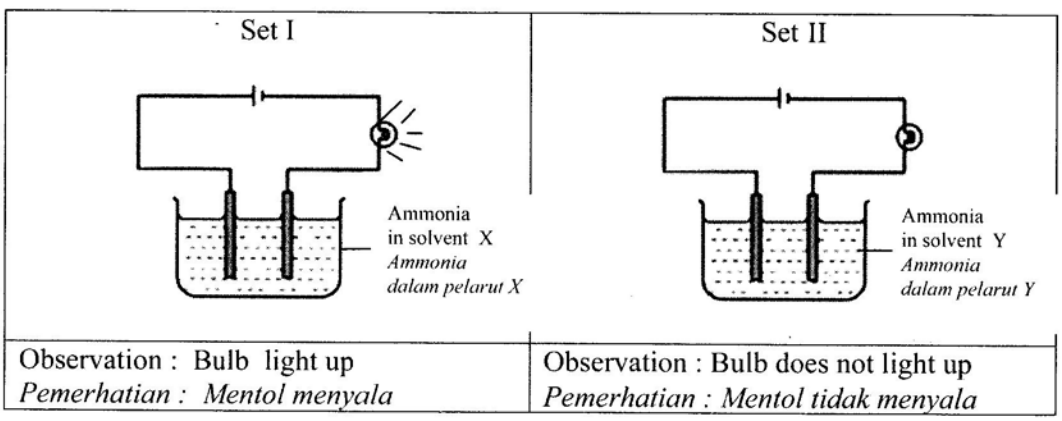


Diagram 7
Rajah 7

Based on the information in diagram 7
Berdasarkan maklumat dalam rajah 7

(i) Name one example of solvent X and solvent Y
Namakan satu contoh bagi pelarut X dan pelarut Y.

[2 *marks*]
[2 *markah*]

(ii) Explain why the bulb in Set I light up while the bulb in Set II does not light up.
Terangkan mengapa mentol dalam Set I menyala manakala mentol dalam Set II tidak menyala.

[4 *marks*]
[4 *markah*]

(c) A pupil carried out an experiment by titrating 25 cm^3 of 0.1 mol dm^{-3} potassium hydroxide solution with 0.1 mol dm^{-3} sulphuric acid. Methyl orange is used as the indicator in the neutralisation reaction.
Seorang pelajar menjalankan eksperimen dengan mentitratkan 25 cm^3 larutan 0.1 mol dm^{-3} kalium hidroksida dengan 0.1 mol dm^{-3} asid sulfurik. Metil jingga digunakan sebagai penunjuk dalam tindak balas peneutralan ini.

Based on the statements above, answer the following questions

(i) Write the chemical equation of the reaction.
(ii) Calculate the volume of sulphuric acid used.
(iii) State the colour changes of methyl orange when it reach end point.
(iv) If the experiment is repeated by using nitric acid, predict the volume of acid used. Explain why.

Berdasarkan pernyataan di atas, jawab soalan-soalan berikut

(i) Tuliskan persamaan kimia bagi tindakbalas ini.
(ii) Hitung isipadu asid sulfurik yang digunakan.
(iii) Nyatakan perubahan warna metil oren apabila ia mencapai takat akhir.
(iv) Sekiranya, eksperimen diulang dengan menggunakan asid nitrik ramalkan isipadu asid yang diperlukan. Terangkan mengapa.

[10 *marks*]
[10 *markah*]

8 (a) Butane, $CH_3CH_2CH_2CH_3$ and Butene $CH_2 = CHCH_2CH_3$ are hydrocarbons.
Butana, $CH_3CH_2CH_2CH_3$ dan Butena $CH_2 = CHCH_2CH_3$ adalah hidrokarbon.

(i) Identify the saturated hydrocarbon and unsaturated hydrocarbon. Explain why.
Kenalpasti hidrokarbon tepu dan hidrokarbon tak tepu. Terangkan mengapa.

[4 *marks*]
[*4 markah*]

(ii) Draw and name the structure of any one of the isomer of butene.
Lukis dan namakan salah satu struktur isomer bagi butena.

[2 *marks*]
[*2 markah*]

(iii) Butene can be converted to butane.
- State the name of the process and the condition needed
- Write the chemical equation involved

Butena boleh ditukarkan kepada butana.
- *Nyatakan nama proses dan keadaan yang diperlukan*
- *Tuliskan persamaan kimia yang terlibat.*

[4 *marks*]
[*4 markah*]

(b) Ethanoic acid can be used to prepare ethyl ethanoate. Diagram 8 shows the flow chart for the reaction to prepare ethyl ethanoate.
Asid etanoik boleh digunakan bagi menghasilkan etil etanoat. Rajah 8 menunjukkan carta alir bagi tindak balas untuk menyediakan etil etanoat.

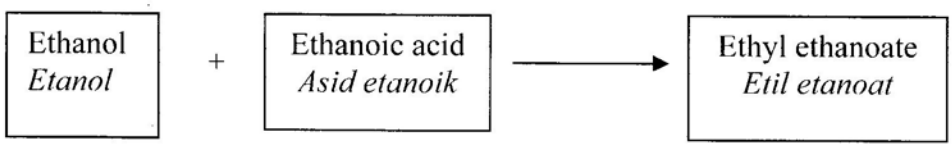


Diagram 8
Rajah 8

(i) Give any one chemical property of ethanoic acid. In your answer include the chemical equation involved.
Berikan satu sifat kimia bagi asid etanoik. Dalam jawapan anda, sertakan persamaan kimia yang terlibat.

[4 *marks*]
[*4 markah*]

(ii) Describe briefly the preparation of ethyl ethanoate in the laboratory. In your description, include the following:
Huraikan dengan ringkas penyediaan etil etanoat di dalam makmal. Penerangan anda hendaklah mengandungi perkara-perkara berikut.
- List of apparatus and materials
  Senarai radas dan bahan
- Procedure
  Prosedur
- Observation
  Pemerhatian

[6 *marks*]
[*6 markah*]

Section C
Bahagian C

[20 *marks*]
[20 *markah*]

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

9 Elements in Group 17 in the Periodic Table are known as halogen.
Unsur-unsur Kumpulan 17 dalam Jadual Berkala dikenali sebagai halogen.

(a) Explain the formation of halide ion from halogen atom.
Terangkan pembentukan ion halida daripada atom halogen

[2 *marks*]
[2 *markah*]

(b) Halogen react with hot iron to produce a compound known as iron(III) halide
Halogen bertindak balas dengan besi yang panas menghasilkan sebatian yang dikenali sebagai besi(lll) halida.

(i) By using **one** example of halogen, write a balanced chemical equation for the above reaction.
Dengan menggunakan **satu** *contoh halogen, tulis persamaan kimia seimbang bagi tindak balas di atas.*

[2 *marks*]
[2 *markah*]

(ii) Compare the reactivity of any **two** halogens and explain your answer.
Bandingkan kereaktifan mana-mana **dua** *halogen dan terangkan jawapan anda.*

[4 *marks*]
[4 *markah*]

(iii) Draw **a** labeled diagram to show the apparatus set-up to carry out the reaction.
Lukis **satu** *rajah berlabel untuk menunjukkan susunan radas bagi mengkaji tindak balas tersebut*

[2 *marks*]
[2 *markah*]

(c) The following statement refer to the redox reaction involving halogen.
Pernyataan berikut merujuk kepada tindak balas redok melibatkan halogen

Halogens are oxidizing agent ***Halogen adalah agen pengoksidaan***

You are given the following apparatus :
Apparatus : U-tube, galvanometer, connecting wires, stopper, dropper, carbon electrodes and retort stand with clamps.

Describe an experiment involving electron transfer at a distance by using the given apparatus. In your description, include the following

- suitable halogen as oxidizing agent
- any reducing agent
- chemical test for the oxidized products

Anda diberi radas dan bahan berikut:
Radas : Tiub-U, galvanometer, wayar penyambung, penutup, penitis, elektrod karbon dan kaki retot dengan penyepit.

Huraikan satu eksperimen yang melibatkan pemindahan elektron pada satu jarak dengan menggunakan radas yang diberikan. Dalam huraian anda sertakan perkara-perkara berikut:

- *halogen yang sesuai sebagai agen pengoksidaan*
- *sebarang agen penurunan*
- *ujian kimia untuk hasil pengoksidaaan*

[10 *marks*]
[10 *markah*]

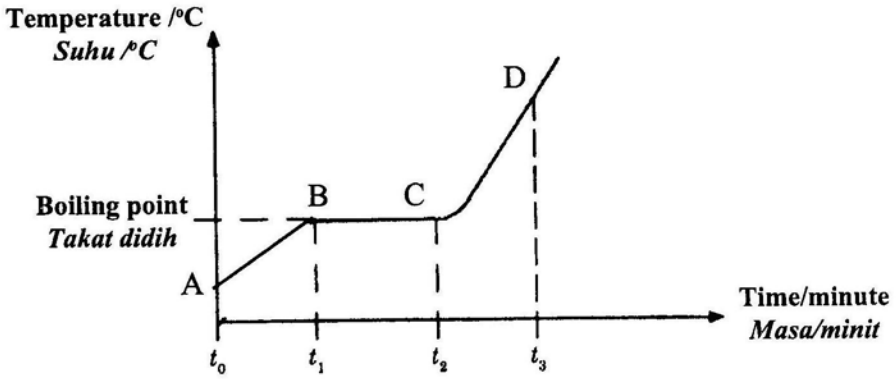
10 (a) (i) Table 10 shows the melting point and boiling point of substance P and Q.
Jadual 10 menunjukkan takat lebuh dan takat didih bagi bahan P dan Q.

Substance *Bahan*	Melting point / °C *Takat lebuh / °C*	Boiling point / °C *Takat didih / °C*
P	60	120
Q	20	90

State the physical state of P and Q at room temperature. Explain.
Nyatakan keadaan fizik bagi P dan Q pada suhu bilik. Jelaskan.

[4 *marks*]
[4 *markah*]

(ii) Graph 10 shows the heating curve of substance Z in a closed container.
Graf 10 menunjukkan lengkung pemanasan bagi bahan Z dalam bekas tertutup.



GRAPH 10
Graf 10

By referring to graph 10, describe the change in state of matter and particles arrangement in a each stages.
Dengan merujuk kepada graf 10, huraikan perubahan keadaan jirim dan susunan zarah-zarah dalam setiap peringkat.

[6 *marks*]
[6 *markah*]

(b)

Temperature is one of the factors that affect the rate of reaction. *Suhu adalah salah satu faktor yang mempengaruhi kadar tindak balas.*

You are given the following apparatus :
Conical flask, thermometer, white paper with mark 'X', stopwatch, tripod stand, wire gauze and measuring cylinder.
Suggest suitable chemicals and describe an experiment to investigate the effect of temperature on the rate of reaction.

Anda diberikan radas-radas berikut :
Kelalang kon, thermometer, kertas putih dengan tanda 'X', jam randik, tungku kaki tiga, kasa dawai dan selinder penyukat.
Cadangkan bahan kimia yang sesuai dan huraikan satu eksperimen untuk mengkaji kesan suhu terhadap kadar tindak balas.

[10 *marks*]
[10 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

4541/3
Percubaan
SPM
Chemistry
Paper 3
Ogos/Sept.
2012
1½ hours

NAMA : .....

NO KAD PENGENALAN : .....

ANGKA GILIRAN : .....

JABATAN PELAJARAN NEGERI PERAK

PEPERIKSAAN PERCUBAAN SIJIL PELAJARAN MALAYSIA NEGERI PERAK 2012

CHEMISTRY
KIMIA

PAPER 3
KERTAS 3

One hour and thirty minutes
Satu jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan* **NAMA, NOMBOR KAD PENGENALAN** *dan* **ANGKA GILIRAN** *anda pada ruang yang disediakan.*

2. *Kertas soalan ini adalah dalam dwibahasa.*

3. *Soalan di bahagian atas adalah dalam bahasa Inggeris dan di bahagian bawah adalah dalam bahasa Melayu.*

4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*

5. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

Kegunaan Pemeriksa		
No soalan	Markah Penuh	Markah Diperolehi
1	21	
2	12	
3	17	
Jumlah	**50**	

Kertas soalan ini mengandungi 11 halaman bercetak dan 1 halaman tidak bercetak.

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

1

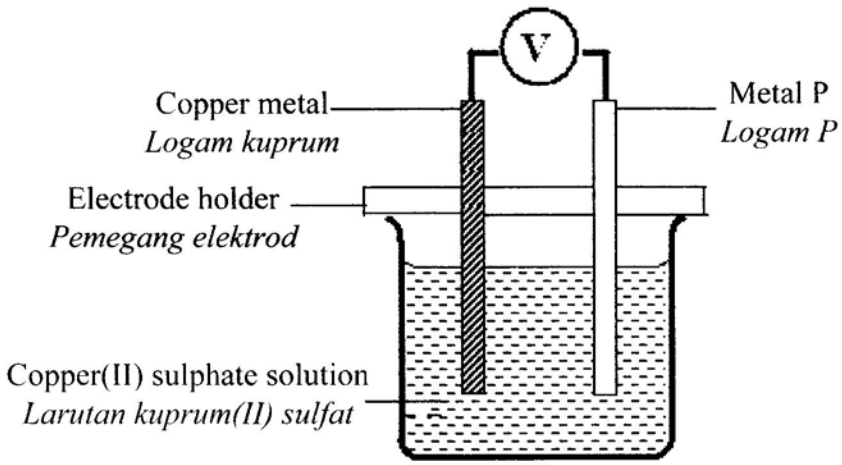


Diagram 1.1
Rajah 1.1

An experiment was carried out to construct an electrochemical series of five metals. Diagram 1.1 shows the set-up of apparatus used to measure the potential difference between Copper metal and metal P. The experiment was repeated by replacing metal P with metals Q, R and S.

Satu eksperimen telah dijalankan untuk membina siri elektrokimia bagi lima logam. Rajah 1.1 menunjukkan susunan radas yang digunakan untuk mengukur beza keupayaan di antara elektrod logam kuprum dan logam P. Eksperimen diulangi dengan menggantikan logam P dengan logam-logam Q, R dan S.

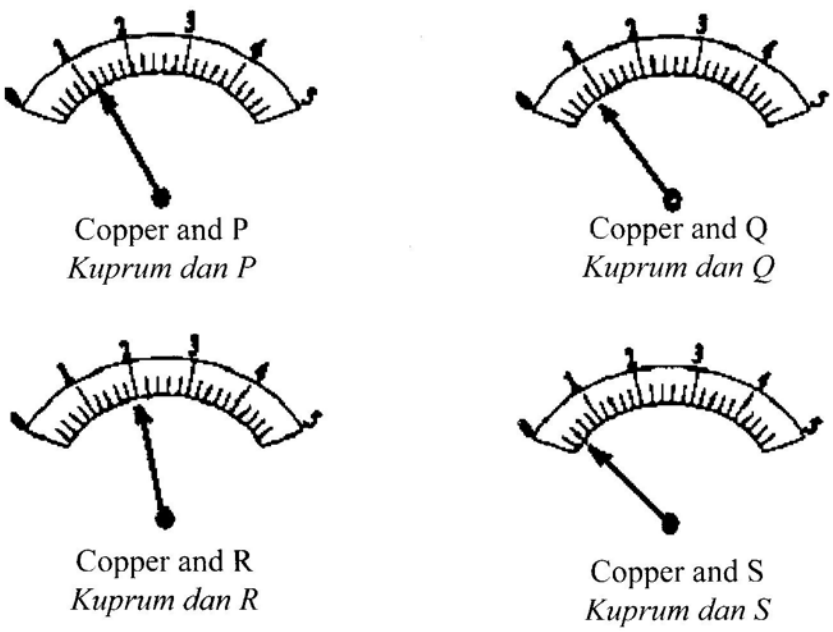


Diagram 1.2
Rajah 1.2

(a) Diagram 1.2 shows the potential difference of four pairs of metals. Based on this diagram, record the potential difference of each pair of metals in Table 1
Rajah 1.2 menunjukkan beza keupayaan bagi empat pasang logam. Berdasarkan pada rajah itu, rekodkan beza keupayaan bagi setiap pasang logam dalam Jadual 1.

Pair of Metals *Pasangan logam*	Potential difference(V) *Beza keupayaan* (V)	Positive terminal *Terminal positif*
Cu and P *Cu dan P*		Cu
Cu and Q *Cu dan Q*		Cu
Cu and R *Cu dan R*		Cu
Cu and S *Cu dan S*		Cu

Table 1
Jadual 1

[3 marks]
[*3 markah*]

(b) Based on this experiment, state :
Berdasarkan eksperimen ini, nyatakan:

Manipulated variable
Pemboleh ubah dimanipulasikan

.....

Responding variable
Pemboleh ubah bergerak balas

.....

Constant variable
Pemboleh ubah dimalarkan

.....

[3 marks]
[*3 markah*]

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

.....

.....

.....

.....

[3 marks]
[*3 markah*]

(d) Based on the potential difference readings recorded in Table 1, arrange Cu, P, Q, R and S metals in the descending order in the electrochemical series.
Berdasarkan pada bacaan beza keupayaan dalam Jadual 1.1, susunkan logam-logam Cu, P, Q, R dan S dalam siri elektrokimia mengikut tertib menurun.

.....

[3 marks]
[*3 markah*]

(e) Predict the positive terminal and the potential difference for the pair of metals P and Q.
Ramalkan terminal positif dan beza keupayaan bagi pasangan logam P and logam Q.

Pair of Metals *Pasangan logam*	Positive Terminal *Terminal Positif*	Potential difference / V *Beza keupayaan / V*
P and Q *P dan Q*		

[3 marks]
[*3 markah*]

Diagram 1.3(a) shows a simple voltaic cell using copper and metal R at the beginning of the experiment.
Rajah1.3(a) menunjukkan satu sel voltaic menggunakan kuprum dan logam R pada awal eksperimen.

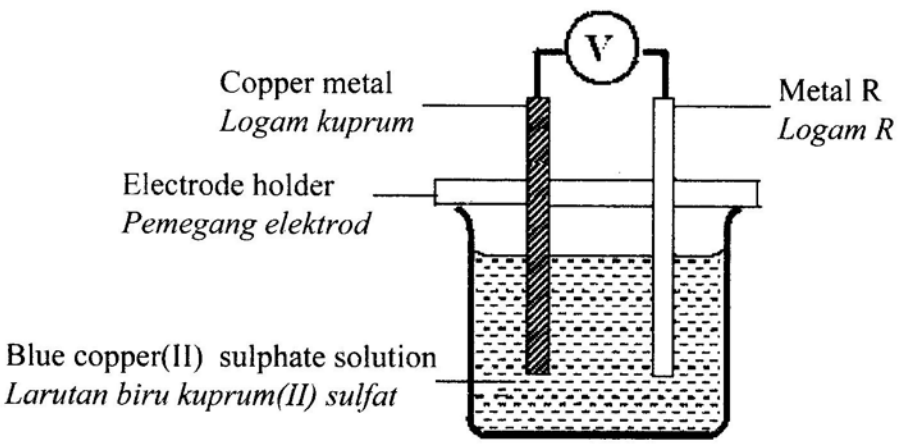


Diagram 1.3(a)
Rajah 1.3(a)

Diagram 1.3(b) shows the results obtained after 30 minutes.
Rajah 1.3(b) menunjukkan keputusan yang didapati selepas 30 minit.

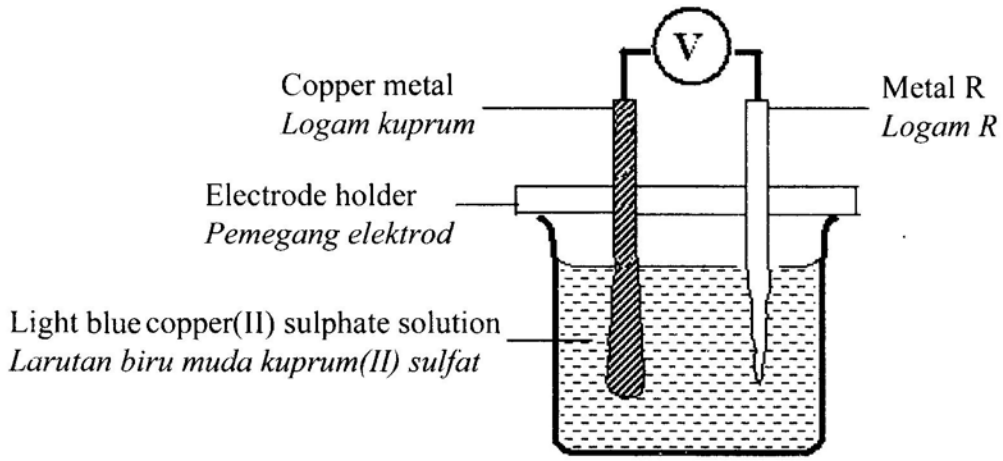


Diagram 1.3(b)
Rajah 1.3(b)

(f) (i) State three different observations obtained.
Nyatakan tiga pemerhatian yang berbeza yang didapati.

1. .....

2. .....

3. .....

[3 marks]
[*3 markah*]

(ii) Voltaic cell in Diagram 1.3(b) is left aside for a day. Draw the set-up of apparatus to show the results of the experiment.
Sel voltaic di Rajah 1.3(b) dibiarkan untuk satu hari. Lukiskan susunan radas untuk menunjukkan keputusan ekperimen.

[3 marks]
[*3 markah*]

2 Diagram 2.1 shows the set-up of apparatus for an experiment to compare the hardness of a metal and its alloy.
Rajah 2.1 menunjukkan susunan radas bagi satu eksperimen untuk membandingkan kekerasan satu logam dan aloinya.

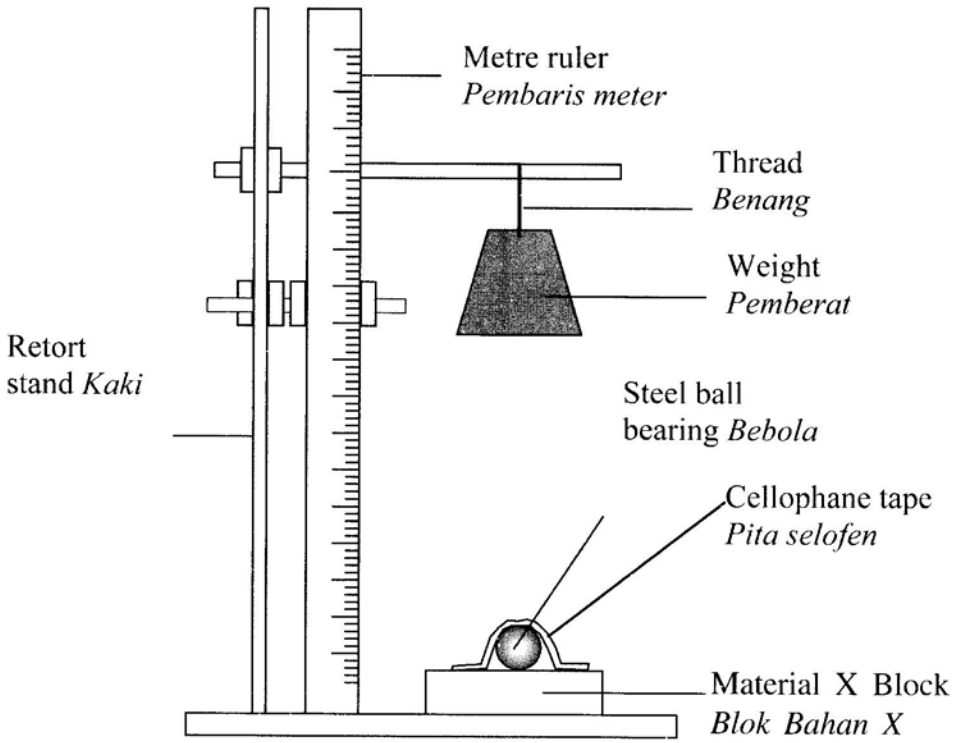


Diagram 2.1
Rajah 2.1

The experiment was carried out according to the following steps:
Eksperimen tersebut dijalankan berdasarkan langkah-langkah berikut:

Step 1: A steel ball bearing is taped onto the material X block.
Langkah 1: Satu bebola keluli dilekatkan di atas blok bahan X.

Step 2: A 1 kg weight is hung at a height of 50 cm above the material X block as shown in Diagram 2.1
Langkah 2: Pemberat 1 kg digantung pada ketinggian 50 cm di atas blok bahan X seperti yang ditunjukkan dalam Rajah 2.1

Step 3: The weight is let to drop onto the ball bearing.
Langkah 3: Pemberat dibiarkan jatuh ke atas bebola keluli.

Step 4: The diameter of the dent made on the material X block was measured.
Langkah 4: Diameter lekuk yang terbentuk pada blok bahan X diukur.

Step 5: Step 1 to 4 are repeated on two other parts of the material X block in order to obtain an average value for the diameter of dents formed.
Langkah 5: Langkah 1 hingga 4 diulang pada dua bahagian lain blok bahan X untuk mendapatkan nilai purata bagi diameter lekuk yang terbentuk.

Step 6: Step 1 to 5 are repeated by replacing the material X block with material Y block.
Langkah 6: Langkah 1 hingga 5 diulang untuk menggantikan blok bahan X dengan blok bahan Y.

Diagram 2.2 shows the top view of the dents made on the material X and Y.
Rajah 2.2 menunjukkan pandangan atas lekuk yang terbentuk pada bahan X dan Y.

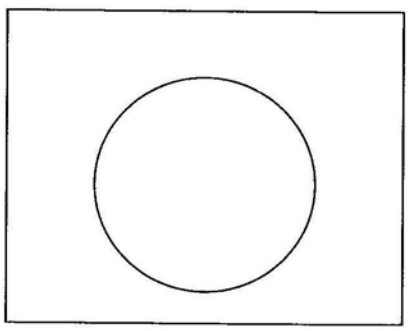
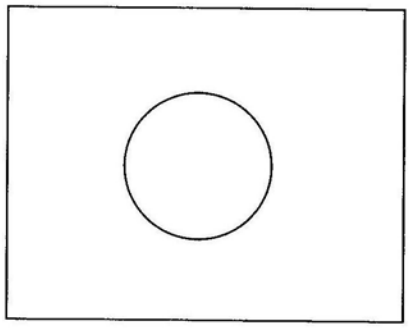
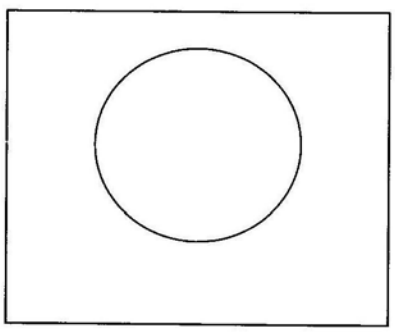
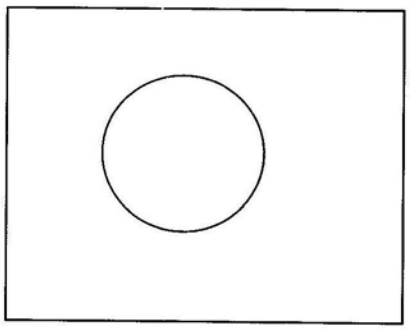
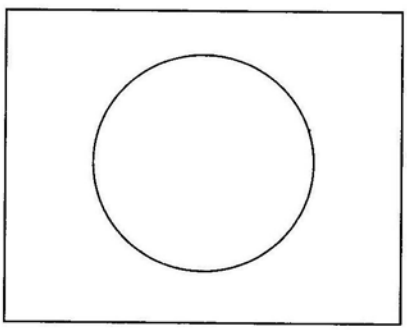
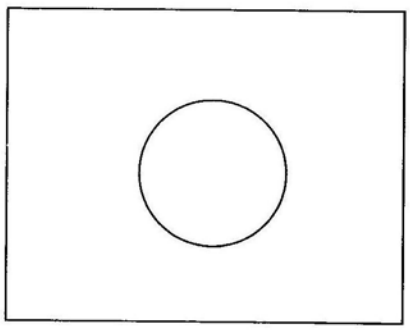
Experiment *Eksperimen*	**Material X** *Bahan X*	**Material Y** *Bahan Y*
I	 Diameter : 2.9 cm *Diameter*	 Diameter : 2.0 cm *Diameter*
II	 Diameter : 2.7 cm *Diameter*	 Diameter : 2.1 cm *Diameter*
III	 Diameter : 2.9 cm *Diameter*	 Diameter : 1.9 cm *Diameter*

Diagram 2.2
Rajah 2.2

(a) Construct a table to record the diameters of the dents and average diameter on material X and material Y.
Bina satu jadual bagi merekodkan diameter lekuk dan diameter purata untuk bahan X dan bahan Y.

[3 marks]
[*3 marks*]

(b) Based on the average diameter of the dents on material X and Y, state the inference that can be make on material X and material Y
Berdasarkan diameter purata lekuk pada bahan X dan Y, nyatakan inferens yang boleh dibuat keatas bahan X dan bahan Y.

.....

.....

.....

[3 marks]
[*3 markah*]

(c) By referring to the results obtained in Diagram 2.2, state the operational definition for hardness of material.
Dengan merujuk kepada keputusan dalam Rajah 2.2, nyatakan definisi secara operasi bagi kekerasan bahan.

.....

.....

[3 marks]
[*3 markah*]

(d) The following is a list of materials:
Berikut ialah senarai beberapa bahan:

Brass, Pewter, Tin, Copper, Stainless steel, Iron
Loyang, Piuter, Timah, Kuprum, Keluli tahan karat, Besi

Classify these materials into pure metal and alloy.
Kelaskan bahan-bahan ini kepada logam tulen dan aloi.

[3 *marks*]
[*3 markah*]

3 When iron is in contact with certain metals, rusting is prevented. However when iron is in contact with other metals, rusting occurs faster.
Diagram 3 shows the set-up of apparatus to investigate the effect of other metals on rusting.

Apabila besi bersentuhan dengan logam-logam, pengaratan dapat dicegahkan. Sebaliknya, apabila besi bersentuhan dengan logam-logam lain, pengaratan berlaku lebih cepat.
Rajah 3 menunjukkan susunan radas untuk mengkaji kesan logam-logam keatas pengaratan.

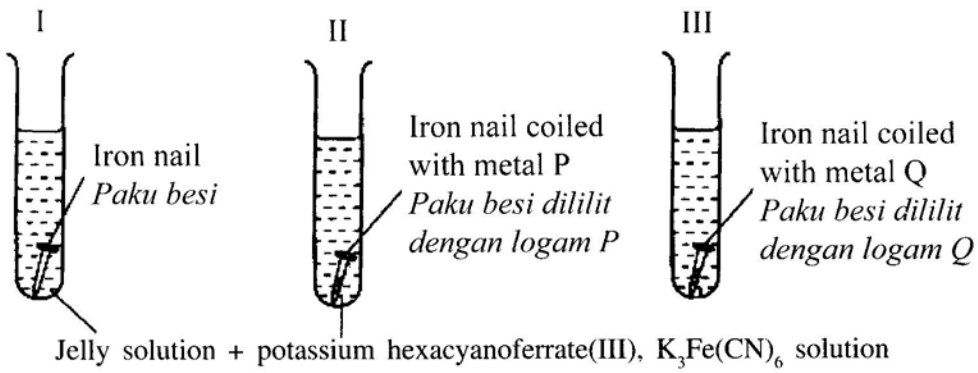


Diagram 3
Rajah 3

Based on the information provided in Diagram 3 and using a named metal P and a metal Q, plan an experiment to investigate the effect of other metals on rusting.

Berdasarkan kepada maklumat yang diberikan dalam Rajah 3 dan dengan menggunakan satu logam P dan Q yang dinamakan, rancangkan satu eksperimen untuk kesan logam-logam lain keatas pengaratan.

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

(a) Problem statement
Pernyataan masalah

(b) All the variables
Semua pembolehubah

(c) Statement of hypothesis
Pernyataan hipotesis

(d) Lists of substances and apparatus
Senarai bahan serta radas

(e) Procedure for the experiment
Prosedur eksperimen

(f) Tabulation of data
Penjadualan data

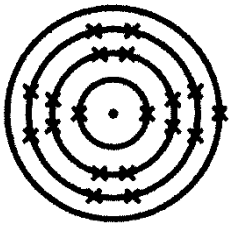
[17 marks]
[*17 markah*]

ENDS OF QUESTION PAPER
KERTAS SOALAN TAMAT

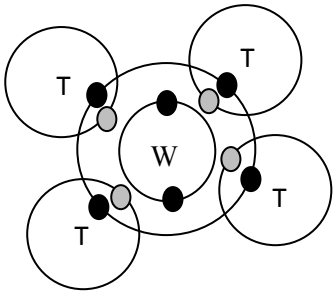
ASNWER SCHEME OF TRIAL PAPER 1

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

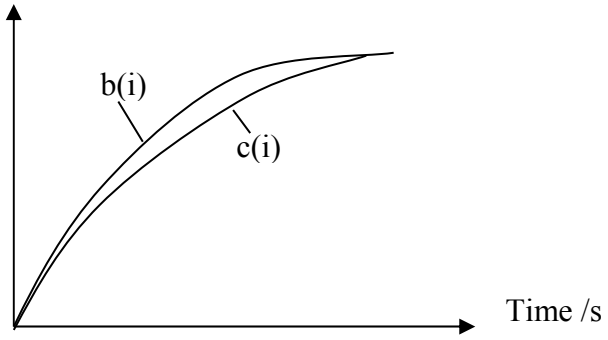
MARKING SCHEME PAPER 2 2012

Number			Answer / sample answer	Marks	
1	(a)	(i)	Proton, electron, neutron	1	2
		(ii)	Total number of proton and neutron in an atom.	1	
	(b)		V= 35 W=24	1 1	
	(c)		2.8.8	1	
	(d)		 1. The nucleus is labelled correct 2. no of shells and electron correct	 1 1	5
	(e)	(i)	78° C	1	
		(ii)	Heat energy is released as the particles attract one another to form solid is equal to heat lost to surrounding.	1	2
			Total		**9**

Number			Answer / sample answer	Marks	
2	(a)		X – Sulphuric acid Y – Ammonia	1 1	
	(b)	(i)	$(NH_4)_2SO_4$	1	
		(ii)	Percentage of nitrogen = $\frac{2(14)}{2(14) + 8(1) + 32 + 4(16)} \times 100\%$ = 21.21%	 1	
	(c)	(i)	Preservative	1	
		(ii)	Flavouring	1	
	(d)		Headaches // Allergy // drowsiness // abdominal pain	1	
	(e)		Gelatin // lecithin // pectin	1	
	(f)		Salt // sugar // spices // turmeric	1	9

Number			Answer / sample answer	Marks	
3	(a)		Form different oxidation number in their compound // form coloured ion or compounds // use as a catalyst // formed complex ion any one	1	
	(b)	(i)	U	1	
		(ii)	$2U + 2H_2O \rightarrow 2\ UOH + H_2$	1+1	
	(c)		Y	1	
			1. Atom of element Y achieve a stable octet electron arrangement,	1	
			2. the atom does not donate or release or share electron	1	
	(d)	(i)	low melting point // low boiling point // do not conduct electricity // do not dissolve in water // dissolve in organic solvent any one	1	
		(ii)			
			1. Nucleus marked, no. of shells and no. of e correct	1	10
			2. 1 atom W and 4 atoms T	1	

Number			Answer/sample answer	Marks	
4	(a)	(i)	copper(II) ions , sulphate ions, hydrogen ions , hydroxide ions // Cu^{2+} , SO_4^{2-} , H^+ , OH^-		1
		(ii)	Electrode P - SO_4^{2-} , OH^-	1	
			Electrode Q - Cu^{2+} , H^+	1	2
		(iii)	Brown solid formed //brown metal formed/deposited		1
		(iv)	Blue colour turn colourless // Intensity of blue solution decreases // blue solution fades		1
	(b)	(i)	Oxygen gas		1
		(ii)	Insert / put a wooden glowing splinter into the mouth of the test tube containing the gas.	1	
			The glowing wooden splinter ignited/rekindles/lighted	1	2
	(c)		Anode: $Cu \rightarrow Cu^{2+} + 2e$	1	
			Cathode: $Cu^{2+} + 2e \rightarrow Cu$	1	2
			Total		10

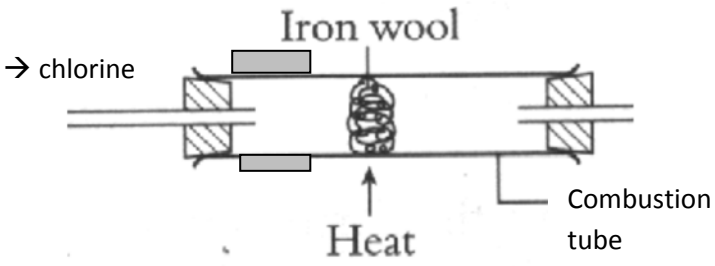
Number			Answer / sample answer	Marks	
5	(a)		$CaCO_3 + 2HCl \longrightarrow CaCl_2 + CO_2 + H_2O$ 1. Correct formula reactants and products 2. Balanced equation	1 1	2
	(b)	(i)	• correct label of axes and units for both axes – X and – Y and correct uniform scale • correct transfer of data • smooth curve	1 1 1	3
		(ii)	• tangent on the curve • answer : 0.14 ± 0.05 cm^3s^{-1}	1 1	2
	(c)	(i)	Volume of gas / cm^3  	1	
		(ii)	(Refer to (b) (i) 1. The smaller the size of reactants, the larger the total surface area // 2. frequency of collision between particles increases 3. frequency of effective collision increases (vice versa for (c) (i))	1 1 1	4
					11

Number		Answer / sample answer	Marks	
6	(a)	Heat of combustion - the heat change when one mol of alcohol is completely burnt in oxygen under standard conditions		1
	(b)	$C_nH_{2n+1}OH$		1
	(c)	1. the number of moles of products formed also increases. 2. More bonds are formed and more energy is released.	1 1	2
	(d)	$C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$, 1. Correct chemical formula of reactants and products 2. Balanced equation	1 1	2
	(e)	1. Correct label of energy(y-axis) and two levels of energy 2. Correct reactants and products	1 1	2
	(f)	Number of mol of ethanol = $\frac{4.6}{2(12) + 6(1) + 16}$ = 0.1 mol Heat change = H = 0.1 x 1376 kJ = 1.376 kJ	1 1 1	3
		Total		11

Number			Answer / sample answer	Mark	
7	a)		1. Ethanoic acid is a weak acid 2. ionises partially in water to produce low concentration of H^+ ion 3. Hydrochloric acid is a strong acid 4. ionises completely in water to produce high concentration of H^+ ion	1 1 1 1	4
	(b)	(i)	Solvent X = water Solvent Y = propanol// any suitable organic solvent	1 1	2
		(ii)	1. Set 1, potassium hydroxide ionize/dissociate in water 2. produce free moving ion 3. Set II, potassium hydroxide does not dissociate in water, 4. no free moving ions .	1 1 1 1	4
	(c)	(i)	$H_2SO_4 + 2KOH \rightarrow K_2SO_4 + H_2O$ 1. correct formula of reactants 2. correct formula products 3. balanced chemical equation	 1 1 1	3
		(ii)	1. Correct number of mole of KOH No. of mole of KOH = $\frac{MV}{1000} = \frac{0.1 \times 25}{1000} = 0.0025$ mol 2. Correct ratio of mole $H_2SO_4 : KOH$ 1 : 2 0.00125 : 0.0025 3. Correct answer with units Volume of sulphuric acid = $\frac{1000 \times 0.00125}{0.1}$ = $12.5cm^3$	1 1 1	3
		(iii)	Yellow to orange	1	1
		(iv)	25.0 cm^3 Nitric acid is a monoprotic acid// sulphuric acid is a diprotic acid Concentration of hydrogen ion, H^+ in nitric acid is half than concentration of hydrogen ion, H^+ in sulphuric acid //vice versa	1 1 1	3
			Total		20

Number			Answer / sample answer	Marks	
8	(a)	(i)	1. Butane - saturated hydrocarbon 2. contains only single covalent bond between carbon atom/ C - C single covalent bond 3. Butene - unsaturated hydrocarbon 4. contains at least one double covalent bond between carbon atom / C-C double bond	1 1 1 1	4
		(ii)	Any one structure of the isomers But-1-ene // But-2-ene // 2-methylprop-1-ene Correct structure of the isomers and correct name	 1 1	2
		(iii)	(sample answer) 1. Hydrogenation / addition of hydrogen 2. Nickel // Platinum, 180°C (Both correct) $C_4H_8 + H_2 \rightarrow C_4H_{10}$ 3. Correct chemical formula of reactants and products 4. Balanced equation	1 1 1 1	4
	(b)	(i)	1. React with reactive metal to form salt and hydrogen gas Eg: $2CH_3COOH + Mg \rightarrow Mg(CH_3COO)_2 + H_2$ 2. React with metal carbonate to form salt, carbon dioxide and water Eg: $2CH_3COOH + CaCO_3 \rightarrow Ca(CH_3COO)_2 + CO_2 + H_2O$ 3. Esterification // reacts with alcohol (accept correct equation) 4. Neutralization// reaction with alkali to produce salt and water (accept correct equation) 5. React with metal oxide to produce salt and water (accept correct equation) any one answer : chemical equation : correct reactants , correct products balanced equation	 1 1+1+1	4
		(ii)	(Sample answer) 1. Apparatus: boiling tubes, measuring cylinder(10 ml) ,dropper, Bunsen Burner Materials: Ethanol, propanoic acid, concentrated sulphuric acid Procedure: 2. Measure 5 cm^3 of ethanol by using a measuring cylinder and pour into a boiling tube/ beaker . 3. Measure 5 cm^3 of ethanoic acid by using a measuring cylinder and add to the ethanol in the boiling tube / beaker. 4. By using a dropper, add 5 drops of concentrated sulphuric acid into the mixture. 5. Heat the mixture 6. Observation: sweet pleasant smell /fruity smell	 1 1 1 1 1	6
			Total		20

9	(a)		Sample answer : 1. Chlorine atom receive one electron 2. chloride ion formed // $Cl + e \rightarrow Cl^-$ [Chlorine can be replaced by fluorine, bromine, iodine]	 1 1	2
	(b)	(i)	Sample answer :		

			$3Cl_2 + 2Fe \rightarrow 2FeCl_3$ 1. Correct formula of reactants and product 2. Balanced chemical equation	 1 1	 2
		(ii)	Sample answer (comparing chlorine and bromine): 1. Chlorine is more reactive than bromine 2. The size of chlorine atom smaller than bromine atom 3. the nucleus attraction to the valence electron in chlorine atom is stronger, 4. easier for the chlorine atom to accept one electron (any other pairs of halogen)	 1 1 1 1	 4
		(iii)	 1. functional diagram – clamp, arrow heating , stopper 2. label – chlorine , iron	 1 1	 2
	(b)		Sample answer: 1. Oxidising agent : Chlorine water // bromine water 2. Reducing agent : Iron(ll) sulphate solution //potassium bromide solution (any correct pair) Procedure : 3. Pour dilute sulphuric acid into the U-tube until its half level of the U-tube, 4. Using a dropper, carefully add iron(ll) sulphate solution to one of the arm of the U-tube, 5. Then, chlorine water is added carefully to the other arm of the U-tube using a dropper, 6. A carbon electrode is dipped into both solution in each arm of the U-tube respectively, 7. The electrodes are connected to a galvanometer by a connecting wire, 8. Leave the set-up of apparatus for 30 minutes, 9. Using a dropper, 1cm^3 of iron(ll) sulphate solution is drawn out and placed into test tube, 10. Add a few drops of sodium hydroxide solution into iron(ll) sulphate solution, 11. Brown precipitate formed	 1 1 1 1 1 1 1 1 1 1	 2 max 8
					20

10	(a)	(i)	1. The substance exists as solid at room temperature, if the melting point is higher than room temperature 2. The substance exists as liquid at room temperature, if the melting point is lower than room temperature, 3. but the boiling point is higher than room temperature 4. The substance exists as gas at room temperature, if the point boiling point is lower than room temperature	1 1 1 1	4
		(ii)	• $t_0 - t_1$ // A to B : liquid • the particles closely together but not in orderly manner • $t_1 - t_2$ // B to C : liquid and gaseous • some of the particles are closely together but not in orderly manner and some are very far apart from each others. • $t_2 - t_3$ // C to D: gaseous • all the particles are very far apart from each other and more in a random motion	1 1 1 1 1 1	6
	(b)		• suitable chemicals : sodium thiosulphate and hydrochloric acid Prosedur : • 50 cm^3 of 0.1 $moldm^{-3}$ of sodium thiosulphate solution is measured and • is poured into a conical flask. • 5 cm^3 of 0.1 $moldm^{-3}$ of hydrochloric acid is measured. • the solution in the conical flask is heated until the temperature rises to 30°C. • the conical flask is put on the paper mark with 'X'. • the acid is added into the conical flask and the stopwatch is started immediately. • the time taken for the mark 'X' disappeared from sight is recorded. • the experiment is repeated at different temperature.	1+1 1 1 1 1 1 1 1 1	10
			•		20

JABATAN PELAJARAN NEGERI PERAK

PEPERIKSAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA
NEGERI PERAK 2012

CHEMISTRY
KIMIA

PAPER 3
KERTAS 3

ANSWER AND MARKING SCHEME

<table>
<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td rowspan="4">1(a)</td><td>[Able to write potential difference to one decimal correctly]

Answer
<table>
<tr><th>Pair of Metals</th><th>Potential difference (V)</th></tr>
<tr><td>Cu and P</td><td>1.2</td></tr>
<tr><td>Cu and Q</td><td>0.8</td></tr>
<tr><td>Cu and R</td><td>2.0</td></tr>
<tr><td>Cu and S</td><td>0.2</td></tr>
</table></td><td>3</td></tr>
<tr><td>[Able to write three potential difference correctly]</td><td>2</td></tr>
<tr><td>[Able to write one potential difference correctly]</td><td>1</td></tr>
<tr><td>[No response or wrong response]</td><td>0</td></tr>
</table>

<table>
<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td rowspan="4">1(b)</td><td>[Able to state three variables correctly]
Sample answer:
Manipulated variable: Different pair of metals//
Responding variable: Potential difference readings//
Constant variable: Copper, $CuSO_4$, concentration of $CuSO_4$, (anyone)</td><td>3</td></tr>
<tr><td>[Able to state any 2 variables correctly]</td><td>2</td></tr>
<tr><td>[Able to state any 1 variable correctly]</td><td>1</td></tr>
<tr><td>[No response or wrong response]</td><td>0</td></tr>
</table>

<table>
<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td rowspan="4">1(c)</td><td>[Able to state the relationship correctly between the manipulated variable and the responding variable]

Sample answer
The further the distance between two metals in the electrochemical series, the higher the potential difference / voltage /voltmeter reading</td><td>3</td></tr>
<tr><td>[Able to state the relationship incorrectly between the manipulated variable and the responding variable]

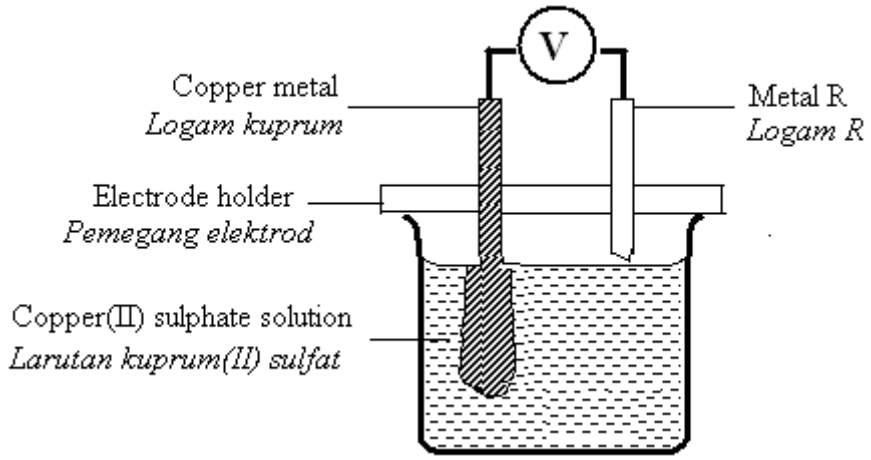
Sample answer
The further the distance between two metals, the higher potential difference/voltage //
The higher the potential difference, the further the distance between two metals in the electrochemical series.</td><td>2</td></tr>
<tr><td>[Able to state an idea of hypothesis]

Sample answer
The distance between two metals the higher affects the potential difference
Different pairs of metals give different potential difference.</td><td>1</td></tr>
<tr><td>[No response given or wrong response]</td><td>0</td></tr>
</table>

Question	Rubric	Score
1(d)	*[Able to arrange the metals in the electrochemical series in descending order correctly]* *Answer:* R, P, Q, S, Cu	3
	[Able to arrange four metals correctly or arrange the metal correctly in ascending order.] *Sample answer:* R, Q, P, S, Cu // Cu, S, P, Q, R	2
	[Able to arrange three metals correctly] *Sample answer:* P, S, Q, R, Cu	1
	[No response given or wrong response]	0

Question Number	Rubric	Score
1(e)	*[Able to predict the positive terminal and the voltage value correctly]* <u>Answer:</u> Positive terminal: Q; Potential difference /V: 0.4	3
	Able to predict any one answers correctly	2
	Able to give a value of less than 1.2 for potential difference	1
	No response or wrong response	0

Question	Rubric	Score
1(f) (i)	*[Able to state all the observations correctly]* <u>Sample answers:</u> 1. Metal R become thinner 2. Brown deposits is formed at copper electrode// Copper metal becomes thicker 3. Blue solution become lighter (paler) // The intensity of blue solution decrease	3
	[Able to state any 2 answers correctly]	2
	[Able to state any 1 answers correctly]	1
	[No response or wrong response]	0

<table>
<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td rowspan="4">1(f) (ii)</td><td>[Able to draw the diagram correctly with the following aspects:
• Metal R in not in contact with the solution or the size of metal R is smaller than that shown in diagram 1.3(b)
• Copper metal (below solution level) thicker than the original size.
• Copper, R and copper sulphate is labeled.
Sample answer
 
</td><td>3</td></tr>
<tr><td>[Able to draw the diagram less correctly with the following aspects:
• Size of metal R smaller than the original size or size of copper metal bigger than the original size.
• Copper, R and copper sulphate solution is labeled.</td><td>2</td></tr>
<tr><td>[Able to draw the diagram with different sizes of copper and metal R</td><td>1</td></tr>
<tr><td>[No response given or wrong response]</td><td>0</td></tr>
</table>

<table>
<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td>2(a)</td><td>[Able to construct a correct table that contains the following information]
1. Three correct headings (with units if applicable)
2. Readings to one decimal point

<u>Sample answer:</u>
<table>
<tr><th rowspan="2">Material</th><th colspan="3">Diameter of dents (cm)</th><th rowspan="2">Average diameter (cm)</th></tr>
<tr><th>1</th><th>2</th><th>3</th></tr>
<tr><td>X</td><td>2.9</td><td>2.7</td><td>2.9</td><td>2.8</td></tr>
<tr><td>Y</td><td>2.0</td><td>2.1</td><td>1.9</td><td>2.0</td></tr>
</table></td><td>3</td></tr>
</table>

	[Able to construct a less correct table with following information.] 1. At least one correct heading (without units) 2. At least one set of correct readings for material X and Y <u>Sample answer:</u> 		Diameter of dents		
---	---	---	---
	1	2	3
X	2.9		
Y	2.0				2
	[*Able to show an idea of constructing a table]* 1. At least a 2 x 2 table 2. At least one row or column filled with heading and numbers Sample answer 		Diameter	
	2.0	
	1.0	| |		
X	1.0	2..0
				1
	[No response given or wrong response]	0

Question	Rubric	Score
2(b)	*[Able to state the inference correctly]* <u>Sample answer:</u> Material Y/X is harder/softer than material X/Y.	3
	[Able to state the inference incompletely.] <u>Sample answer:</u> Material Y/X is harder /softer.	2
	[Able to state an idea of inference.] <u>Sample answer:</u> Material Y/X is hard/soft.	1
	[No response given or wrong response]	0

Question	Rubric	Score
2(c)	*[Able to state the correct operational definition on hardness.]* <u>Sample answer</u> When a 1 kg weight is dropped on a ball bearing taped on material X and Y separately, the material with a smaller dent formed (or a smaller diameter of dent) is a harder material	3
	[Able to state the part of the operational definition on hardness or less accurate definition] <u>Sample answer:</u> Material with a smaller dent is harder. // A weight is dropped onto material X and Y separately.	2
	[Able to state an idea of alloy.] <u>Sample answer:</u> The hard material has big dent. //Alloy form dent. // Alloy is hard//	1
	[No response or wrong response]	0

Question	Rubric	Score
2(d)	*[Able to classify all the six materials correctly.]* <u>Sample answer:</u> Pure metal: Tin, Copper, Iron Alloy: Brass, Pewter, Stainless steel	3
	[Able to classify any four materials correctly.]	2
	[Able to classify any two materials correctly.]	1
	[No response or wrong response]	0

Question	*Rubrik*	Score
3(a)	*[Able to give the problem statement accurately.]* Sample answer: How do different types of metals in contact with iron affect rusting?	3
	[Able to give the problem statement less accurately.] Sample answer: How do metals in contact with iron affect rusting? // How do metals P and metal Q affect rusting?	2
	[Able to give an idea of statement of the problem.] Sample answer: To investigate the effect of other metals on rusting. // Iron rust faster in jelly// Iron in contact with P rust faster,	1
	[No response given or wrong response]	0

Question	*Rubrik*	Score
3(b)	*[Able to state the three variables correctly.]* Sample answer: *Manipulated variable:* Different type of metals *Responding variable:* Presence of blue coloration *Constant variable:* Iron nails, jelly, temperature, volume of jelly solution (any one)	3
	[Able to state any two variables correctly]	2
	[Able to state any one variables correctly]	1
	[No response given or wrong response]	0

Question	*Rubrik*	Score
3(c)	*[Able to state the relationship between the manipulated variable and the responding variable accurately.]* Sample answer: When a more electropositive metal is in contact with iron, the metal prevents rusting. When a less electropositive metal is in contact with iron, the metal speed up rusting. *Accept 'more reactive metal' as 'more electropositive metal'*	3
	[Able to state the relationship between the manipulated variable and the responding variable.] Sample answer: *Rusting of iron is prevented when it is in contact with a more electropositive metal. Rusting of iron is prevented when it is in contact with a less electropositive metals. //* *Iron coiled with metal P rust faster than iron coiled with metal Q*	2
	[Able to state the idea of hypothesis correctly.] Sample answer: Iron in contact with P and Q rust.	1
	[No response given or wrong response]	0

Question	*Rubrik*	Score
3(d)	*[Able to give adequate list of substance and apparatus.]* Sample answer: Substance Iron nails, magnesium strip [or a named metal which is more electropositive than iron], copper strip [or a named metal which is less electropositive than iron], hot jelly solution with a little potassium hexacyanoferrate(II), sandpaper Apparatus Test tube, test tube rack	3
	[Able to give a list of materials and apparatus containing] • *Iron and two named metals* • *Jelly with potassium hexacynoferrate(II)* • *Test tube* Sample answer: Iron, magnesium, zinc, test tubes, jelly, potassium hexacynoferrate(II)	2

	[Able to give an idea of materials and apparatus.] • *Iron and a metal* • *Jelly* • *Test tube* Sample answer: Iron, copper, test tube	1
	[No response given or wrong response]	0

Question	*Rubrik*	Score
3(e)	*[Able to state the following five steps]* Sample answer: 1. Clean three iron(nail)s, magnesium strip and copper strips with sandpaper. 2. Coil two iron nails with magnesium and copper each. 3. Place all the three iron nails in separate labeled test tubes. 4. Pour the same volume of hot jelly containing potassium hexacynoferrate into the test tubes until it covers completely the iron nails 5. Place the test tubes in the test rack and leave them aside for a day.	3
	[*Able to state the following steps*] Step 2, 4 and 5	2
	[*Able to state the following steps*] Step 2 and 4	1
	[No response given or wrong response]	0

<table>
<tr><th>Question</th><th>Rubrik</th><th>Score</th></tr>
<tr><td rowspan="3">3(f)</td><td>[Able to exhibit the tabulation of data that include the following four information]
1. Correct heading for manipulated variable
2. Correct heading for responding variable
3. Substance used as manipulated variable listed.
4. Table has four rows and two columns

Sample answer :
<table><tr><th>Test tube</th><th>Observation</th></tr><tr><td>I (Iron)</td><td></td></tr><tr><td>II (Iron and magnesium)</td><td></td></tr><tr><td>III (Iron and copper)</td><td></td></tr></table></td><td>2</td></tr>
<tr><td>[Able to exhibit the tabulation of data less accurately.]
1. One correct heading or at least substances listed
2. Table has at least two rows and two column

Sample answer :
<table><tr><td></td><th>Observation</th></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table>
Or
<table><tr><td></td><td></td></tr><tr><td>Iron</td><td></td></tr><tr><td>Iron and magnesium</td><td></td></tr></table></td><td>2</td></tr>
<tr><td>[Empty table or no response given or wrong response]</td><td>0</td></tr>
</table>