

NAMA :
TINGKATAN :



JABATAN PELAJARAN NEGERI TERENGGANU

Ujian Pengesahan TOV

4541/2

SIJIL PELAJARAN MALAYSIA 2012

CHEMISTRY

Kertas 2

Jan/Feb

2 ½ jam

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. Tulis nama dan tingkatan anda pada ruangan yang disediakan di atas.
2. Kertas soalan ini adalah dalam dwibahasa.
3. Soalan dalam Bahasa Inggeris mendahului soalan yang sepadan dalam Bahasa Melayu.
4. Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam Bahasa Inggeris atau Bahasa Melayu.
5. Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini

Untuk Kegunaan Pemeriksa		
Bahagian	Soalan	Markah diperoleh
A	1	
	2	
	3	
	4	
	5	
	6	
B	7	
	8	
C	9	
	10	
Jumlah		

Disediakan oleh:
Guru AKRAM Terengganu

Dengan kerjasama
MPSM Negeri Terengganu

Dibayai oleh:
Kerajaan Negeri Terengganu

TERENGGANU NEGERI ANJUNG ILMU

Kertas soalan ini mengandungi 23 halaman bercetak

Section A
[60 mark]

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

1. Table 1 shows the proton number of two elements X and Y.
Jadual 1 menunjukkan nombor proton bagi dua unsur X dan Y.

Element Unsur	Proton number Nombor proton
X	6
Y	11

Table / Jadual 1

- (a) The number of neutron of atom of element X is 6. Draw the atomic structure of atom X.
Bilangan neutron bagi atom unsur X adalah 6. Lukiskan struktur atom bagi atom X.

[2 marks]

- (b) (i) Element X has isotopes. What is meant by isotopes?
Unsur X mempunyai isotop. Apakah yang dimaksudkan dengan isotop?

[1 mark]

- (ii) State one example of an isotope.
Nyatakan satu contoh bagi isotop.

[1 mark]

- (c) The nucleon number of atom of element Y is 23. Calculate the number of neutrons in atom Y.
Nombor nukleon bagi atom unsur Y adalah 23. Hitungkan bilangan neutron dalam atom Y.

[1 mark]

- (d) Methanol is an organic compound with melting point of -97°C and boiling point of 65°C .
Metanol ialah sebatian organik dengan takat lebur -97°C dan takat didih 65°C .

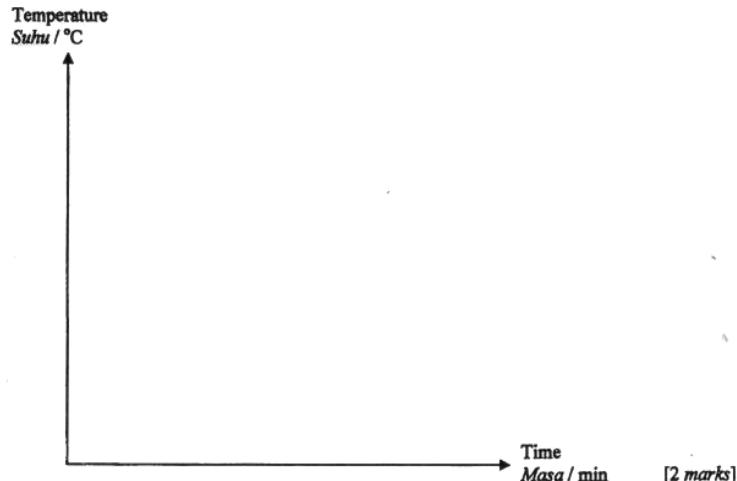
- (i) What is the physical state of methanol at room temperature?
Apakah keadaan fizik bagi metanol pada suhu bilik?

.....
[1 mark]

- (ii) State how the movement of methanol particles changes when heated from room temperature to 100°C .
Nyatakan bagaimana pergerakan zarah methanol berubah apabila dipanaskan daripada suhu bilik kepada 100°C .

.....
[1 mark]

- (iii) Sketch the graph of temperature against time when methanol is heated from room temperature to 100°C .
Lakarkan graf suhu melawan masa apabila metanol dipanaskan daripada suhu bilik kepada 100°C .



- 2 Table 2 shows two type of alloys and their components.
Jadual 2 memunjukkan dua jenis aloi dan komposisinya.

Alloy Aloi	Component Komposit
Bronze Gangsa	90% of copper 5% of element X
Duralumin Duralumin	90% of aluminium 4% of copper 1% of magnesium

Table / Jadual 2

- (a) What type of particle is found in pure copper?
Apakah jenis zarah yang terdapat dalam kuprum tulen?

.....
[1 mark]

- (b) Name element X.
Namakan unsur X.

.....
[1 mark]

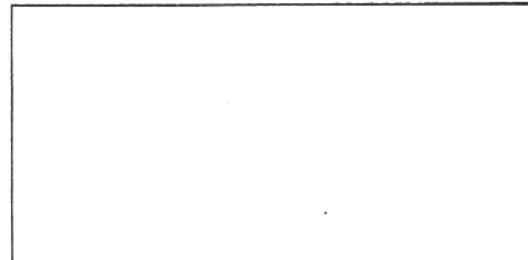
- (c) (i) State one use of duralumin.
Nyatakan satu kegunaan duralumin.

.....
[1 mark]

- (ii) State two properties of duralumin based on your answer in (c) (i).
Nyatakan dua sifat bagi duralumin berdasarkan jawapan anda di (c) (i).

.....
[2 marks]

- (d) Draw the arrangement of particles in bronze.
Lukiskan susunan zarah yang terdapat dalam gangsa.



- (e) Explain why bronze is harder than pure copper.
Terangkan mengapa gangsa lebih keras berbanding kuprum tulen.

.....

 [3 marks]

- 3 The diagram 3 shows the electron arrangement of compound P. Compound P formed from reaction between element X and element Y.
Rajah 3 menunjukkan susunan elektron bagi sebatian P. Sebatian P terbentuk daripada tindak balas antara unsur X dan unsur Y.

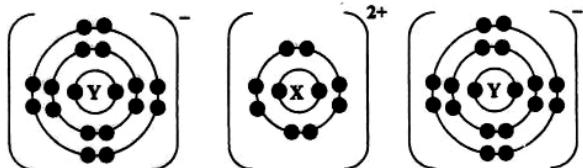


Diagram / Rajah 3

- (a) (i) State the type of compound P.
Nyatakan jenis sebatian P.

[1 mark]

- (ii) State one physical property of compound P.
Nyatakan satu sifat fizik bagi sebatian P.

[1 mark]

- (b) How are Y ion and X ion formed from their respective atoms?
Bagaimakah ion Y dan ion X terbentuk daripada atom masing-masing?

Y ion :
 Ion Y :

X ion :
 Ion X :

[2 marks]

- (c) (i) Write the formula of compound P.
Tuliskan formula sebatian P.

[1 mark]

- (ii) Write the chemical equation for the reaction between element X and element Y to form compound P.
Tuliskan persamaan kimia bagi tindak balas antara unsur X dan unsur Y untuk membentuk sebatian P.

[2 marks]

- (d) (i) Between atom of element X and Y, which one has a smaller size.
Antara atom unsur X dan atom unsur Y, yang manakah mempunyai saiz yang lebih kecil.

[1 mark]

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

[2 marks]

- 4 Table 4 shows the apparatus set-up for two sets of Electrolytic Cell.
 Jadual 4 memperkongsikan susunan radas bagi dua set Sel Elektrolitik.

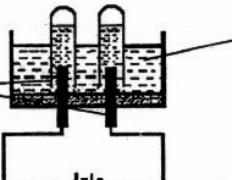
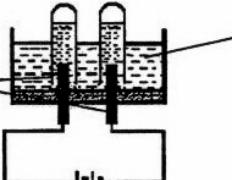
Set	Diagram set up of apparatus Gambar rajah susunan radas
I	 <p>Carbon electrodes Elektrod karbon</p> <p>0.01 mol dm⁻³ of sodium chloride solution Larutan natrium klorida 0.01 mol dm⁻³</p>
II	 <p>Carbon electrodes Elektrod karbon</p> <p>1.0 mol dm⁻³ of sodium chloride solution Larutan natrium klorida 1.0 mol dm⁻³</p>

Table / Jadual 4

- (a) What is the meaning of anode?
Apakah maksud anod?
- [1 mark]
- (b) State all anion in sodium chloride solution.
Nyatakan semua anion dalam larutan natrium klorida.
- [1 mark]

- (c) Based on both Electrolytic Cell
Berdasarkan kedua-dua Sel Elektrolitik
- (i) Write an equation for the reaction occurs at cathode.
Tulis satu persamaan kimia bagi tindak balas yang berlaku di katod.
- [2 marks]

- (ii) Describe briefly a chemical test to confirm the product formed at cathode.
Huraikan secara ringkas satu ujian kimia untuk mengesahkan hasil di katod.
-
 [2 marks]

- (d) Complete Table 4.2 by state the name of the product formed at anode in Set I and Set II after 10 minutes of electrolysis. Give a reason for your answer.
Lengkapkan Jadual 4.2 dengan menyatakan nama bagi hasil yang terbentuk di anod dalam Set I dan Set II selepas 10 minit elektrolisis. Beri alasan bagi jawapan anda.

Set	Name of product <i>Nama hasil</i>	Reason <i>Alasan</i>
I		
II		

Table / Jadual 4.2

[4 marks]

- 5 Diagram 5 shows the flow chart for the chemical changes that occurs to salt P.
Rajah 5 menunjukkan carta air bagi perubahan-perubahan kimia yang berlaku kepada suatu garam P.

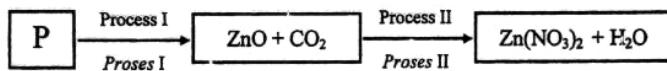


Diagram / Rajah 5

Based on the Diagram 5;
Berdasarkan Rajah 5;

- (a) Draw a diagram to show the set-up of apparatus to carry out Process I.
 In your diagram, show how to test the carbon dioxide gas released.
*Lukiskan gambar rajah susunan radas untuk menjalankan Proses I.
 Dalam gambar rajah anda, tunjukkan bagaimana anda menguji gas karbon dioksida yang terbebas.*

[2 marks]

- (b) State the name of salt P.
Nyatakan nama bagi garam P.

[1 mark]

- (c) State the colour of zinc oxide, ZnO during Process I.
Nyatakan warna bagi zink oksida, ZnO semasa Proses I.

Hot Panas	Cold Sejuk

[2 marks]

- (d) In Process II; zinc oxide, ZnO is dissolved in an acid.
Dalam Proses II; zink oksida, ZnO dilarutkan dalam suatu asid.

- (i) State the name of the acid used.
Tuliskan nama bagi asid yang digunakan.

[1 mark]

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

[2 marks]

- (e) Describe a chemical test to verify the presence of the cation in zinc nitrate.
Huraikan satu ujian kimia untuk menentusahkan kehadiran kation dalam zink nitrat.

.....

[3 marks]

- 6 An experiment is carried out to determine the rate of reaction between calcium carbonate and dilute hydrochloric acid solution. The volumes of carbon dioxide gas evolved at fixed intervals times are recorded. Table 6 shows the data obtained.

Satu eksperimen dijalankan untuk menentukan kadar tindak balas antara kalsium karbonat dan larutan asid hidroklorik cair. Isipadu gas karbon dioksida yang terbebas dicatat mengikut sela masa yang tetap. Jadual 6 menunjukkan data yang diperolehi.

Time /s Masa /s	0	60	120	180	240	300	360	420	480
Volume of gas /cm ³ Isipadu gas /cm ³	0.0	5.0	9.6	13.6	16.5	18.5	19.0	19.0	19.0

Table / Jadual 6

- (a) Write a chemical equation when calcium carbonate reacts with hydrochloric acid solution.

Tuliskan persamaan kimia apabila kalsium karbonat bertindak balas dengan larutan asid hidroklorik.

[2 marks]

- (b) Draw a graph of volume of gas produced against time on the graph paper provided on page 12.

Lukiskan graf isipadu gas yang terbebas melawan masa pada kertas graf yang dibekalkan di halaman 12.

[3 marks]

- (c) Based on the graph in (b), determine :

Berdasarkan graf di (b), tentukan :

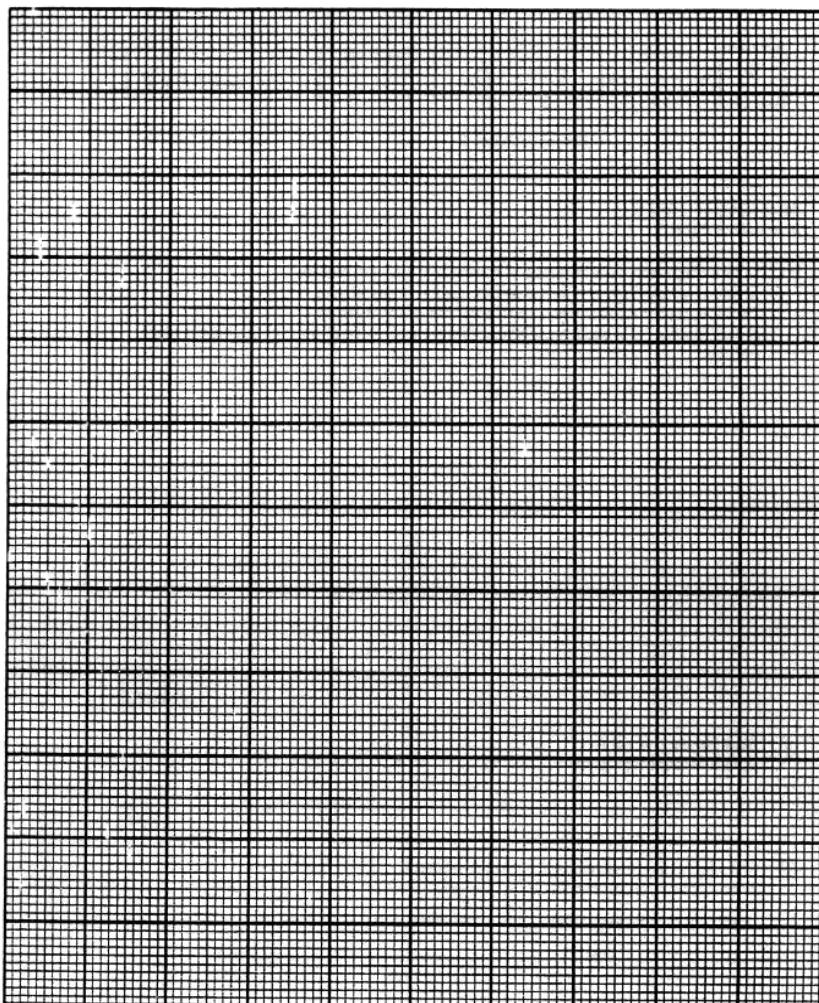
- (i) the average rate of reaction for the whole reaction,
kadar tindak balas purata bagi keseluruhan tindak balas,

[2 marks]

- (ii) the rate of reaction at 200 s.
kadar tindak balas pada 200 s.

[3 marks]

Graph of volume of gas against time
Graf isipadu gas melawan masa



- (d) Base on experiment above, give a reason why rate of reaction decrease with time.
Berdasarkan eksperimen di atas, berikan satu alasan mengapa kadar tindak balas berkurang dengan masa.
-
.....
.....

[1 mark]

Section B
[20 marks]

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

- 7 Table 7 shows the set-up of apparatus in two experiments to determine the empirical formula of oxide of metal P and oxide of metal Q.
Jadual 7 menunjukkan susunan radas dalam dua eksperimen untuk menentukan formula empirik bagi oksida logam P dan oksida logam Q.

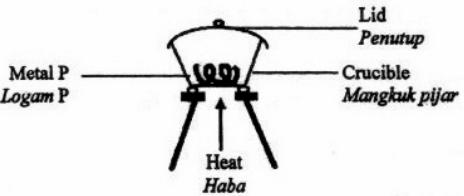
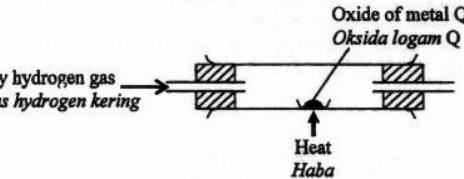
Experiment Eksperimen	Set-up of apparatus Susunan radas
I	 <p>Metal P Logam P</p> <p>Lid Penutup</p> <p>Crucible Mangkuk pajar</p> <p>Heat Haba</p>
II	 <p>Dry hydrogen gas Gas hidrogen kering</p> <p>Oxide of metal Q Oksida logam Q</p> <p>Heat Haba</p>

Table / Jadual 7

- (a) Suggest one suitable metal P and one suitable metal Q.
 Explain why method in Experiment I is suitable to determine the empirical formula of oxide of metal P and method in Experiment II is suitable to determine the empirical formula of oxide of metal Q.
Cadangkan satu logam yang sesuai untuk P dan satu logam yang sesuai untuk Q. Terangkan mengapa kaedah dalam Eksperimen I sesuai untuk menentukan formula empirik oksida logam P dan kaedah dalam Eksperimen II sesuai untuk menentukan formula empirik oksida logam Q.

[4 marks]

- (b) The results obtained from Experiment I as the following ;
Keputusan yang diperolehi dalam Eksperimen I adalah seperti berikut :

Mass of crucible + lid <i>Jisim mangkuk pijar + penutup</i>	20.0 g
Mass of crucible + lid + metal P <i>Jisim mangkuk pijar + penutup + logam P</i>	21.2 g
Mass of crucible + lid + oxide of metal P <i>Jisim mangkuk pijar + penutup + oksida logam P</i>	22.0 g

Based on the results, determine the empirical formula of oxide P.

Write a chemical equation for the reaction takes place in Experiment I.

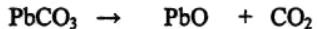
Berdasarkan kepada keputusan, tentukan formula empirik bagi oksida logam P.

Tulis persamaan kimia bagi tindak balas yang berlaku dalam Eksperimen I.

[6 marks]

- (c) The chemical equation below represent a reaction.

Persamaan kimia di bawah menunjukkan satu tindak balas.



State two information obtained from the given equation.

Calculate the volume of carbon dioxide gas produce when 2.67 g of lead (II) carbonate, PbCO_3 is reacted at room condition.

Nyatakan dua maklumat yang diperolehi daripada persamaan yang diberi.

Hitungkan isipadu gas karbon dioksida yang dihasilkan apabila 2.67 g plumbum (II) karbonat ditindakbalaskan pada keadaan bilik.

[Relative Atomic Mass / Jisim Atom Relatif : Pb = 207, C = 12, O = 16]

[Molar gas volume at room conditions / Isipadu molar gas pada keadaan bilik = 24 dm^3]

[5 marks]

- (d) 1.2 dm^3 of ammonia gas is reacted with hydrogen chloride.
 1.2 dm^3 gas ammonia bertindak balas dengan hidrogen klorida.

- (i) Write a chemical equation for the reaction

Tulis satu persamaan kimia bagi tindak balas tersebut.

[2 marks]

- (ii) Calculate
Hitung

- Number of mol ammonia gas used
Bilangan mol gas ammonia yang digunakan
- Mass of product formed
Jisim hasil yang terbentuk

[Relative Atomic Mass / Jisim atom relatif : N=14, H=1, Cl=35.5]

[3 marks]

- 8 (a) Table 8.1 shows the pH value of two solutions.
Jadual 8.1 menunjukkan nilai pH bagi dua larutan.

Solution Larutan	pH value Nilai pH
X : 0.1 mol dm^{-3} of potassium hydroxide solution	13
Y : 0.1 mol dm^{-3} of aqueous ammonia	11

Table / Jadual 8.1

Explain why the two solutions have different pH value.

Terangkan mengapa kedua-dua larutan tersebut mempunyai nilai pH yang berbeza.

[4 marks]

- (b) An unlabelled reagent bottle is said to contain sulphuric acid solution.
 Describe a chemical test how to confirm the solution is an acid.

Write the chemical equation for the reaction occurred.

Satu botol reagen yang tidak berlabel dikatakan mengandungi larutan asid sulfurik.

Huraikan satu ujian kimia untuk mengesahkan larutan tersebut adalah suatu asid.

Tuliskan persamaan kimia bagi tindak balas yang terlibat.

[4 marks]

- (c) Diagram 8.2 shows the structural formula of ethanoic acid.
Rajah 8.2 menunjukkan formula struktur bagi asid etanoik.

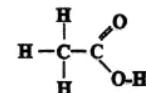


Diagram / Rajah 8.2

- (i) Explain why ethanoic acid is a monoprotic acid.
Terangkan mengapa asid ethanoik adalah asid monoprotik.

[2 marks]

- (ii) Glacial ethanoic acid does not conduct electricity but the aqueous solution of ethanoic acid does. Explain why.
Asid etanoik glasial tidak boleh mengkonduksikan elektrik tetapi larutan akues asid etanoik boleh. Terangkan mengapa.

[3 marks]

- (d) The equation below shows the reaction between magnesium and hydrochloric acid.
Persamaan tindak balas di bawah menunjukkan tindak balas antara magnesium dan asid hidroklorik.



50.0 cm^3 of hydrochloric acid reacts with excess magnesium to produce 48 cm^3 of hydrogen gas. Calculate the concentration of the hydrochloric acid used.

50.0 cm^3 asid hidroklorik bertindak balas dengan magnesium berlebihan menghasilkan 48 cm^3 gas hidrogen. Hitung kepekatan asid hidroklorik yang digunakan.

[Molar gas volume at room conditions = 24.0 dm^3]
 [Isipadu molar gas pada keadaan bilik = 24.0 dm^3]

[3 marks]

- (e) Emission of sulphur dioxide, SO_2 gas from vehicles and industries to the environment leads to the formation of acid rain.

Based on the information above, describe how the sulphur dioxide, SO_2 gas affects the quality of the environment.

Pelepasan gas sulfur dioksida, SO_2 daripada kenderaan dan industri ke alam sekitar membawa kepada pembentukan hujan asid

Berdasarkan maklumat di atas, huraiakan bagaimana gas sulfur dioksida, SO_2 memberi kesan kepada kualiti alam sekitar.

[4 marks]

Section C
[20 marks]

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

- 9 (a) Diagram 9.1 and 9.2 show the electron arrangement of two atoms of element X and element Y.
Rajah 9.1 dan 9.2 menunjukkan susunan elektron bagi dua atom unsur X dan unsur Y.

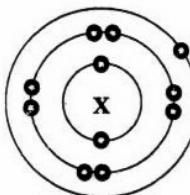


Diagram / Rajah 9.1

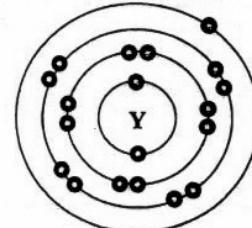


Diagram / Rajah 9.2

Based on the diagram,
Berdasarkan rajah,

- (i) state the name of element X and Y
nyatakan nama bagi unsur X dan Y.
- (ii) write the chemical equation for the reaction between element X and chlorine gas.
 tuliskan persamaan kimia lagi tindak balas antara unsur X dan gas klorin.

[4 marks]

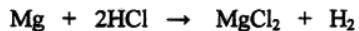
- (b) Table 9.3 show the observation when element X and element Y react with oxygen gas.
Jadual 9.3 menunjukkan pemerhatian apabila unsur X dan unsur Y bertindak balas dengan gas oksigen.

Element Unsur	Observation <i>Pemerhatian</i>
X	X burn rapidly and brightly with yellow flame and liberates white fume which become a white solid. The white solid dissolve in water to produce a colourless solution. This solution turns red litmus blue. <i>X terbakar dengan cepat dan terang dengan nyalaan kuning dan membebaskan serbuk putih yang menjadi pepejal putih. Pepejal putih larut dalam air menghasilkan larutan tanpa warna. Larutan itu menukar litmus merah menjadi biru.</i>
Y	Y burn very rapidly and brightly with lilac flame and liberates white fume which become a white solid. The white solid dissolve in water to produce a colourless solution. This solution turns red litmus blue. <i>Y terbakar dengan sangat cepat dan terang dengan nyalaan ungu dan membebaskan serbuk putih yang menjadi pepejal putih. Pepejal putih larut dalam air menghasilkan larutan tanpa warna. Larutan itu menukar litmus merah menjadi biru.</i>

Table / Jadual 9.3

WWW.ANDREWCHOO.EDU.MY

- (d) The equation below shows the reaction between magnesium and hydrochloric acid.
Persamaan tindak balas di bawah menunjukkan tindak balas antara magnesium dan asid hidroklorik.



50.0 cm³ of hydrochloric acid reacts with excess magnesium to produce 48 cm³ of hydrogen gas. Calculate the concentration of the hydrochloric acid used.
50.0 cm³ asid hidroklorik bertindak balas dengan magnesium berlebihan menghasilkan 48 cm³ gas hidrogen. Hitung kepekatan asid hidroklorik yang digunakan.

[Molar gas volume at room conditions = 24.0 dm³]
[Isipadu molar gas pada keadaan bilik = 24.0 dm³]

[3 marks]

- (e) Emission of sulphur dioxide, SO₂ gas from vehicles and industries to the environment leads to the formation of acid rain.

Based on the information above, describe how the sulphur dioxide, SO₂ gas affects the quality of the environment.

Pelepasan gas sulfir dioksida, SO₂ daripada kenderaan dan industri ke alam sekitar membawa kepada pembentukan hujan asid

Berdasarkan maklumat di atas, huraiakan bagaimana gas sulfir dioksida, SO₂ memberi kesan kepada kualiti alam sekitar.

[4 marks]

- 10 (a) Food stored in a refrigerator lasts longer than food stored in a kitchen cabinet. Explain why
Makanan yang disimpan dalam peti sejuk tahan lebih lama daripada makanan yang disimpan dalam almari dapur.
 Terangkan mengapa.

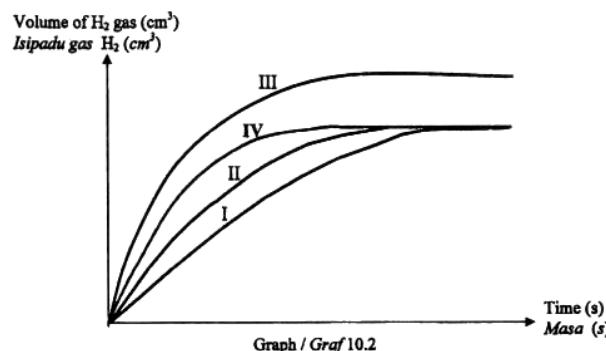
[3 marks]

- (b) Four experiments, I, II, III and IV are carried out to investigate the factors affecting the rate of reaction. Table 10.1 shows the reactants and the conditions of reaction involved in experiment I, II and III.
Empat eksperimen, I, II, III dan IV dijalankan untuk mengkaji faktor-faktor yang mempengaruhi kadar tindak balas. Jadual 10.1 menyatakan bahan tindak balas dan keadaan tindak balas yang terlibat dalam eksperimen I, II dan III.

Experiment Eksperimen:	Reactants Bahan-bahan tindak balas	Temperature °C Suhu °C
I	20 cm ³ of 1.0 mol dm ⁻³ hydrochloric acid + excess zinc granules	30
	20 cm ³ asid hidroklorik 1.0 mol dm ⁻³ + ketulan zink berlebihan	
II	20 cm ³ of 1.0 mol dm ⁻³ hydrochloric acid + excess zinc powder	30
	20 cm ³ asid hidroklorik 1.0 mol dm ⁻³ + serbuk zink berlebihan	
III	20 cm ³ of 1.2 mol dm ⁻³ hydrochloric acid + excess zinc powder	30
	20 cm ³ asid hidroklorik 1.2 mol dm ⁻³ + serbuk zink berlebihan	

Table / Jadual 10.1

Graph 10.2 shows the result of experiment I, II, III and IV.
Graf 10.2 menunjukkan keputusan bagi eksperimen I, II, III dan IV.



- (i) Referring to Experiment I, II, III and IV, state the meaning of rate of reaction.
Merujuk kepada Eksperimen I, II, III dan IV, nyatakan maksud kadar tindak balas.
[1 mark]

- (ii) Compare the rate of reaction for :
Bandingkan kadar tindak balas bagi :

- Experiment I and Experiment II
Eksperimen I and Eksperimen II
- Experiment II and Experiment III
Eksperimen II and Eksperimen III

Explain your answer based on the collision theory.

Terangkan jawapan anda berdasarkan teori perlanggaran.

[8 marks]

- (iii) Suggest one condition of reaction involved in Experiment IV without changing the reactants.

Describe how to carry out the experiment in the laboratory.

Cadangkan satu keadaan tindak balas yang terlibat dalam Eksperimen IV tanpa menukar bahan-bahan tindak balas.

Huraikan bagaimana untuk menjalankan eksperimen itu di dalam makmal.

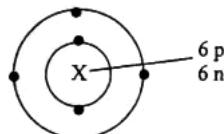
[8 marks]



TOV 2012 (TG. 5)
4541/2 CHEMISTRY
Paper 2

Section A

1 (a)

*Electron arrangement**Number of proton & neutron*1
1

(b) (i) Isotopes are atoms (of the same element) with the same number of protons/proton number but different number of neutrons/nucleon number.

1

(ii) *Any example of isotope**Sample answer; carbon-14, cobalt-60, sodium-24 etc*

1

(c) 12

1

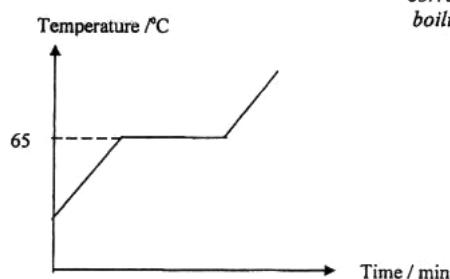
(d) (i) Liquid

1

(ii) Becomes faster/ more active

1

(iii)



correct curve
boiling point

1
1**TOTAL 9**

2 (a) Atom

1

(b) Tin

1

(c) (i) To make the body of aeroplane

1

(ii) light
Strong1
1

(d)



1

(e) Size of atom in bronze are different

1

Tin atom disrupt the orderly arrangement of copper atoms

1

Layer of atom in bronze not slide easily

1

TOTAL 9

3 (a)(i) ionic

1

(ii) high melting/boiling point // can conduct electricity in molten or aqueous solution // soluble in water

1

(b) Y ion : atom Y receive one electron
X ion : atom X release 2 electron1
1(c) (i) XY_2

1

(ii) $X + Y_2 \rightarrow XY_2$ *Formula of reactants and product correct*
*Balanced*1
1

(d) (i) atom Y

1

(ii) The number of proton in Y is higher// positive charge of the nucleus of the nucleus in Y is higher
The attraction force between nucleus and electron in Y is stronger// Electron in Y is pulled closer to the nucleus.

1

TOTAL 10

CONFIDENTIAL

3

4541/2

4 (a) Electrode that is connected to positive terminal of battery

1

(b) Hydroxide ion / OH^{-1} and chloride ion / Cl^{-1}

1

(c)(i) 1. Correct formula of reactant and product
2. Balance

1



(ii) 1. Place/put a lighted wooden splinter at the mouth of test tube containing gas

1

2. Pop sound produce

1

(d) Set I

1. Name of product : oxygen gas

1

2. Reason : Hydroxide ion is lower position in the electrochemical series

1

Set II

3. Name of product : Chlorine gas

1

4. Reason : Chloride ion is more concentrated

1

TOTAL 10

CONFIDENTIAL

4

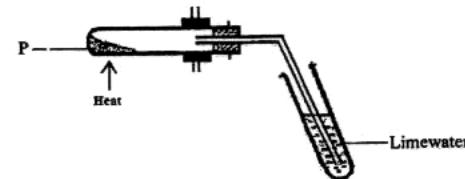
4541/2

5 (a)

[Functional diagram]
[Label of : P, heat, label of lime water]

1

1

Sample Answer :

(b) Zinc carbonate

1

(c) Hot : yellow
Cold : white

1

1

(d) (i) Nitric acid

1

ZnO + 2HNO₃ → Zn(NO₃)₂ + H₂O
. Correct formula of reactant and product
Balanced

1

1

[Name of the reagent used]
[Procedure of the test]
[Observation]

1

1

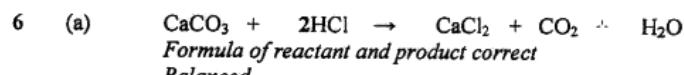
1

Sample Answer :

1. Pour the solution into the test tube
2. Add ammonia solution is added until excess.
3. White precipitate dissolved in excess ammonia solution.

TOTAL 11

WWW.ANDREWCHOO.EDU.MY



(b) *axis with label/unit*
All points are transferred correctly
Shape of the graph

(c) (i) *calculation step*
correct answer with unit
Sample answer

$$\frac{19}{360} = 0.053 \text{ cm}^3 \text{s}^{-1}$$

(c) (ii) *tangent of graph at 200 sec and triangle*
calculation steps
correct answer (0.045 to 0.055) with unit
Sample answer

$$\frac{20 - 9}{310 - 85} = 0.048 \text{ cm}^3 \text{s}^{-1}$$

(d) Concentration of HCl decreases with time// mass of CaCO_3 decreases with time

TOTAL 11

- 7(a) 1. P : Magnesium/Mg // Zinc/ Zn // Aluminium/ Al
 2. Q : Copper / Cu // Lead/Pb // Stanum/ Sn
 3. P is a reactive metal
 4. Q less reactive than hydrogen // Q below than hydrogen in Reactivity Series
- (b) 1. *Mass P and Oxygen*
 2. *Number of mol P and oxygen*
 3. *Simplest ratio P and oxygen*
 4. *Correct empirical formula*

Answer

Element	P	O
Mass (g)	1.2	0.8
Mol	1.2 / 24 // 0.05	0.8 / 16 // 0.05
Simplest ratio	1	1

Empirical formula : PO

5. *Correct formula of reactant and product*

6. *Balance*



- (c) 1. Lead(II) carbonate is a reactant .
 2. Lead(II) oxide and carbon dioxide is a product
 3. 1 mol lead(II) carbonate decomposed to 1 mol lead(II) oxide and 1 mol carbon dioxide

[Any two]

3. Mol $\text{PbCO}_3 = 2.67 / 267 = 0.01$

4. 1 mol PbCO_3 produce 1 mol CO_2
 0.01 mol PbCO_3 produce 0.01 mol CO_2

5. Volume $\text{CO}_2 = 0.01 \times 24 \text{ dm}^3 // 0.24 \text{ dm}^3 // 240 \text{ cm}^3$

- (d)(i) 1. *Correct formula of reactant*
 2. *Correct formula of product*



(ii) 1. Mol $\text{NH}_3 = 1.2 / 24 // 0.05$

2. Molar mass $\text{NH}_4\text{Cl} = 53.5$

3. Mass $\text{NH}_4\text{Cl} = 0.05 \times [14 + 4 + 35.5] \text{ g} // 2.9 \text{ g}$

13
TOTAL 20

- 8 (a) pH value of X (KOH solution) is **higher** than Y.
 X is a **strong** alkali // Y (NH₃ solution) is a weak alkali
 X **completely** ionises / Y partially ionises in water
 X has a **higher** concentration of hydroxide/OH⁻ ion // Y has a lower concentration of hydroxide/OH⁻ ion

1
1
1
1.....4

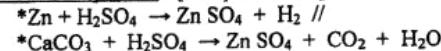
- (b) Add [*suitable metal*/metal carbonate**] into the acid

1

Bubbles released

1

Chemical equation : [Sample answer]



1+1...4

- (c) (i) 1 mole of ethanoic acid produce 1 mole of H⁺ ion when ionises in water // CH₃COOH → CH₃COO⁻ + H⁺

1
1.....2

- (ii) Without water, glacial ethanoic acid does not ionise, no hydrogen ion, H⁺ produced // Glacial ethanoic acid exists as **molecules**. In the present of water in aqueous solution, ethanoic acid will **ionise** to produce hydrogen ion, H⁺.

1
1.....3

(d)

$$\begin{aligned} \text{Number of mole of H}_2\text{ gas} &= \frac{48 / 1000}{24} \\ &= 0.002 \text{ mol} \end{aligned}$$

1

From the given equation ;

1 mol of H₂ gas produced by 2 mol of HCl

Therefore ;

0.002 mol of H₂ gas produced by 0.004 mol of HCl

1

$$\begin{aligned} \text{Concentration of HCl} &= \frac{0.004}{50.0/1000} \\ &= 0.08 \text{ mol dm}^{-3} \end{aligned}$$

1.....3

1. SO₂ dissolve in rain water to produce acid rain // SO₂ + H₂O → H₂SO₃
2. Corrodes the buildings / metal structure
3. Acid rain flow into rivers / lakes, rivers / lakes become acidic / Aquatic organism / fish die
4. pH of the soil decreases / destroys trees

1
1
1
1.....4

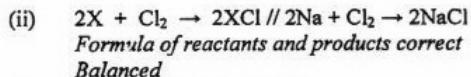
TOTAL 20

Section C

- 9 (a) (i) Element X : Sodium
 Element Y : Potassium

1

1



1

1.....4

- (b) (i) 1. Y more reactive than X
 2. X oxide / Y oxide formed
 3. The solution is alkali.
 Y more reactive than X
 Atomic size Y bigger than X//Valence electron further away from the nucleus
 Valence electron to be more weakly pulled by the nucleus
 Electron can be released more easily

Max 2....2

1

- (ii) Material and apparatus:
 Metal X / sodium , metal Y/potassium , distilled water, water trough /basin ,knife, forceps

1

Procedure

- 1 Metal X / sodium is cut out using a knife.
- 2 The oil on the surface of metal X / sodium is removed using a piece of filter paper
- 3 Metal X/sodium is placed onto the water surface in a water trough
- 4 with the help of forceps
- 5 All changes that occur are recorded
- 6 Steps 1 to 5 is repeated using metal Y/potassium

1

1

1

1

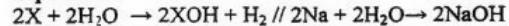
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Tabulation of data

Metal /element	Observation
X/sodium	X/sodium moves rapidly and randomly on the water surface.
Y/potassium	Y/potassium moves very rapidly and randomly on the water surface.

1

Equation



1

Formula of reactants and products correct

1.....10

Balanced

TOTAL 20

(c) Alternatif for (c)**Material and apparatus:**

Metal X / sodium , metal Y/potassium , chlorine gas, gas jar ,knife, Forceps, Bunsen burner, gas jar spoon.

1

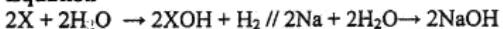
Procedure

- 1 Metal X / sodium is cut out using a knife 1
- 2 The oil on the surface of metal X/ sodium is removed using a piece of filter paper 1
- 3 Metal X/sodium is heated in a gas jar spoon until it starts to burn 1
- 4 The gas jar spoon is quickly lowered into a gas jar filled chlorine gas 1
- 5 All changes that occur are recorded 1
- 6 Steps 1 to 5 is repeated using metal Y/potassium 1

Tabulation of data

Metal /element	Observation
X/sodium	X/sodium burns rapidly and brightly with a yellow flame
Y/potassium	Y/potassium burns very rapidly and brightly with a lilac flame

1

Equation

Formula of reactants and products correct

1

Balanced

1

- 10 (a) The temperature in a refrigerator is lower than kitchen cabinet
 Bacteria activity in a refrigerator is lower //
 Less toxin is produced by bacteria
 Rate of food spoilage is lower

1
 1
 1.....3

- (b) (i) Change in volume of H_2 gas per unit time

1

- (b) (ii) Comparing Experiment I and Experiment II
 Rate of reaction in Experiment II is higher than Experiment I.
 Size of zinc in experiment II is smaller //
 Total surface area of zinc in experiment II is higher
 Frequency of collision between H^+ and zinc atom increases.
 Frequency of effective collision between the particles increases.

1
 1
 1
 1
 1

Comparing Experiment II and Experiment III

- Rate of reaction in Experiment III is higher than Experiment II.
 HCl in experiment III has higher concentration
 Number of H^+ per unit volume is higher
 Frequency of effective collision between H^+ and zinc atom increases.

1
 1
 1
 1.....8

(c) Condition :

- Add catalyst/CuSO₄ solution //
 Increases the temperature of reaction/temperature higher than 30°C//

1

Procedure :

1. A burette filled with water is inverted over water in a basin and clamped vertically using a retort stand. 1
 2. The initial burette reading is recorded. 1
 3. Add zinc powder into a conical flask. 1
 4. 20 cm³ of 1 mol dm⁻³ hydrochloric acid is measured using a measuring cylinder and poured into the conical flask. 1
 5. Add catalyst/ CuSO₄ solution into the conical flask // Heat the conical flask 1
 6. The conical flask is closed immediately with a stopper fitted with a delivery tube. At the same time, a stopwatch is started. 1
 7. The volume of hydrogen gas released is collected in the burette. 1
 8. The burette reading is recorded at regular intervals of $\frac{1}{2}$ -minute (30 seconds). 1
- 1...max8