

Name :

Class :

CONFIDENTIAL

4541/3

Chemistry

Paper 3

September

2010

1½ hours



MAKTAB RENDAH SAINS MARA
SIJIL PELAJARAN MALAYSIA
TRIAL EXAMINATION
2010

CHEMISTRY

Paper 3

One hour and thirty minutes

DO NOT OPEN THIS QUESTION BOOKLET UNTIL BEING TOLD TO DO SO

1. Write down your name and class in the space provided
Tuliskan nama dan kelas anda pada ruang yang disediakan.
2. The question booklet is bilingual.
Buku soalan ini adalah dalam dwibahasa.
3. Candidates are required to answer all questions.
Calon dikehendaki menjawab semua soalan

<i>For Examiner's Use</i>		
Question	Full Mark	Mark
1	33	
2	17	
Total	50	

This question booklet contains 12 printed pages including the front page.

[See Next Page

1 An experiment was carried out to construct an ionic equation for the precipitation of silver chloride according to the following steps:

Satu eksperimen telah dijalankan untuk membina persamaan ion bagi pemendakan argentum klorida mengikut langkah berikut:

Step I : 5.00 cm³ of 1.0 mol dm⁻³ potassium chloride solution was poured into 7 test tubes labelled P, Q, R, S, T, U, and V.

Langkah I : 5.00 cm³ larutan kalium klorida 1.0 mol dm⁻³ dimasukkan ke dalam 7 tabung uji berlabel P, Q, R, S, T, U dan V.

Step II : 1.00 cm³ of 1.0 mol dm⁻³ silver nitrate solution was added to test tube P from a burette.

Langkah II : 1.00 cm³ larutan argentum nitrat 1.0 mol dm⁻³ ditambah ke dalam tabung uji P menggunakan buret.

Step III : Step II was repeated for test tubes Q, R, S, T, U, and V using different volumes of silver nitrate solution. Diagram 1 shows the initial and final burette readings.

Langkah III : Langkah II diulangi bagi tabung uji Q, R, S, T, U dan V menggunakan isipadu larutan argentum nitrat yang berlainan. Rajah 1 menunjukkan bacaan awal dan akhir buret.

Step IV : All the test tubes were put in the rack to allow silver chloride precipitate to settle.

Height of precipitate formed is recorded in Table 1.

Langkah IV : Semua tabung uji diletakkan di atas rak supaya argentum klorida termendak. Ketinggian mendakan dicatat dalam Jadual 1.

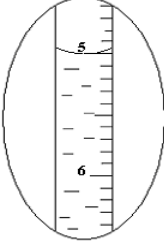
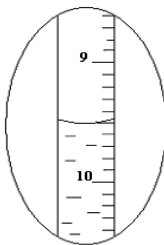
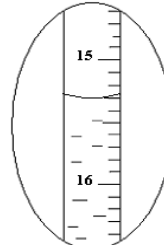
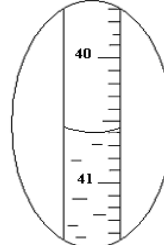
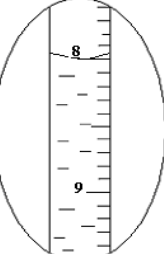
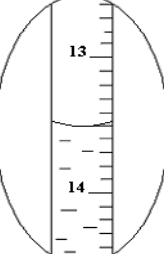
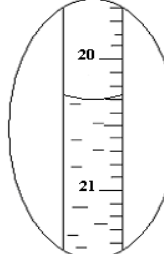
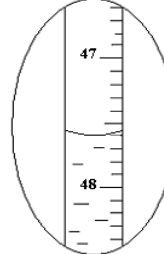
Test tubes Tabung uji	R	S	T	V
Initial reading Bacaan awal				
 cm ³ cm ³ cm ³ cm ³
Final reading Bacaan akhir				
 cm ³ cm ³ cm ³ cm ³

Diagram 1
Rajah 1

Test tube <i>Tabung uji</i>	P	Q	R	S	T	U	V
Volume of silver nitrate/ cm ³ <i>Isipadu argentum nitrat / cm³</i>	1.00	2.00				6.00	
Height of precipitate/ cm <i>Ketinggian mendakan / cm</i>	1.0	2.0	3.0	4.0	5.0	5.0	5.0

Table 1
Jadual 1

- (a) Record the burette readings in the spaces provided in Diagram 1.
Rekodkan bacaan buret pada ruang yang disediakan dalam Rajah 1.

[3 marks]
[3 markah]

1(a)

- (b) Complete Table 1.
Lengkapkan Jadual 1.

[3marks]
[3 markah]

1(b)

- (c) (i) State the variables involved in this experiment.
Nyatakan pembolehubah yang terlibat dalam eksperimen ini.

Manipulated variable
Pembolehubah dimanipulasikan:

.....

Responding variable
Pembolehubah bergerak balas:

.....

Constant variable
Pembolehubah dimalarkan:

.....

[3marks]
[3markah]

1(c)(i)

- (ii) State the hypothesis for the experiment.
Nyatakan hipotesis untuk eksperimen ini.

.....

.....

.....

[3marks]
[3 markah]

1(c)(ii)

- (d) Based on Table 1, plot a graph of height of precipitate against volume of silver nitrate solution on the graph paper provided on page 5.
Berdasarkan Jadual 1, plotkan graf ketinggian mendakan melawan isipadu larutan argentum nitrat yang digunakan pada kertas graf di muka surat 5.

[3marks]
[3 markah]

1(d)

- (e) State what is observed regarding the height of the precipitate.
Nyatakan apa yang diperhatikan tentang ketinggian mendakan.

.....
.....
.....

[3marks]
[3 markah]

1(e)

- (f) (i) On the graph in (d), mark and write the minimum volume of silver nitrate solution needed for complete reaction with 5.00 cm³ of 1.0 mol dm⁻³ potassium chloride solution.
Pada graf di (d), tanda dan tuliskan isipadu larutan argentum nitrat yang diperlukan untuk bertindak balas lengkap dengan 5.00 cm³ larutan kalium klorida 1.0 mol dm⁻³

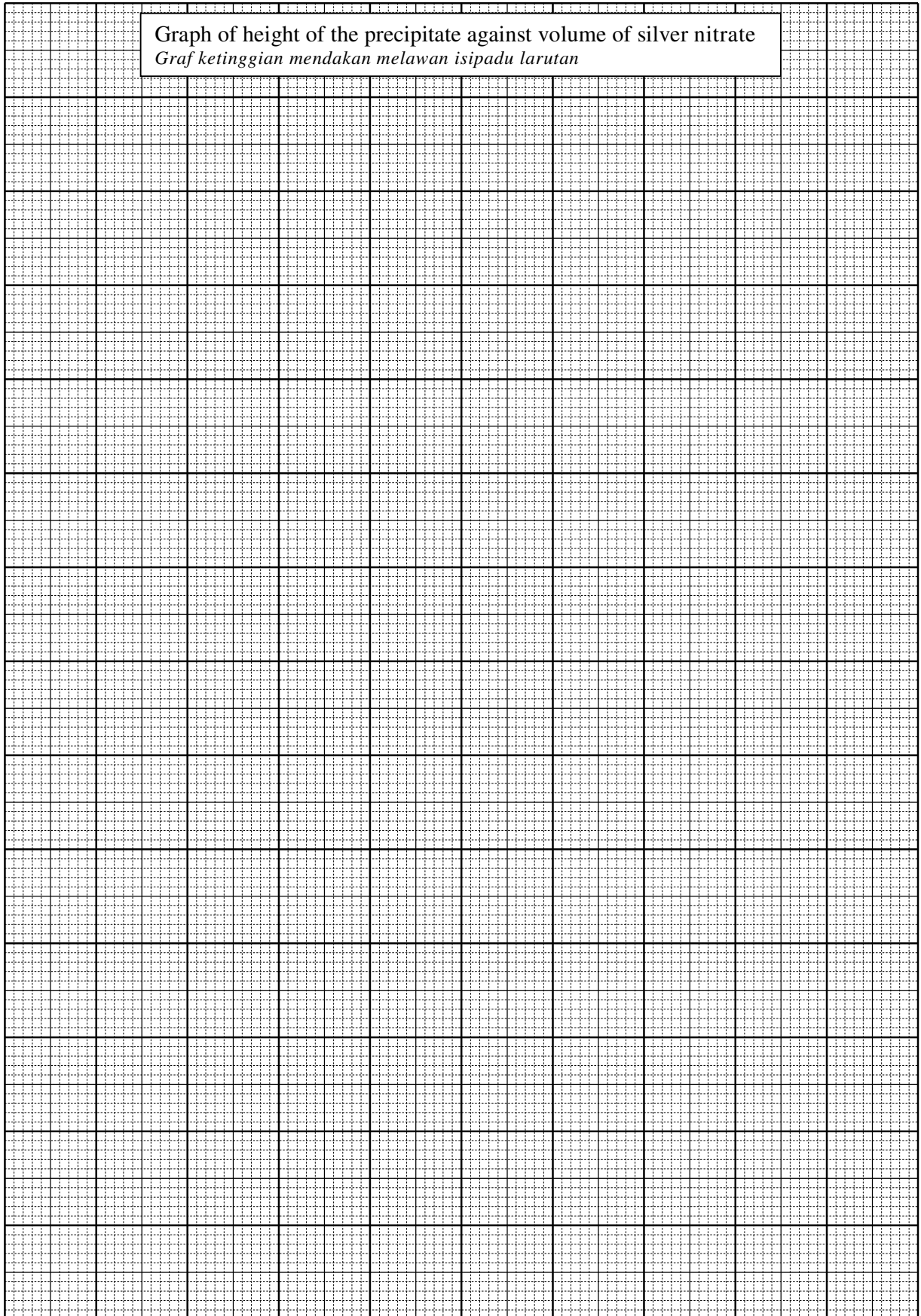
[3marks]
[3 markah]

1(f)(i)

- (ii) Using the volume obtained in (f)(i), calculate the number of moles of silver ions and chloride ions used.
Then calculate the number of moles of chloride ions that will react with 1.0 mole of silver ions.
*Menggunakan isipadu di (f)(i), hitung bilangan mol ion argentum dan ion klorida yang digunakan.
Kemudian, hitungkan bilangan mol ion klorida yang akan bertindak balas dengan 1.0 mol ion argentum.*

[3marks]
[3 markah]

1(f)(ii)



(iii) Write the ionic equation for the precipitation of silver chloride.
Tuliskan persamaan ion untuk pemendakan argentum klorida.

.....

[3marks]
[3 markah]

1(f)(iii)

(g) Give the operational definition for double decomposition reaction.
Berikan definisi secara operasi bagi tindak balas penguraian gandadua.

.....

.....

[3marks]
[3 markah]

1(g)

(h) Classify the ions found in silver nitrate solution and potassium chloride solution into anions and cations.
Kelaskan ion-ion yang terdapat dalam larutan argentum nitrat dan kalium klorida kepada anion dan kation.

[3marks]
[3 markah]

1(h)

- 2 Diagram 2 shows a galvanised zinc roof which is made from iron coated by zinc layer and a food can made from iron coated by tin layer. Both galvanised zinc roof and food can are not easily corroded.

Rajah 2 menunjukkan atap zink galvani diperbuat daripada besi yang disadurkan dengan lapisan zink dan tin makanan yang disadurkan dengan lapisan timah. Kedua-dua atap zink galvani dan tin makanan tidak mudah berkarat.

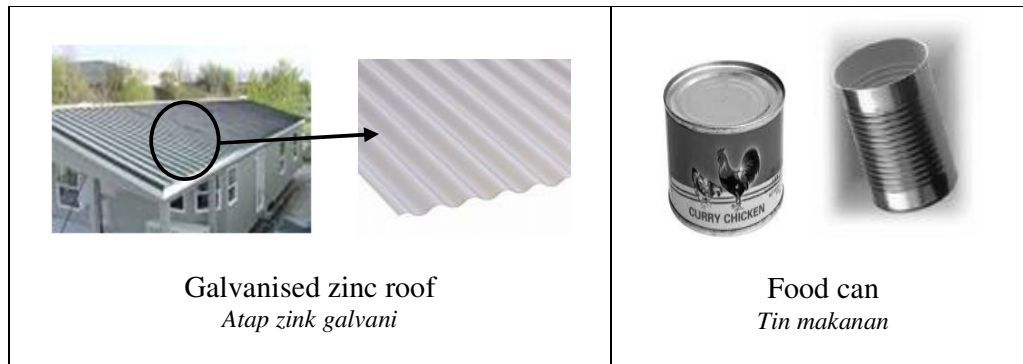


Diagram 2
Rajah 2

Referring to the above example, plan a laboratory experiment to investigate the effect of other metals on the rusting of iron.

You are given iron nails, magnesium ribbon, zinc strip, copper strip and tin strip.

Merujuk kepada contoh di atas, rancang satu eksperimen dalam makmal untuk mengkaji kesan logam lain terhadap pengurangan besi.

Anda dibekalkan dengan paku besi, pita magnesium, kerajang zink, kerajang kuprum dan kerajang stanum.

Your planning should include the following:

Perancangan anda haruslah mengandungi perkara-perkara berikut :

- (a) Statement of problem
Pernyataan masalah
- (b) All the variables
Semua pembolehubah
- (c) Statement of hypothesis
Pernyataan hipotesis
- (d) List of substances and apparatus
Senarai bahan dan alat radas
- (e) Procedure of the experiment
Prosedur eksperimen
- (f) Tabulation of data
Penjadualan data

[17 marks]

[17 markah]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

SUGGESTED ANSWERS

1 (a)

Test tube	R	S	T	V
Final burette reading (cm ³)	8.00	13.50	20.30	47.60
Initial burette reading (cm ³)	5.00	9.50	15.30	40.60
Volume of AgNO ₃ solution (cm ³)	3.00	4.00	5.00	7.00

(b)

Test tube	P	Q	R	S	T	U	V
Volume of AgNO ₃ solution (cm ³)	1.00	2.00	3.00	4.00	5.00	6.00	7.00
Height of precipitate (cm)	1.0	2.0	3.0	4.0	5.0	5.0	5.0

(c) (i) Manipulated variable: volume of silver nitrate solution

Responding variable : height of precipitate

Constant variable: volume of potassium chloride solution/ size of test tubes

(ii) Hypothesis:

When the volume of silver nitrate solution increases, the height of precipitate formed increases until maximum and then becomes constant.

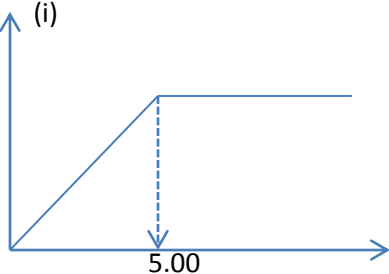
(d) Graph: 1. both X-axis and Y-axis are labeled with units

2. size of graph more than ½ page

Refer (e)

(e) the height of precipitate increases from test tube P to Q to R to S to T then becomes constant from test tubes T to U to V.

(f) (i)



(ii) No of mol of Ag⁺ ion = $1 \times 5 / 1000 = 0.005$ mol

No of mol Cl⁻ ion = $1 \times 5 / 1000 = 0.005$ mol

No of mol Cl⁻ ion reacts with 1 mol of Ag⁺ ion = 1 mol

(iii) Ionic equation : $\text{Ag}^+ + \text{Cl}^- \rightarrow \text{AgCl}$

(g) Operational Definition :

- When silver nitrate solution is added to potassium chloride solution ,
- a white precipitate is formed showing that
- double decomposition is a reaction in which there is an exchange of ions between 2 solutions
To form an insoluble salt

(h)

Cations	Anions
K^+, Ag^+	Cl^-, NO_3^-

2.

(a) Statement of problem

What is the effect of other metal in contact with iron in the rusting of iron?

(b) All the variables:

manipulated variable: Type of metal in contact with iron

Responding variable : rusting of iron

Constant variable: iron nail// jelly solution & potassium hexacyanoferrate(III) solution

(c) Statement of hypothesis

When iron is in contact with a more electropositive metal, the rusting of iron is inhibited//
when iron is in contact with a less electropositive metal, the rusting of iron is faster

(d) List of substances and apparatus

Substances: jelly solution, potassium hexacyanoferrate(III) solution, sand paper

Iron nail, magnesium ribbon, zinc strip, copper strip and tin strip

Apparatus: test-tubes and rack, dropper

(e) Procedure of the experiment

1. Clean 5 iron nails, magnesium ribbon, zinc strip, copper strip and tin strip with sand paper.
2. Pour a few cm^3 jelly solution into five test tubes followed by a few drops of potassium hexacyanoferrate(III) solution.
3. Coil 4 iron nails each with magnesium ribbon, zinc strip, copper strip and tin strip.
4. Put the 4 iron nails coiled with metals into 4 different test tube and another clean iron nail into the fifth test tube.
5. Leave the test tubes for a day.
6. The colour of the solution is recorded after one day.

(f) Tabulation of data

Test tubes	Observation
Iron nail coiled with magnesium	
Iron nail coiled with copper strip	
Iron nail coiled with zinc strip	
Iron nail coiled with tin strip	