Type of Salts

[SBPdiag06-07] Which of the following best defines the term 'salt'? [

A Formed when a hydrogen ion in an acid is replaced by a metal ion or ammonium ion
B Formed when a metal ion reacts with a non- metal ion
C That contains sodium ions and chloride ions
D It is salty in taste

[MRSM07-08] A salt always ..

A contains ions
B dissolves in water
C forms white crystals
D conducts electricity

[SBPtrial11-07] Which of the following is a salt and soluble in water?

A Sodium hydroxide
B Aluminium oxide
C Magnesium nitrate
D Calcium carbonate

[MRSM11-11] Which of the following is a soluble salt?

A Silver chloride
B Barium sulphate
C Potassium nitrate
D Copper(II) carbonate

[SBPtrial0-07] Which of the following salts is soluble in water?

A Zinc sulphate
B Silver chloride
C Barium sulphate
D Magnesium carbonate

[MRSM05-12] Which of the following salts is water soluble?

A Calcium sulphate
B Silver chloride
C Sodium carbonate
D Lead(II) sulphate

[MRSM07-07] Which of the following salt is soluble in water?

A Iron(II) sulphate
B Silver chloride
C Calcium carbonate
D Lead(II) bromide

[SBPTrial07-07] Which of the following is a soluble salt?

A Lead(II) iodide
B Copper(II) carbonate
C Barium sulphate
D Sodium hypochlorite

[SBPTrial07-21] Nitric acid will change to nitrate salt when hydrogen ions are replaced by

I copper ion
II hydroxide ion
III carbonate ion
IV ammonium ion

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

[SBPTrial08-07] Which of the following compounds is a soluble salt?

A Lead(II) iodide
B Barium sulphate
C Calcium chloride
D Magnesium carbonate

[SBPdiag07-05] Among the following salts, which is soluble in water?

A Barium sulphate
B Lead(II) chloride
C Zinc carbonate
D Lead(II) nitrate

[SBPdiag08-07] Which of the following statements is correct?

A All carbonate salts are soluble in water
B All chloride salts are soluble in water
C All nitrate salts are soluble in water
D All sulphate salts are soluble in water

[MRSM04-03] The following salts are soluble except ....

A copper(II) carbonate
B copper(II) nitrate
C copper(II) chloride
D copper(II) sulphate

[SBPTrial09-04] Which of the following salts is insoluble in water?

A Copper(II) sulphate
B Silver nitrate
C Lead(II) chloride
D Potassium iodide

[SBPmidYearF5-21] Which of the following is an insoluble salt?

A Silver nitrate
B Ammonium chloride
C Magnesium carbonate
D Zinc sulphate

Preparation of Soluble Salts

[SBPtrial11-20] Which of the following substances are suitable to prepare copper(II) chloride?

I Copper metal and hydrochloric acid
II Copper(II) nitrate and sodium chloride
III Copper(II) oxide and hydrochloric acid
IV Copper(II) carbonate and hydrochloric acid

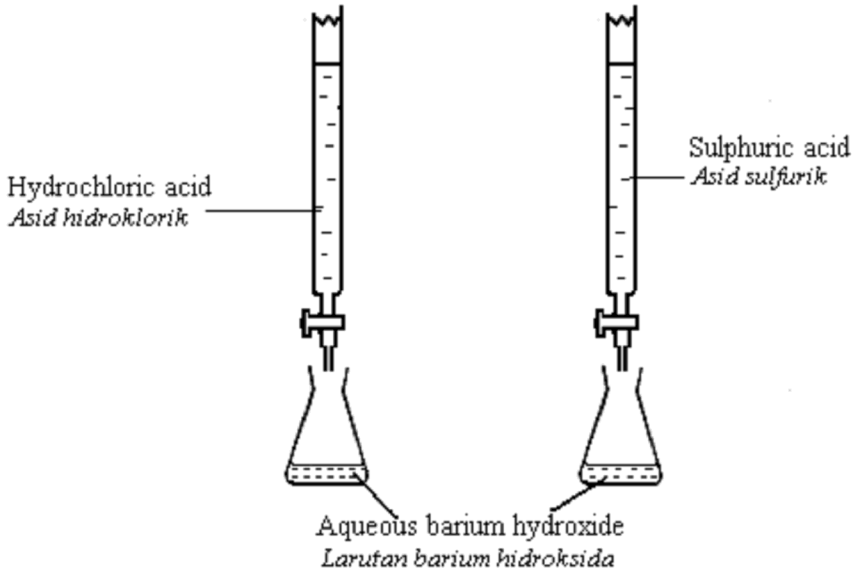
A I and II
B III and IV
C I, III and IV
D I, II, III and IV

[SBPtrial10-35] Which of the following reactions are suitable to prepare copper(II) sulphate?

I Copper and sulphuric acid
II Copper(II) oxide and sulphuric acid
III Copper(II) carbonate and sulphuric acid
IV Copper(II) chloride and sodium sulphate

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

[MRSM07-34] Diagram 21 shows apparatus set up used to prepare barium chloride and barium sulphate. In each experiment, the acid is run into the conical flask until the resulting liquid has pH 7.



What are the next steps to obtain samples of the solid salts?

	Barium chloride	**Barium sulphate**
A	Crystallisation	Crystallisation
B	Crystallisation	Filtration
C	Filtration	Crystallisation
D	Filtration	Filtration

Preparation of Insoluble Salts

[SBPdiag08-15] Insoluble salts can be prepared through

A Precipitation Reaction
B Neutralization Reaction
C Crystallization
D Recrystallisation

[SBPmidYearF5-11] What is precipitation reaction?

A One aqueous soluble salt and one insoluble salt are mixed to form an insoluble salt.
B One aqueous soluble salt and one insoluble salt are mixed to form soluble salt.
C Two different aqueous soluble salts are mixed to form an insoluble salt
D Two different aqueous soluble salts are mixed to form soluble salt.

[MRSM10-27] Diagram 6 shows the reaction of lead(II) nitrate with solution X.

Lead(II) nitrate solution + Solution X → White precipitate

Diagram 6

What is the solution X?

A Potassium iodide
B Sodium chromate
C Sodium chloride
D Potassium bromide

[MRSM04-05] Figure 3 shows the apparatus set – up for the separation of silver chloride salt from the mixture of reaction products.

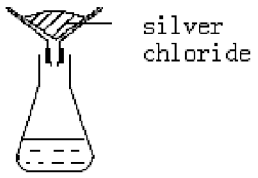


FIGURE 3

Which of the following reactants is most suitable for the preparation of silver chloride?

A Silver and hydrochloric acid
B Aqueous silver nitrate and aqueous sodium chloride
C Solid silver carbonate and hydrochloric acid
D Aqueous silver nitrate and sodium hydroxide

[MRSM09-27] Diagram 9 shows the formation of a white precipitate when solution J and solution K are mixed.

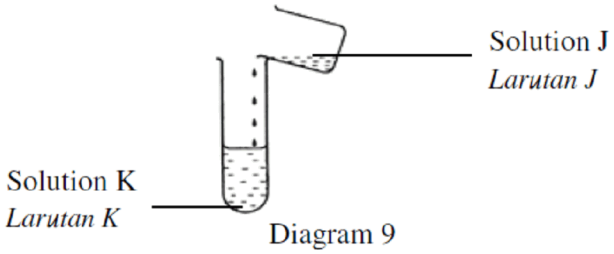


Diagram 9

Which of the following is the most suitable to be solution J and solution K?

I Sodium sulphate and lead (II) nitrate
II Sodium chloride and aluminium nitrate
III Sodium chloride and silver nitrate
IV Sodium nitrate and calcium chloride

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

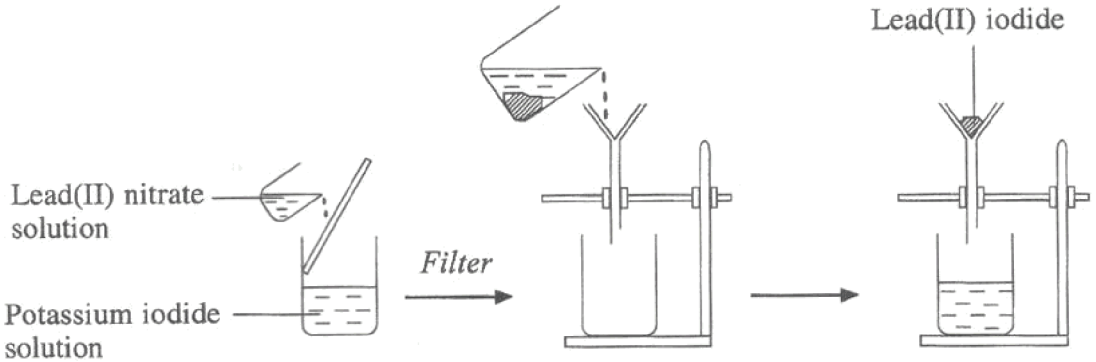
[MRSM07-07] Lead(II) iodide is formed when aqueous lead(II) nitrate is added to a solution containing iodide ions. What type of reaction takes place?

A Neutralisation
B Oxidation
C Reduction
D Precipitation

[SBPTrial08-31] Which of the following pairs of substances is most suitable to prepare copper(II) sulphate salt?

A Copper with dilute sulphuric acid
B Copper(II) chloride with dilute sulphuric acid
C Copper(II) carbonate with dilute sulphuric acid
D Copper(II) nitrate solution with sodium sulphate solution

[SPM06-27] Diagram 9 shows the set up of the apparatus of an experiment.



What is the process shown in Diagram 9?

A Preparation of insoluble salt
B Preparation of soluble salt
C Purification of insoluble salt
D Purification of soluble salt

[SBPdiag07-45] Which pair of solutions when combined will produce an insoluble salt?

A Nitric acid and potassium carbonate
B Barium chloride and sodium sulphate
C Sulphuric acid and sodium hydroxide
D Hydrochloric acid and magnesium nitrate

[SBPmidYearF508-08] Which of the following salts is prepared through precipitation process?

A Lead(II) chromate(VI)
B Ammonium chloride
C Potassium carbonate
D Barium chloride

[MRSM06-27] Which of the following equation represents the most suitable reaction to prepare an insoluble salt?

A	$Pb(OH)_2$	+	2HCl	-- >	$PbCl_2$	+	$2H_2O$
B	Pb	+	H_2SO_4	-- >	$PbSO_4$	+	H_2
C	$AgNO_3$	+	NaCl	-- >	AgCl	+	$NaNO_3$
D	CaO	+	H_2SO_4	-- >	$CaSO_4$	+	H_2O

[SBPmidYearF508-49] Which of the following reactions represent the precipitation reactions?

I	$Pb(NO_3)_2$ + Na_2SO_4	→	$PbSO_4$ + $2NaNO_3$
II	$Ba(NO_3)_2$ + 2KCl	→	$BaCl_2$ + $2KNO_3$
III	$Pb(NO_3)_2$ + 2KCl	→	$PbCl_2$ + $2KNO_3$
IV	$Ca(NO_3)_2$ + Na_2SO_4	→	$CaSO_4$ + $2NaNO_3$

A I and III only
B I, II and III only
C I, III and IV only
D 1, II, III and IV

[SPM10-29] Which equations represent double decomposition reactions that form a precipitate?

I	$CuSO_4$	+	Na_2CO_3	→	$CuCO_3$	+	Na_2SO_4
II	$CuSO_4$	+	$Mg(NO_3)_2$	→	$Cu(NO_3)_2$	+	$MgSO_4$
III	$AgNO_3$	+	NaCl	→	AgCl	+	$NaNO_3$
IV	$ZnCl_2$	+	Na_2SO_4	→	$ZnSO_4$	+	2NaCl

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

Test for salts

[SBPtrial10-34] The following information shows the

- Releases brown gas and a gas which lights up glowing splinter when heated strongly
- Residue after heating is brown when it is hot and yellow when it is cold

What is salt X?

A Zinc nitrate
B Zink carbonate
C Lead(II) nitrate
D Lead(II) carbonate

[SBPdiag07-40] Which of the following compound is wrongly matched to its colour?

	Compound	**Colour**
A	Copper(II) nitrate	Reddish
B	Copper(II) sulphate	Blue
C	Copper(II) carbonate	Green
D	Copper(II) oxide	Black

[SBPtrial11-33] Diagram 11 shows the apparatus set-up for the heating salt J.

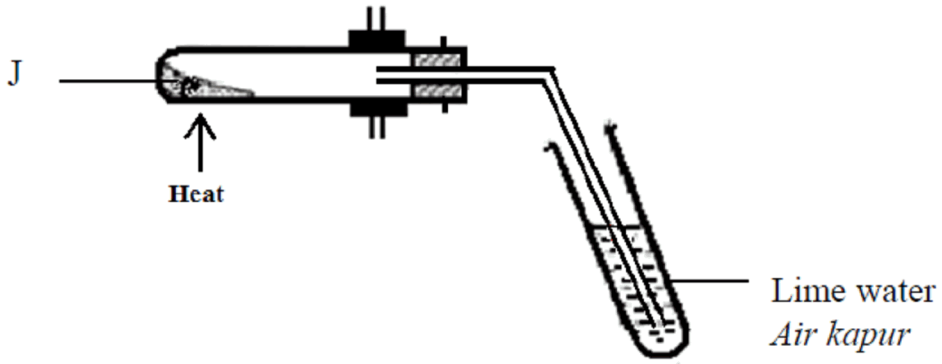


Diagram 11

When J is heated, the lime water become milky and the hot residue is brown but turns yellow on cooling. What is J?

A Lead(II) oxide
B Zinc carbonate
C Lead(II) carbonate
D Lead(II) nitrate

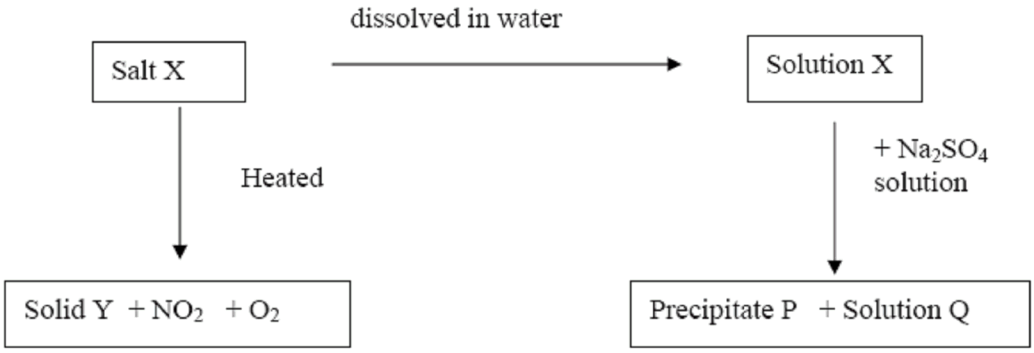
[SBPdiag06-39] A metal carbonate, XCO_3, is green in colour. When it is heated strongly, the remaining solid is black. Which of the following metals could be X?

A Zinc
B Lead
C Copper
D Aluminium

[SBPdiag07-10] A green solid is heated up strongly and the residue is black in colour. The solid is

A Sodium carbonate
B Lead(II) nitrate
C Iron(II) carbonate
D Copper(II) carbonate

[MRSM05-43] The flow chart shows the analysis process of salt X. The heating of salt X yields residue Y that is brown when hot and turns yellow when cold.



Which of the following pairs represent solid Y and precipitate P?

	Solid Y	**Precipitate P**
A	Lead(II) oxide	Lead(II) sulphate
B	Zinc oxide	Zinc nitrate
C	Zinc oxide	Zinc sulphate
D	Lead(II) oxide	Lead(II) nitrate

[MRSM09-42] Diagram 16 shows the observations of an experiment conducted on solution Z.

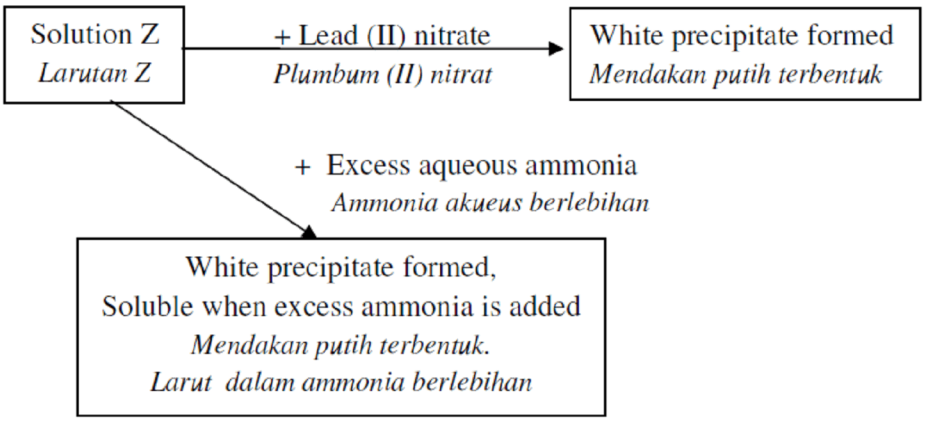


Diagram 16

From the observations, Z could be

A zinc sulphate
B calcium chloride
C magnesium nitrate
D aluminium sulphate

[SPM10-28] Table 5 shows the observations in three tests on solution X.

	Test	**Observation**
I	Add sodium hydroxide solution until in excess	White precipitate which dissolves in excess sodium hydroxide solution
II	Add ammonia solution until in excess	White precipitate which dissolves in excess sodium ammonia solution
III	Add 2 cm^2 of dilute nitric acid and few drops of silver nitrate solution	White precipitate formed

Table 5

What is X?

A Zinc chloride
B Zinc sulphate
C Aluminium chloride
D Aluminium sulphate

[MRSM03-30]

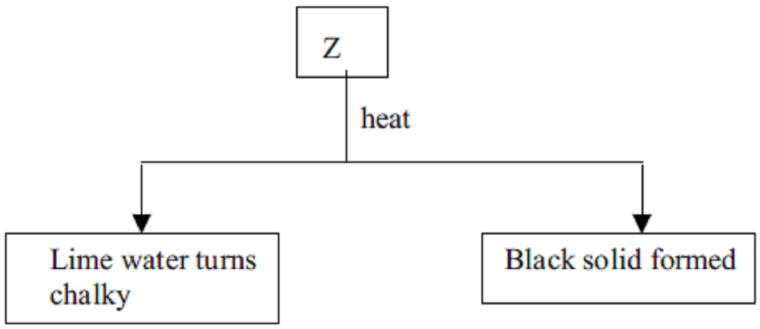


Figure 7

Figure 7 shows the results of the action of heat on solid Z. Which of the following represents solid z?

A Magnesium carbonate
B Copper carbonate
C Magnesium nitrate
D Copper nitrate

[SBPTrial09-20]Diagram 7 shows the set up of the apparatus for the action of heat on substance W.
After a few minutes lime water turns cloudy.

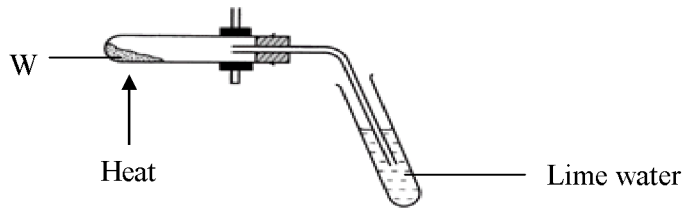


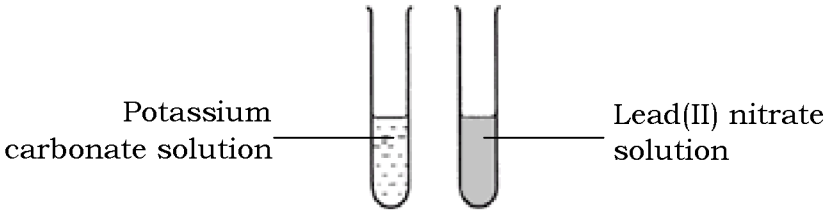
Diagram 7

Which of the following salts could be W?

I Lead(II) nitrate
II Zinc carbonate
III Copper(II) carbonate
IV Potassium carbonate

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

[SBPTrial07-33] The diagram below shows the test tubes containing lead(II) nitrate solution and potassium carbonate solution but without a label. Which of the following solutions can be used to distinguish both solutions?



I Sodium nitrate
II Sodium iodide
III Dilute nitric acid
IV Potassium sulphate

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

[SPM06-41] You are asked by your teacher to verify the cation and anion in a sample of ammonium chloride salt solution.
What substance can you use to verity the cation and anion?

	Cation	**Anion**
A	Nessler reagent	Dilute nitric acid and silver nitrate
B	Nessler reagent	Dilute hydrochloric acid and barium chloride
C	Potassium thiocyanate	Dilute nitric acid and silver nitrate
D	Potassium thiocyanate	Dilute hydrochloric acid and barium chloride

[MRSM07-44]44. Diagram 24 shows some reactions of a compound J.

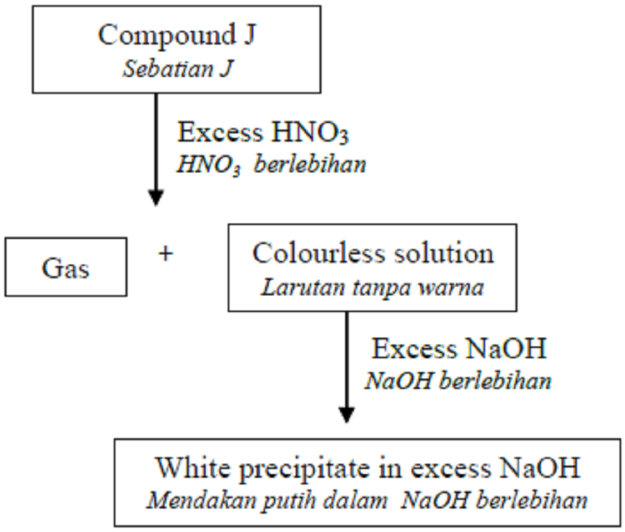


Diagram 24

What could compound J be?

A Aluminium carbonate
B Magnesium carbonate
C Copper(II) carbonate
D Zinc carbonate

[MRSM03-43]

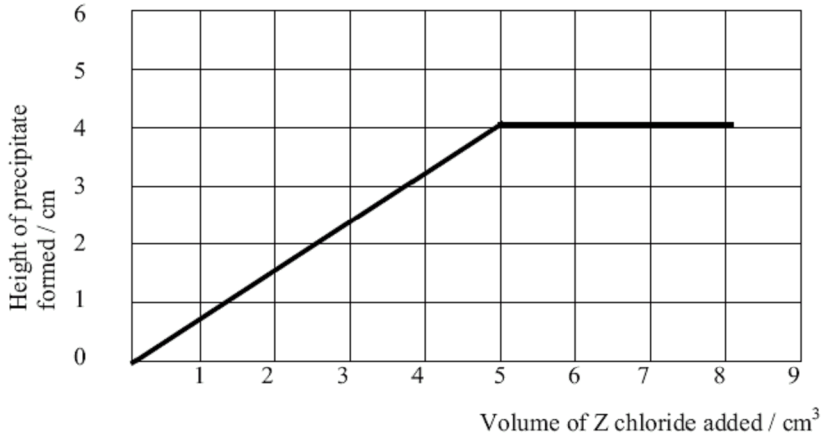


Figure 12

5.0 cm^3 of 0.5 mol dm^{-3} sodium sulphate solution was placed into eight different test tubes of the same size. Different volumes of 0.5 mol dm^{-} Z chloride solution was added to each test tube. The mixture was shaken and the height of the precipitate formed was measured after one hour. The result is shown in Figure 12.
What is the empirical formula of the precipitate formed?

A Z_2SO_4
B $Z(SO_4)_2$
C ZSO_4
D $Z_2(SO_4)_3$

[MRSM07-42] An experiment was carried out to determine the formula of a compound, M sulphate. 5 cm^3 of 0.2 mol dm^{-3} aqueous M nitrate is poured into 7 different test tubes. Different volumes of 0.1 mol dm^{-3} aqueous potassium sulphate, K_2SO_4 is added to each test tube. The height of white precipitate, M sulphate is recorded.

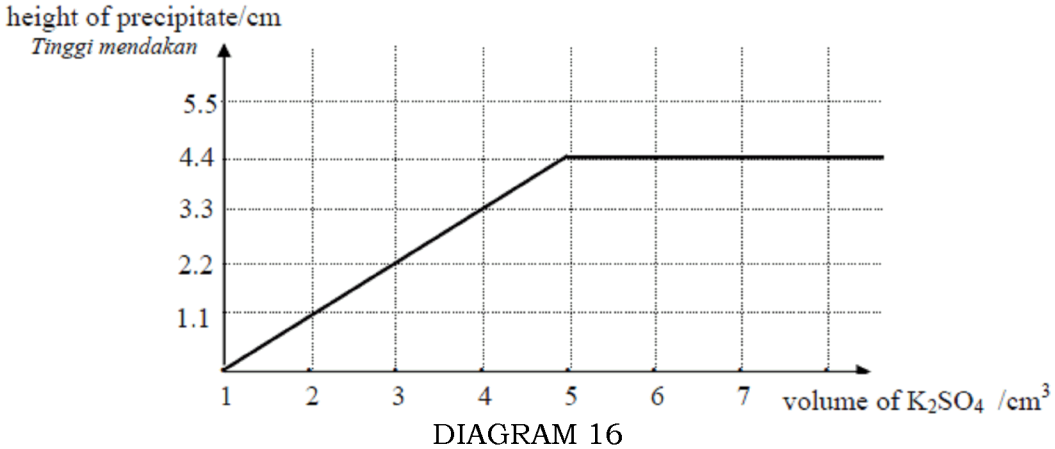


DIAGRAM 16

Diagram 16 shows the graph for height of precipitate against volume of 0.1 mol dm^{-3} potassium sulphate used.

What is the formula for M sulphate?

A MSO_4
B M_2SO_4
C $M_2(SO_4)_3$
D $M_3(SO_4)_2$

[SBPmidYearF5-49] You were asked by your teacher to verify the cation and anion in a sample of iron(II) chloride salt solution. What substance can you use to verify the cation and anion?

	Cation	**Anion**
A	Nessler reagent	Dilute nitric acid and silver nitrate
B	Nessler reagent	Dilute hydrochloric acid and barium chloride
C	Sodium hydroxide	Dilute nitric acid and silver nitrate
D	Sodium hydroxide	Dilute hydrochloric acid and barium chloride

Test for Cations - Salts

[SPM11-18] Which substance forms yellow precipitate when added to lead(II) nitrate solution?

A Sodium chloride
B Sodium carbonate
C Potassium iodide
D Potassium sulphate

[MRSM11-43] Table 8 shows the result of a series of tests carried out on a solution of salt G.

Test	**Observation**
Add dilute sulphuric acid	No changes
Add lead(II) nitrate solution , then heat it	White precipitate dissolves when heated.
Add sodium hydroxide solution until in excess	White precipitate is formed. It is insoluble in excess sodium hydroxide solution
Add ammonia solution until in excess	White precipitate is formed. It is insoluble in excess ammonia solution

Table 8

Based on the results of the experiment, what is salt G?

A Zinc chloride
B Magnesium sulphate
C Aluminium sulphate
D Magnesium chloride

[MRSM03-34]

Test	**Observation**
Solid K was heated	• A brown gas evolved
The gas evolved was tested using damp litmus paper and glowing splint	• The gas changed blue litmus paper to red • The gas evolved lights up the glowing splint • The residue was brown when hot, turned yellow when cold

Table 5

A test to identify a solid K is carried out as in Table 5. Which of the following ions may be found in solid K?

I Zn^{2+}
II Pb^{2+}
III CO_3^{2-}
IV NO_3^-

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

[SPM11-48] A student wants to identify cation that present in a salt solution. When sodium hydroxide solution is added into the salt solution, brown precipitate is formed.
What is the method that need to be done next and the observation expected to confirm the presence of the cation?

	Method	**Observation**
A	Warm up the solution	Gas released turns red litmus paper into blue
B	Heat up the solution	Gas released turns lime water chalky
C	Add potassium tiosianate solution	Red blood solution produced
D	Add acidic potassium manganate(VII)	Purple solution is decolourised

[MRSM05-26] The table shows the observation of the experiment on solution P.

Experiment	**Observation**
Add sodium hydroxide solution gradually until in excess	White precipitate formed and dissolved in excess sodium hydroxide solution
Add ammonia aqueous gradually until in excess	White precipitate formed and does not dissolved in excess ammonia aqueous

Possible cations for solution P are

I Mg^{2+}
II Zn^{2+}
III Al^{3+}
IV Pb^{2+}

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

[MRSM04-16] Which of the following ions will form precipitates that do not dissolve in excess aqueous ammonia?

I Copper(II) ions
II Aluminium ions
III Lead(II) ions
IV Zinc ions

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

[MRSM04-20] Excess powdered metal Z was added to aqueous copper(II) sulphate and stirred. After a few minutes, the solution turned colourless. Z could be

I Mg
II Ag
III Al
IV Zn

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

[SPM04-20] Which of the following ions form a white precipitate that dissolves in excess sodium hydroxide solution?

I Al^{3+}
II Mg^{2+}
III Pb^{2+}
IV Zn^{2+}

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

[SBPTrial08-18] Which of the following ions form a precipitate that dissolve in excess ammonia solution?

I Zn^{2+}
II Al^{3+}
III Pb^{2+}
IV Cu^{2+}

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

[SBPdiag07-15] The table below shows the results of qualitative analysis of a salt.

Qualitative analysis	Observation
Sodium hydroxide solution is added slowly until in excess.	White precipitate formed dissolves in excess sodium hydroxide solution.
Ammonia solution is mixed slowly until in excess.	White precipitate formed does not dissolve in excess ammonia solution.

Among the following ions, which may be present in the salt?

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

[SBPdiag08-47|SBPdiag06-46] When sodium hydroxide is added drop wise until in excess to a solution, a white precipitate which is soluble in excess is formed. The ions that could be present in the solution are

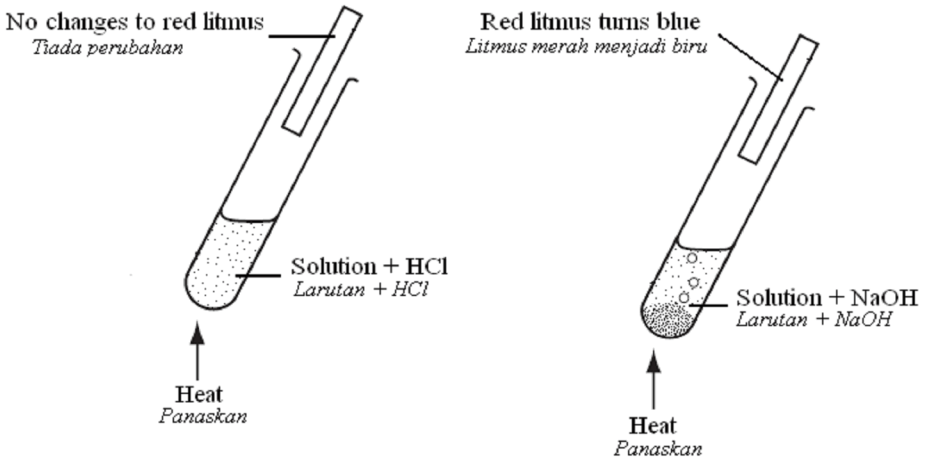
I Al^{3+}
II Zn^{2+}
III Mg^{2+}
IV Pb^{2+}

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

[SBPmidYearF508-18] Which of the following ions form a white precipitate that does not dissolves in excess sodium hydroxide solution but no change occur in aqueous ammonia solution?

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

[MRSM07-27] Diagram 15 shows how ion W in a solution can be identified.



What is ion W?

A NH_4^+ (aq)
B Al^{3+} (aq)
C NO_3^- (aq)
D SO_4^{2-} (aq)

[SBPdiag07-50] Pb^{2+} ion can be differentiated from Al^{3+} ion by using the following reagents **except**

A sodium hydroxide
B hydrochloric acid
C potassium iodide
D sodium sulphate

[SBPTrial09-33]Which of the following substances can be used to differentiate between sodium sulphate solution and sodium chloride solution?

A Dilute nitric acid
B Barium nitrate solution
C Potassium iodide solution
D Magnesium nitrate solution

[SBPdiag06-31] Which of the following ions would liberate a gas that turns damp red litmus paper blue when added with sodium hydroxide solution?

A H^+
B NH_4^+
C Zn^{2+}
D Fe^{2+}

[SBPdiag08-23] Which of the following ions would liberate a gas that turns damp red litmus paper blue when added with sodium hydroxide solution and then heated?

A H^+
B NH_4^+
C Zn^{2+}
D Fe^{2+}

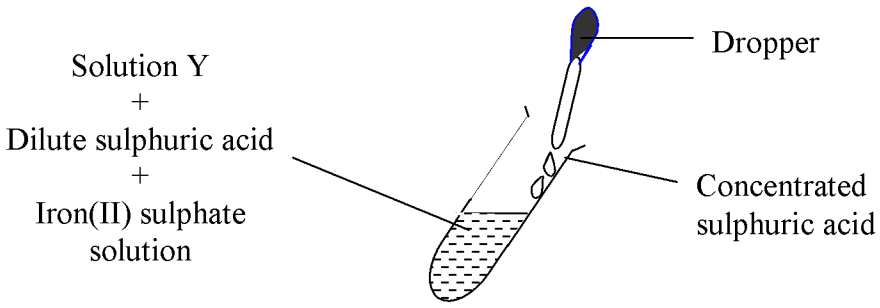
Test for Anion – Salts

[SBPdiag06-23] The diagram shows steps taken to test the presence of ion in the solution K

Dilute sulphuric acid
↓
Iron (II) sulphate
↓
A few drops of concentrated sulphuric acid
↓
Brown ring formed

Which of the following substances could be K?

A Magnesium nitrate
B Potassium chloride
C Sodium sulphate
D Sodium oxide



[SBPdiag07-30] Below is the diagram of set up of apparatus to verify the presence of an anion. What anion can be identified from this confirmatory test?

A Nitrate ion
B Sulphate ion
C Chloride ion
D Carbonate ion

Calculation involves Salts

[MRSM04–42] The reaction between lead(II) nitrate solution and potassium iodide solution can be represented by the following equation:

$$Pb(NO_3)_{2\,(ak)} + 2\,KI_{(ak)} \text{ -- > } PbI_{2\,(p)} + 2\,KNO_{3\,(ak)}$$

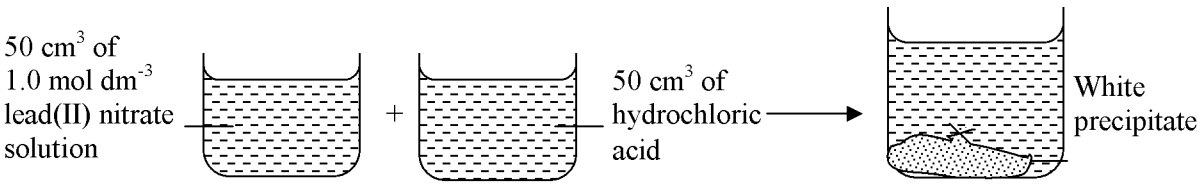
25.0 cm^3 potassium iodide solution 1.0 mol dm^{-3} is added to 25.0 cm^3 lead(II)nitrate solution 1.0 mol dm^{-3}. What is the maximum mass of lead(II) iodide produced in this reaction? [Relative Atomic Mass: I=127, Pb=207]

A 4.175 g
B 5.76 g
C 8.35 g
D 11.52 g

[SBPTrial07-46] 200 cm^3 of 0.1 mol dm^{-3} sodium chloride solution reacts completely with excess silver nitrate. Calculate the mass of precipitate produced.
[Relative atomic mass of: Ag, 108; Cl, 35.5]

A 2.78 g
B 2.87 g
C 3.78 g
D 3.87 g

[SBPTrial08-47] Diagram 16 shows the preparation of lead(I



What is the concentration of the hydrochloric acid needed to react completely with lead(II) nitrate solution?

A 0.5 mol dm^{-3}
B 1.0 mol dm^{-3}
C 1.5 mol dm^{-3}
D 2.0 mol dm^{-3}

[SBPtrial11-46] The following equation shows the reaction between silver nitrate and sodium chloride.

$$AgNO_{3(aq)} + NaCl_{(aq)} \rightarrow AgCl_{(s)} + NaNO_{3(aq)}$$

What is the mass of the insoluble salt produced when 50 cm^3 1.0 mol dm^{-3} silver nitrate reacts with 50 cm^3 2.0 mol dm^{-3} sodium chloride?
[Relative atomic mass : N = 14, O = 16, Na = 23, Cl = 35.5, Ag = 108]

A 8.50 g
B 4.25 g
C 7.175 g
D 14.35 g

[SBPTrial09-46] The following chemical equation shows the reaction between potassium iodide solution and lead(II) nitrate solution:

$$Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$$

Calculate the maximum mass of precipitate formed when excess potassium iodide solution is added to 50 cm^3 of 0.2 mol dm^{-3} lead(II) nitrate solution.
[Relative atomic mass: Pb=207, I=127, K=39, N=14, O=16]

A 1.01 g
B 2.02 g
C 4.61 g
D 9.22 g

[SBPmidYearF508-38] The reaction between lead(II) nitrate and potassium iodide solution is represented by the equation below

$$Pb(NO_3)_{2\,(aq)} + 2KI_{\,(aq)} \text{ -- > } PbI_{2\,(s)} + 2KNO_{3\,(aq)}$$

10.0 cm^3 of 1.0 mol dm^{-3} potassium iodide solution is mixed with 20.0 cm^3 of 1.0 mol dm^{-3} lead(II) nitrate solution.
What is the maximum mass of lead(II) iodide produced in this reaction?
[Relative atomic mass: I=127, Pb=207]

A 3.34 g
B 4.61 g
C 6.68 g
D 9.22 g

Structure {Paper02}

[MRSM10-04c]

(*c*) Diagram 4.2 shows a series of reaction to prepare zinc carbonate.

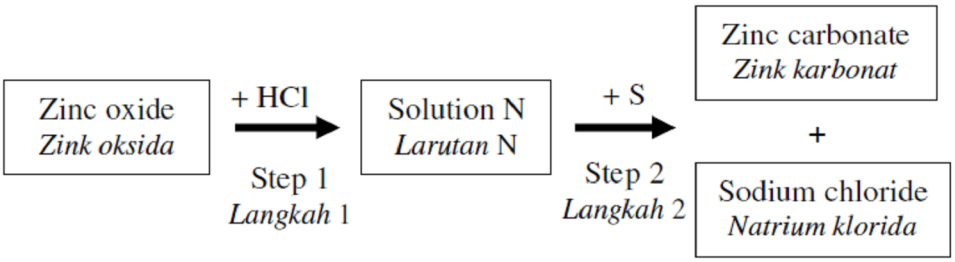


Diagram 4.2

(i) Name the following solutions: [2 *marks*]

N : .....

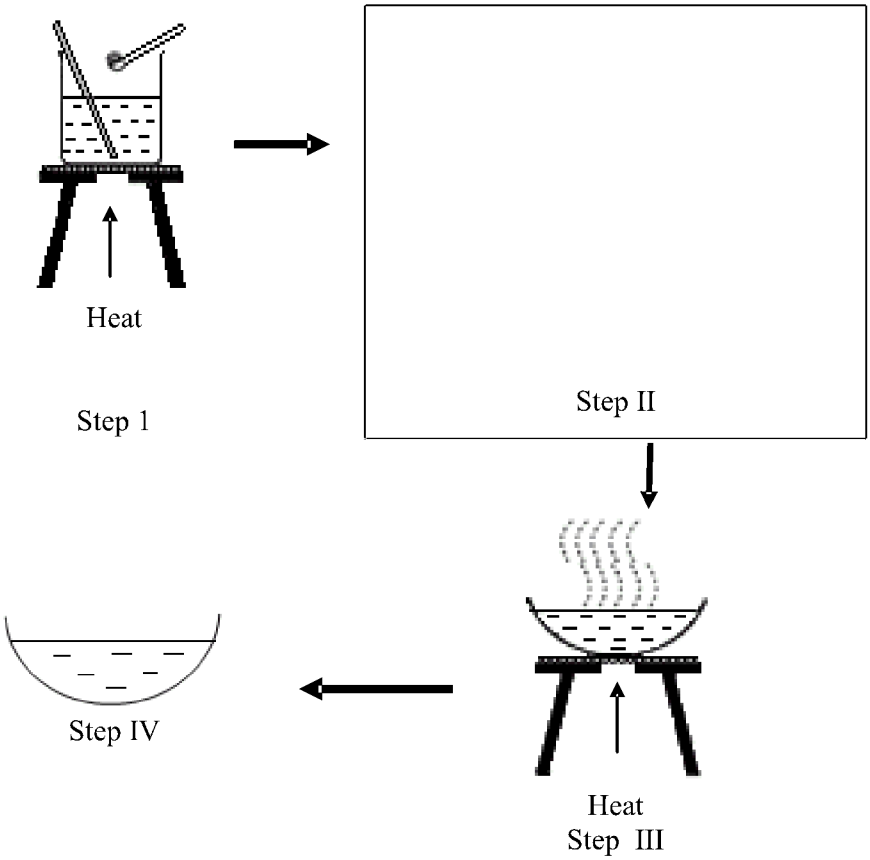
S : .....

(ii) State the type of reaction in Step 2. [1 *mark*]

.....

[MRSM08-03]

Diagram 3 shows the apparatus set-up for the preparation of zinc sulphate from zinc carbonate and an acid.



(a) What is meant by salt? [1M]

.....

.....

(b) (i) Draw the diagram for step II in the box provided. [2M]

(ii) What is the purpose of carrying out step II? [1M]

.....

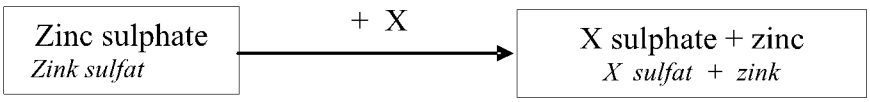
(c)(i)Name the acid used. [1M]

.....

(ii) Write the chemical equation for the reaction. [2M]

.....

(d) The chart shows the reaction of zinc sulphate and metal X.



(i) Suggest a name for metal X. [1M]

.....

(ii) What is observed when aqueous ammonia is added in excess to zinc sulphate solution? [2M]

.....

.....

[SPM04-05]

Diagram 5 shows Experiment I and II in the preparation of a salt.

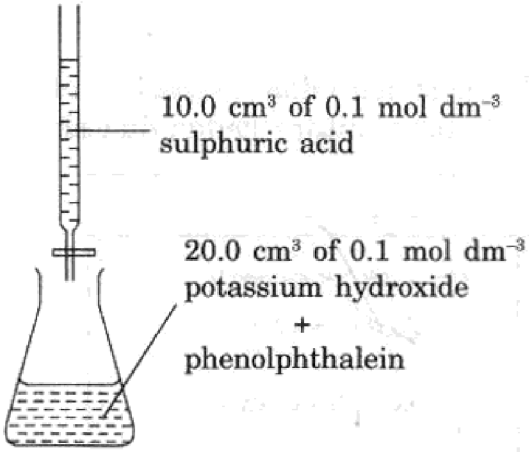
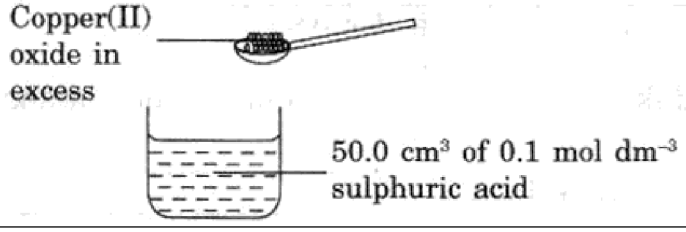
Experiment	Method
I	
II	

Diagram 5

(a) State one observation in Experiment I. [1M]

.....

(b) Based on Experiment II:
(i) State the reason why copper(II) oxide is added in excess. [1M]

.....

(ii) State how the excess copper(II) oxide powder can be separated from the products. [1M]

.....

(iii) State the chemical equation for the reaction that takes place in Experiment II. [1M]

.....

(iv) Calculate the maximum mass of the salt formed. [2M]
[Relative atomic mass of O=16, S =32 and Cu=64]

(c) Experiment I is repeated. Sulphuric acid is replaced by hydrochloric acid of the same concentration. Predict the volume of hydrochloric required for a complete reaction. [1M]

.....

(d) There are several steps in the preparation of the salts in each of the Experiments I and II. State one difference in the steps between the two experiments.

Experiment I	**Experiment II**

(e) (i) State the type of reaction in the preparation of salts in Experiments I and II. [1M]

.....

(ii) State one type of reaction in the preparation of a salt other than that in (e) (i). [1M]

.....

[SBPtrial09-04]

Diagram 4 shows Experiments I and II in the preparation of a salt.

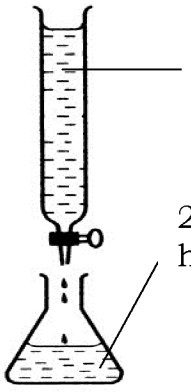
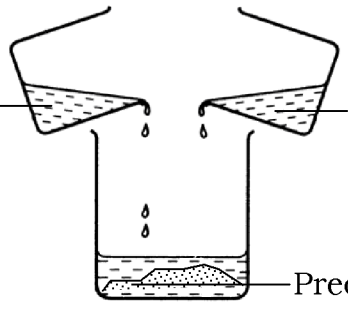
Experiment	**Method**
I	 0.1 mol dm^{-3} hydrochloric acid 25.0 cm^3 of 0.2 mol dm^{-3} sodium hydroxide + phenolphthalein
II	10 cm^3 of 1.0 mol dm^{-3} lead(II) nitrate solution  Excess potassium iodide solution Precipitate X

Diagram 4

(a) Based on Experiment I:

(i) State the name for the reaction. [1M]

.....

(ii) Write the chemical equation for the reaction that occurs in the conical flask.

.....

(iii) State the colour change in the conical flask at the end point.

.....

(iv) Calculate the volume of hydrochloric acid used to neutralise the sodium hydroxide solution. [2M]

(b) Based on Experiment II:

(i) State the name of the reaction. [1M]

.....

(ii) State the name of precipitate X. [1M]

.....

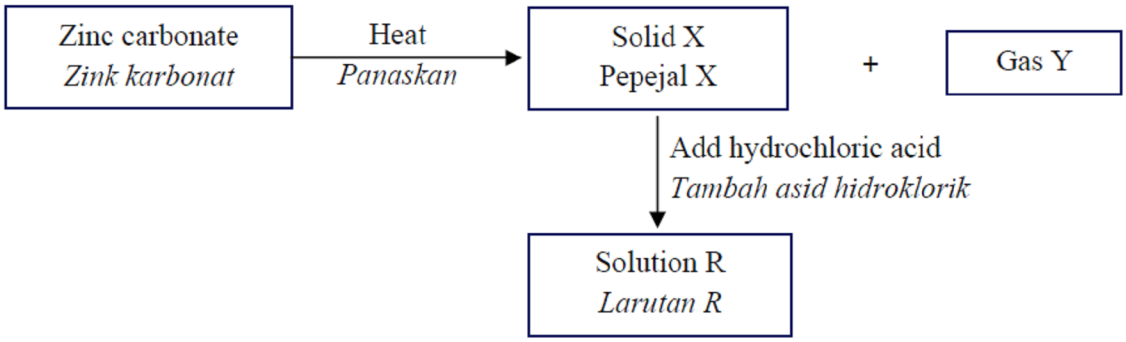
(iii) Write the ionic equation for the reaction.[1M]

.....

(iv) Calculate the maximum mass of precipitate X formed. [2M]
Relative atomic mass: Pb=207, I=127]

[SBPTrial10-04]

Diagram 4 shows the series of reactions that involve zinc compounds.



(a) Zinc carbonate is an insoluble salt. State two reactants that can be used to prepare zinc carbonate. [2 *marks*]

.....

.....

(b) (i) Solid X and gas Y are formed when zinc carbonate is heated strongly. State the name of solid X. [1 mark]

.....

(ii) Draw a labelled diagram to show the apparatus set-up for the heating of zinc carbonate. Show how the presence of gas Y is verified. [2 marks]

(c) Reaction between solid X and hydrochloric acid produced solution R.

(i) Write a chemical equation for the reaction. [2 marks]

.....

(ii) Describe how to obtain a dry crystal salt R from solution R. [3 marks]

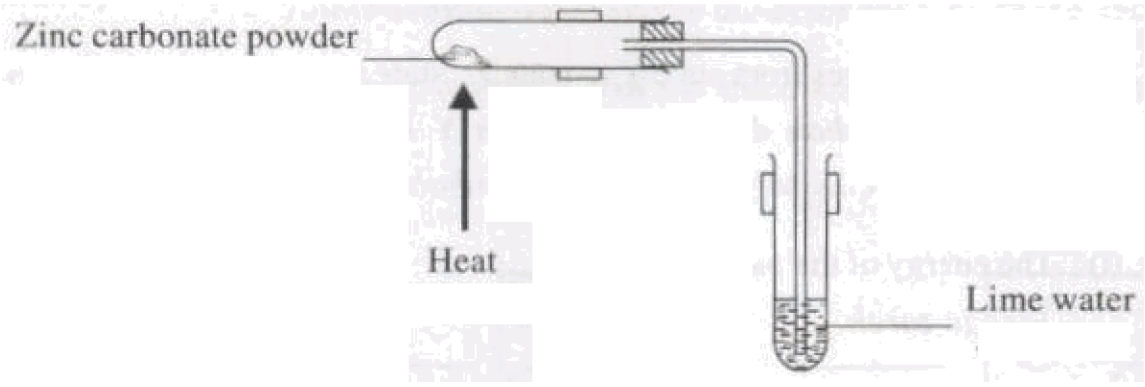
.....

.....

.....

[SPM10-02]

Diagram 2 shows the apparatus set-up for the heating of zinc carbonate, $ZnCO_3$ powder. The gas released from this experiment turned lime water chalky.



(a) Name the gas released in this experiment. [1M]

.....

(b) In table 2, state the colour of the residue of this experiment when it is hot and when it is cold. [2M]

Colour of residue	
Hot	Cold

Table 2

(c) Write a balanced chemical equation for this reaction. [1M]

.....

(d) 12.5 g of zinc carbonate, $ZnCO_3$ is heated during this experiment. Calculate the volume of gas released.
[RAM C=12, Zn=65, 1 mol of gas occupies 24 dm^3 at room conditions] [2M]

(e) The residue of this experiment is reacted with substance X to produce zinc chloride, $ZnCl_2$ solution.

(i) What is substance X? [1M]

.....

(ii) How many moles of ions in one mole of zinc chloride? [1M]

.....

(iii) State **one** cation present in zinc chloride solution. [1M]

.....

[SBPmidyearF507-05]

Figure 5 shows a series of changes involving solid W.

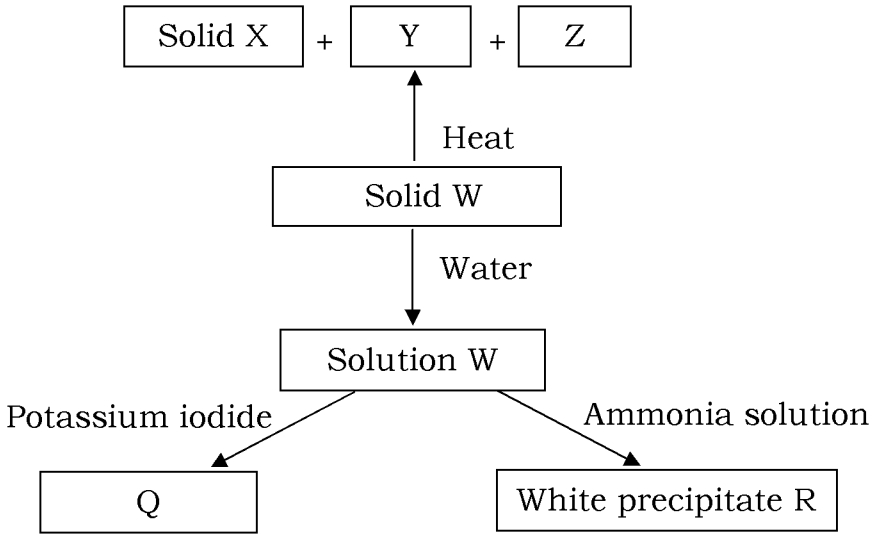


FIGURE 5

Gas Y is colourless. Gas Z is brown in colour. Solid X is brown in colour when hot and yellow in colour when cold.

(a) Identify: [3M]

(i) gas Y :.....

(ii) gas Z :.....

(iii) solid X :.....

(b) Describe a chemical test to identify the gas Y. [2M]

.....

.....

.....

(c) (i) Name the cation in solution W. [1M]

.....

(ii) Write the ionic equation for the reaction between solution W and ammonia solution. [1M]

.....

(iii) Name the white precipitate R. [1M]

.....

(d) In another experiment, potassium iodide solution is added to solution W.

(i) State what can be observed. [1M]

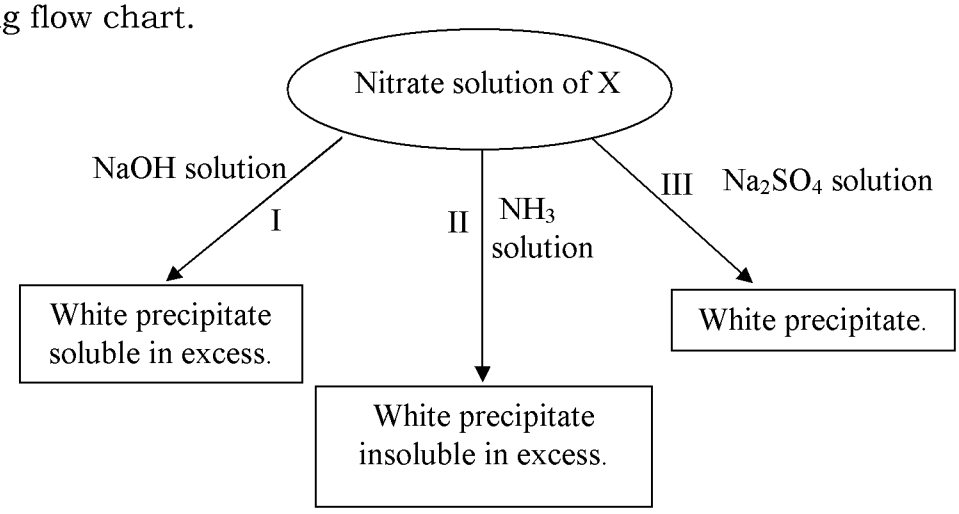
.....

(ii) Name the reaction that takes place in d (i). [1M]

.....

[SBPdiag07-06]

Three series of tests, I, II and III are carried out on a nitrate solution of X as shown in the following flow chart.



(a) List all the ions that can be identified from test I. [2M]

.....

(b) Name the nitrate solution of X and write its chemical formula.

.....

(c)Based on test III

(i) Name the type of reaction. [1M]

.....

(ii) Write the ionic equation. [1M]

.....

(d) Describe briefly a confirmatory test to verify the cation in the nitrate solution of X. [2M]

.....

.....

.....

(e) How do you obtain a dry sample of the white precipitate form in test III? [2M]

.....

.....

.....

.....

[SBPtrial05-03]

Figure 2 shows the series of reaction done by a student to determine compound J

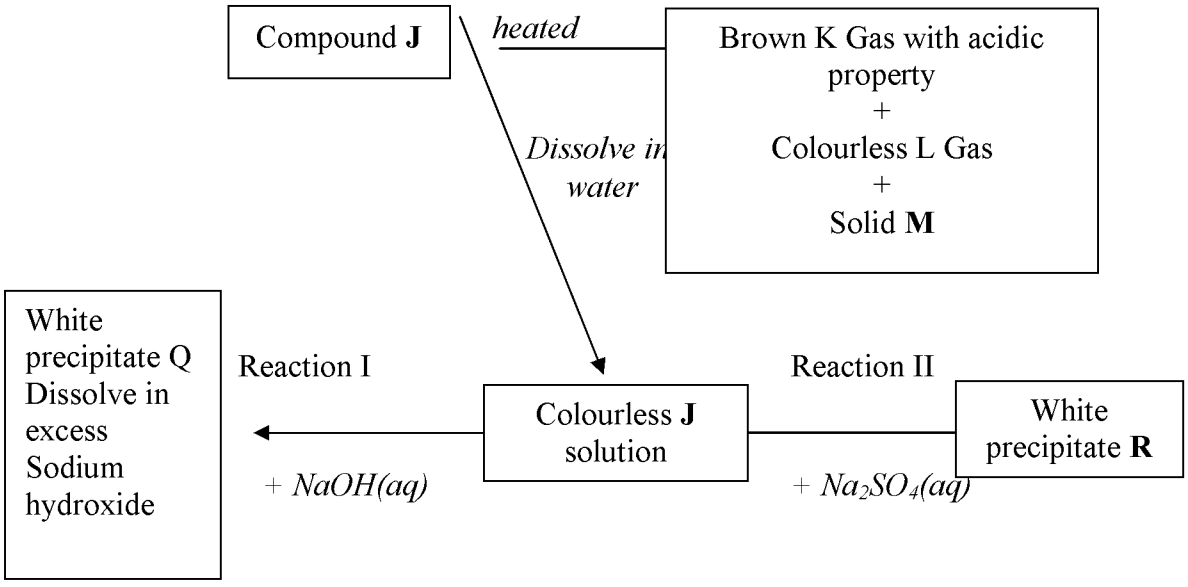


Figure 2

(a.) Name

(i) K Gas : ..... [1M]

(ii)L Gas : ..... [1M]

(b) Based on reaction I, J solution produces white precipitate Q which dissolves in excess sodium hydroxide solution. Write all the cations formulae that are expected to exist in J Solution. [1 M]

.....

(c) Based on reaction I and reaction II, name the cation exists in J solution. [1M]
Lead (II) ion

.....

(d) State the observation when the solid M is cooled. [1M]
Brown when hot, yellow when cool

.....

(e) Write the ionic equation for reaction to produce white precipitate R. [1M]

.....

(f) Name the compound J. [1M]

.....

(g) (i)write the equation for decomposition of compound J by heating process. [1M]

.....

(ii) Explain how to confirmatory test for L gas. [2M]

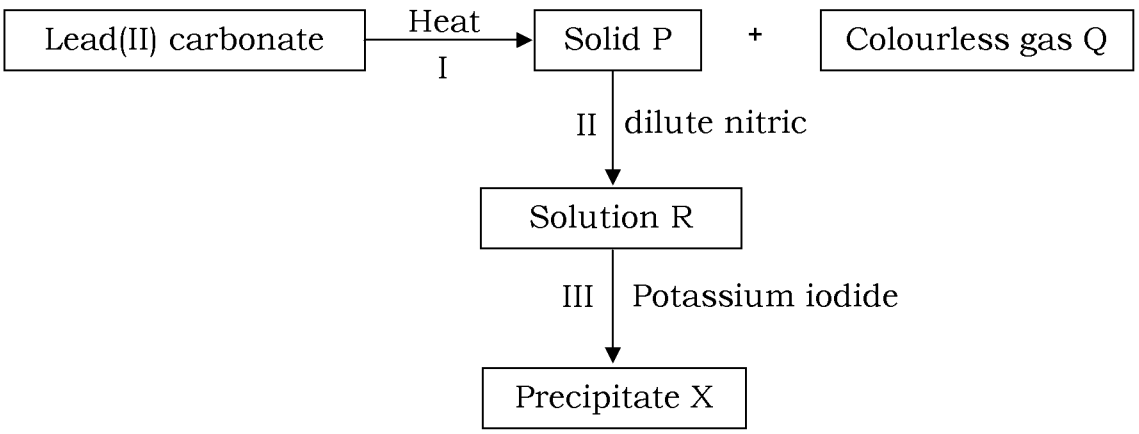
.....

.....

.....

[SBPtrial08-03]

Diagram 3 shows a series of reactions of lead(II) carbonate.



(a) (i) Name the solid P. [1M]

.....

(ii) Draw a labelled diagram of the setup of apparatus can be used to produce solid P and to identify gas Q in step I. [2M]

(iii) Write the chemical equation for the decomposition of lead(II) carbonate when heated. [1M]

.....

(iv) 13.35 g lead(II) carbonate is heated to decompose completely, calculate the volume of gas Q produced at room condition. [2M]
[Relative atomic mass: Pb=207, C=12, O=16 and 1 mol of gas occupies 24 dm^3 at room condition]

(b) (i) Name the precipitate X. [1M]

.....

(ii) State the colour of precipitate X. [1M]

.....

(iii) Write the ionic equation for the formation of precipitate X. [1M]

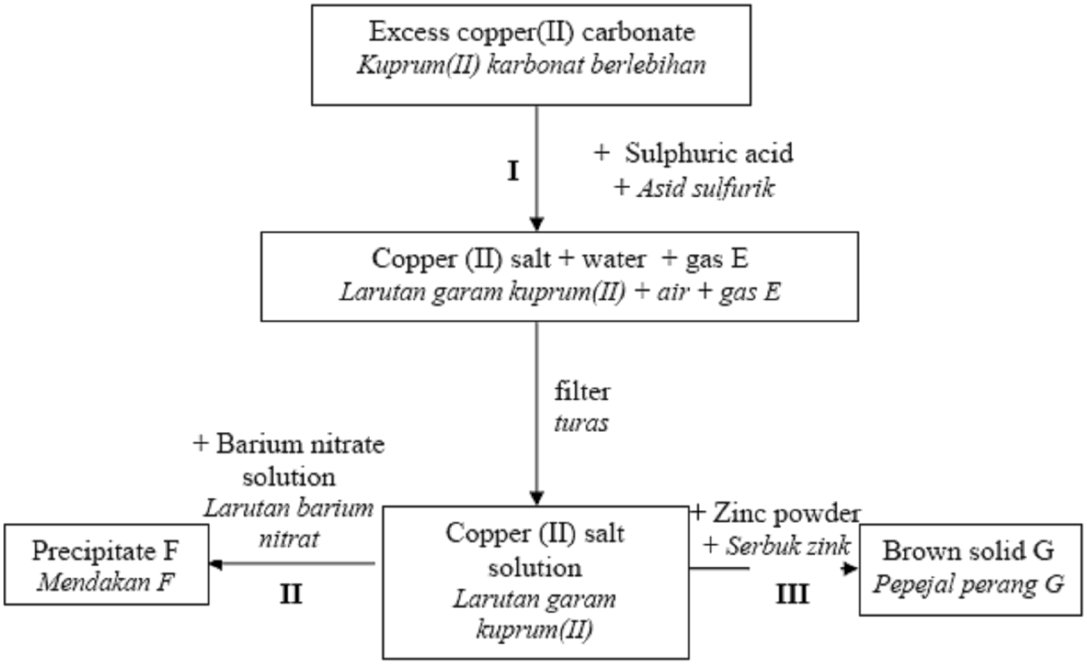
.....

(iv) How to obtain precipitate X from the mixture. [1M]

.....

[MRSM09-05]

The following flow chart shows the formation of a copper (II) salt solution and a series of its reactions.



(*a*) (i) State one observation in Reaction I. [1M]

.....

(ii) Name the copper(II) salt and gas E that are produced in Reaction I. [2M]

Copper(II) salt : .....

Gas E : .....

(*b*) (i) Name the process occurred in Reaction II to produce precipitate F. [1M]

.....

(ii) Write an ionic equation for the formation of precipitate F. [1M]

.....

(iii) If 0.02 mol of precipitate F is formed, calculate the volume of 0.5 mol dm^{-3} of barium nitrate solution used. [2M]

(*c*) Brown solid G is formed when zinc powder is added to copper(II) salt solution in Reaction III. Explain. [2M]

.....

.....

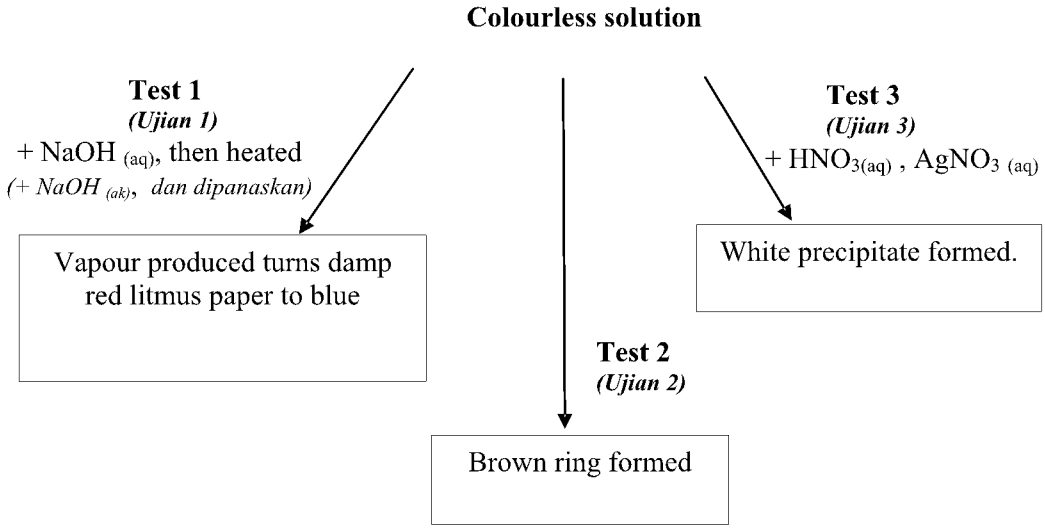
(*d*) State the observation when aqueous ammonia is added till excess to the copper(II) salt solution. [2M]

.....

.....

[MRSM07-03]

(a) Diagram 3 shows a series of tests performed on a colourless solution which contains one cation and two anions.



(i) Based on the observations in Diagram 3, complete the table below with appropriate inferences.[3M]

Test	**Inference**

(ii) Write an ionic equation for the reaction in Test 3.[1M]

.....

(b) A student wants to prepare a pure sample of crystalline zinc sulphate by reacting dilute sulphuric acid with substance X.

(i) Name the substance X.[1M]

.....

(ii) Write an equation for the above reaction.[1M]

.....

(iii) Calculate the maximum mass of zinc sulphate that can be prepared if 50.0 cm^3 of 0.2 mol dm^{-3} sulphuric acid is reacted with excess X. [3M]
[The relative formula mass of zinc sulphate = 161]

[MRSM04-04]

Diagram 3 shows a series of reactions for the production of magnesium nitrate and substance G with magnesium as the initial reactant.

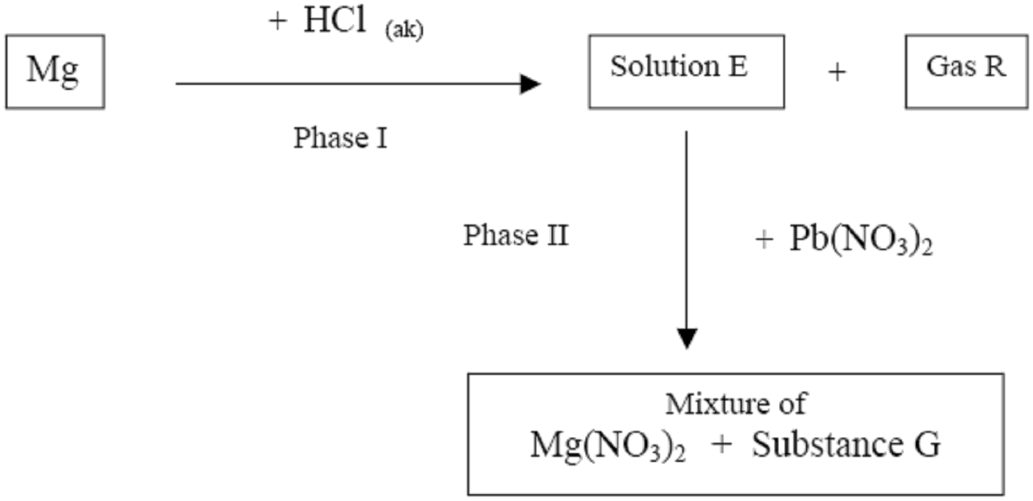


Diagram 3

(a) Name solution E and substance G. [2M]

Solution E : .....

Substance G : .....

(b) Explain how you can identify and confirmed the presence of gas R. [2M]

.....

.....

(c) In phase I, 20 cm^3 of hydrochloric acid 1.0 mol dm^{-3} is reacted with excess magnesium powder.

(i) Write the chemical equation for this reaction.[1M]

.....

(ii) Calculate the maximum volume of gas R that can be produced at room condition. [Molar volume of gas: 24 dm^3 mol^{-1} at room condition] [3M]

(d) (i) Name the type of reaction that took place in phase II.[1M]

.....

(ii) Explain how you can separate substance G from the product's mixture. [2M]

.....

.....

.....

[MRSM03-03]

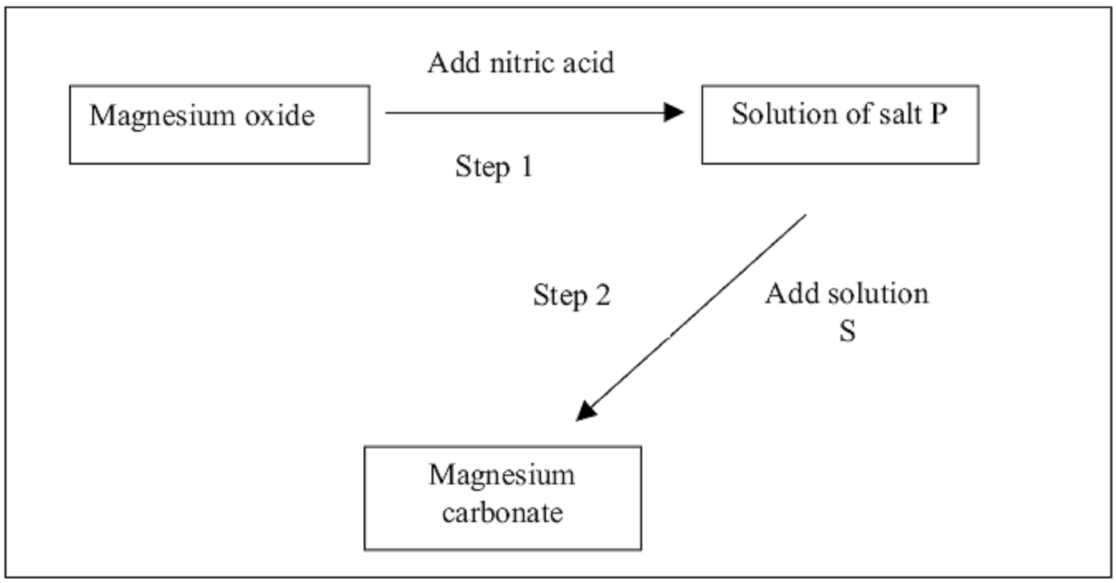


FIGURE 3

Figure 3 shows the steps taken to prepare magnesium carbonate.

(a) Write a chemical equation for the production of P. [1M]

.....

(b) Describe briefly how solution P can be prepared. [2M]

.....

.....

(c) (i) Name solution S that needs to be added to solution P to produce magnesium carbonate ? [1M]

.....

(ii) Write an ionic equation for the formation of magnesium carbonate. [1M]

.....

(d) 50 cm^3 of 0.5 mol dm^{-3} nitric acid reacts with excess magnesium oxide powder. [Relative Atomic Mass: C=12, O=16, Mg=24]

(i) Calculate the number of moles of salt P formed? [1M]

(ii) Calculate the maximum mass of magnesium carbonate that can be formed. [Relative Atomic Mass: C=12, O=16, Mg=24] [2M]

(e) Magnesium carbonate can be converted to magnesium oxide. Describe how this conversion can be done. [1M]

.....

.....

[SPM05-04]

Table 4 shows the positive and negative ions in three salt solutions.

Name of Salt	Positive	Negative
Copper(II) Sulphate	Cu^{2+}	SO_4^{2-}
Sodium Sulphate	Na^{+}	SO_4^{2-}
Lead(II) Nitrate	Pb^{2+}	NO_3^{-}

Table 4

Use the information in Table 4 to answer the following questions.

(a) What is another name for a positively charged ion? [1M]

.....

(b) Name the ions in copper (II) sulphate solution. [1M]

..... ion

..... ion

(c) Write the formula for sodium sulphate. [1M]

.....

(d) When 10 cm^3 of 0.5 mol dm^{-3} sodium sulphate solution is added to excess lead (II) nitrate solution, a white precipitate is formed.

(i) Write the chemical equation for the reaction. [2M]

.....

(ii) Describe the chemical equation in (d)(i). [1M]

.....

.....

(iii) Name the white precipitate. [1M]

.....

(iv) Calculate the number of mole of sodium sulphate in the solution.
Use the formula: Number of mole = Volume X concentration. [1M]

(v) Calculate the mass of precipitate formed.
Given that the relative atomic mass of O=16, S=32, Pb=27.
Use the formula: Mass = Number of mole X Relative molecular mass. [2M]

Essay {Paper02}

[SBPmidyearF508-09c]

(c) You are required to prepare a dry zinc(II) sulphate using 100 cm^3 sulphuric acid 0.1 mol dm^{-3}.

(i) Describe the laboratory experiment to prepare the dry of zinc(II) sulphate. [7M]

(ii) Calculate the mass of dry zinc sulphate formed. [4M]
[Relative atomic mass: H=1, O=16, S=32, Zn=65]

(d) Give two examples of salt and the uses in daily life. [2M]

----------oooOO aĎaŽ OOooo----------

[SBPtrial05-09c]

(c) A student need to prepare dry copper(II) sulphate salt. Describe one laboratory experiment how to prepare that salt. Include in your description the chemical equation involve. [10M]

----------oooOO aĎaŽ OOooo----------

[SBPmidyearF507-10b]

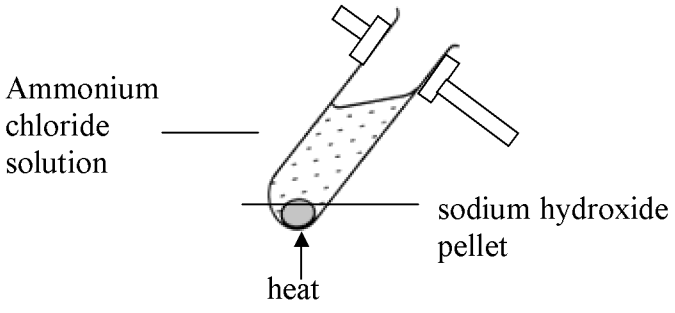
(b)Describe an experiment to prepare a pure sample of dry copper(II) carbonate using only the chemical substances given. You are provided with sodium carbonate, nitric acid solution, copper(II) oxide and all the required apparatus. In your answer, write down the chemical equations for the reactions. [8M]

----------oooOO aĎaŽ OOooo----------

[SBPdiag07-10]
(a) (i) State three different reactions or chemical equations to produce magnesium sulphate. [3M]

(ii) Based on one of the reaction above, describe an experiment to prepare a dry sample of magnesium sulphate. [10M]

(b) A small piece of solid sodium hydroxide pellet was put into ammonium chloride solution and then heated slowly as shown in the figure below.



The gas given off turned the moist red litmus paper to blue.

(i) Name the gas. [1M]

(ii) Write the chemical equation when the gas dissolves in water. [1M]

(iii) Describe a chemical test to identify the gas given off by using concentrated hydrochloric acid. [2M]

(iv) State the observation when the gas is passed through copper(II) sulphate solution. [3M]

----------oooOO aĎaŽ OOooo----------

[SBPdiag06-10]

(a) An insoluble salt can be prepared by the precipitation reaction.
Give an example of an insoluble salt and suggest two solutions to prepare the insoluble salt.
Write the ionic equation to represent the precipitation reaction. [4M]

(b) Figure 10 shows an incomplete flow chart of cation and anion tests for salt X.

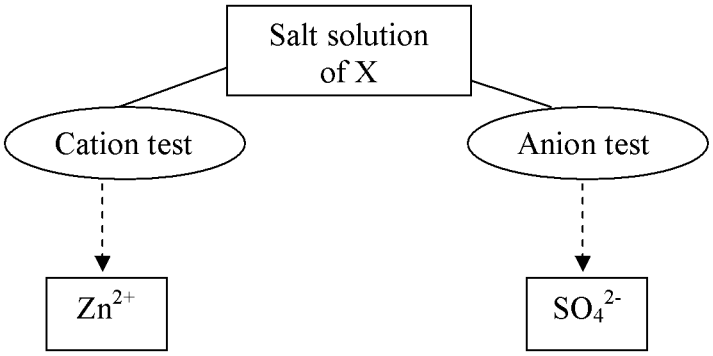


FIGURE 10

Use the reagents listed below to confirm that salt solution of X contains Zn^{2+} ions and SO_4^{2-} ions. [6M]

REAGENTS

- Sodium hydroxide solution
- Ammonia solution
- Hydrochloric acid
- Barium chloride solution

(b) Copper(II) sulphate is a soluble salt. Describe how to prepare a dry sample of copper(II) sulphate in the laboratory.

Your answer should consist of the following: [10M]

- Chemicals required
- Procedure of the preparation
- Chemical equation involved in the reaction

----------oooOO aĎaŽ OOooo----------

[SBPTrial06-08]{Translate}

(a) (i) State three type of reaction for preparation of soluble salt others than potassium, sodium and ammonium salt. [3M]

(ii) For every type of reaction you state at (a)(i), write one chemical equation for the salt prepare. [3M]

(b) Describe one experiment to prepare magnesium sulphate crystal salt in laboratory. In your description, include the chemical equation for the reaction involve. [10M]

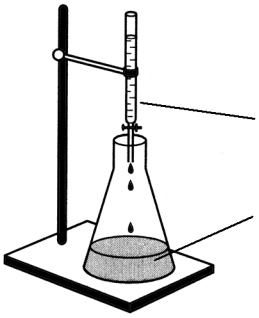
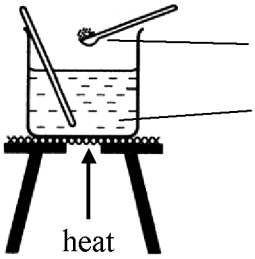
(c) Describe one chemical test to show how you can differentiate between magnesium nitrate and magnesium chloride. [4M]

----------oooOO aĎaŽ OOooo----------

[SBPdiag05-essay04]

(a) Explain the definition of double decomposition reaction using one chemical equation. [2M]

(b) Table below shows Experiment I and Experiment II in the process of preparing salt.

Experiment	**Method**
I	 10.0 cm^3 sulphuric acid 0.5 mol dm^{-3} 20.0 cm^3 sodium hydroxide solution 0.5 mol dm^{-3} + phenolphthalein
II	 Excess Copper (II) oxide powder 100.0 cm^3 sulphuric acid 0.5 mol dm^{-3}

(i) Compare and contrast Experiment I and Experiment II. In your answer, include the type of reaction, method to prepare salt, observation and chemical equation for the reaction. [8M]

(ii) Describe Experiment II for the preparation of dry crystal salt copper (II) sulphate, starting from copper (II) oxide powder. [10M]

----------oooOO aĎaŽ OOooo----------

[SBPtrial04-09] {Translate}

(a) What mean by salt? [1M]

(b) You a given the Iron(III) sulphate crystal. Give one chemical test to determine the cation and anion of the salt. [7M]

(c) Describe the laboratory experiment to prepare copper(II) chloride crystal. [12M]

----------oooOO aĎaŽ OOooo----------

[SBPtrial07-07c]

(c) You are required to prepare dry zinc sulphate salt. The chemicals supplied are:

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

Describe a laboratory experiment to prepare the salt. In your description, include chemical equations involved. [1M]

----------oooOO aĎaŽ OOooo----------

[MRSM06-10b,c]

(b) The label on a reagent bottle containing solution X is missing.
Solution X is suspected to contain either lead (II) nitrate or calcium nitrate.
Describe the suitable chemical tests to verify the ions present in solution X.[6M]

(c) You are required to prepare dry zinc sulphate salt.
The chemicals supplied are:

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

Describe a laboratory experiment to prepare the salt.
In your description, include the chemical equations involved. [10M]

----------oooOO aĎaŽ OOooo----------

[MRSM05-07b,c]

(b) 5 g of zinc sulphate salt is required to be prepared from the reaction between zinc metal with sulphuric acid of 0.5 mol dm^{-3}

(i) Write a chemical equation for the formation of zinc sulphate salt. [1M]

(ii) Calculate the minimum volume of sulphuric acid 0.5 mol dm^{-3} required to prepare the salt if excess zinc is used. [3M]
[Use the information that the relative atomic mass of Zn = 65, S = 32, O = 16]

(iii) Explain briefly how zinc sulphate crystals can be separated from the salt solution. [2M]

(c) Diagram 1 shows 3 beakers containing three different salt solutions labelled X, Y and Z

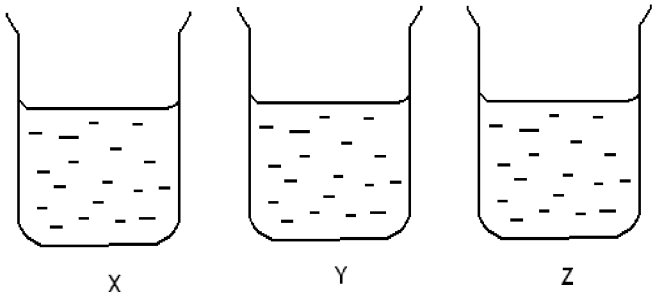


Diagram 1

Three beakers labelled X, Y and Z may contained the following salt solutions

- Calcium nitrate
- Magnesium nitrate
- Magnesium chloride

You are provided only with ammonia and silver nitrate solutions.

Describe how you could differentiate between the 3 salt solutions by using the two provided reagents. Include your observations and conclusions. [10M]

----------oooOO aĎaŽ OOooo----------

[MRSM04-09c]

(c) You are required to prepare dry pure zinc carbonate salt. The chemicals supplied are

- Zinc oxide powder
- Dilute nitric acid
- Sodium carbonate solution

Describe a laboratory experiment to prepare the salt. In your description, include the chemical equations involved. [9M]

----------oooOO aĎaŽ OOooo----------

[MRSM03-09c]

(c) There are three unlabelled reagent bottles containing aqueous solution of lead (II) nitrate, zinc nitrate and aluminium nitrate.

Describe the chemical test that can be used to identify each solution. [8M]

[MRSM03-09a]

1(a) Salt is widely used in various fields. Name one example of salt and its uses in each of the following fields: [2M]

(i) Agriculture
(ii) Food preparation

----------oooOO aĎaŽ OOooo----------

[SPM09-10c]

(c) You are given a solution that contains a mixture of iron(III) nitrate and iron(III) chloride.

Describe the confirmatory tests to determine the presence of cation and anion in the solution. Your description must include all the materials used, observation and conclusion. [10 M]

----------oooOO aĎaŽ OOooo----------

[SPM08-10b]

(b) Lead (II) sulphate is insoluble in water.
Describe the preparation of lead (II) sulphate in the laboratory.
In your description, include the chemical equation involved. [10 M]

----------oooOO aĎaŽ OOooo----------

[SPM05-08]

(a) The following information is about hydrochloric acid and ethanoic acid.

- the pH of 1 mol dm^{-3} hydrochloric acid solution is 1
- the pH of 1 mol dm^{-3} ethanoic acid solution is 4

Explain why these two solutions have different pH values. [4M]

(b) Figure 8.1 shows two reagent bottles each containing an aqueous solution.

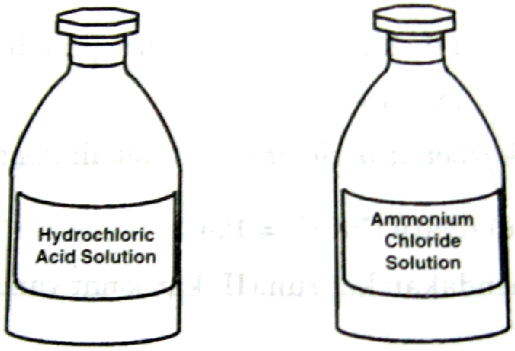
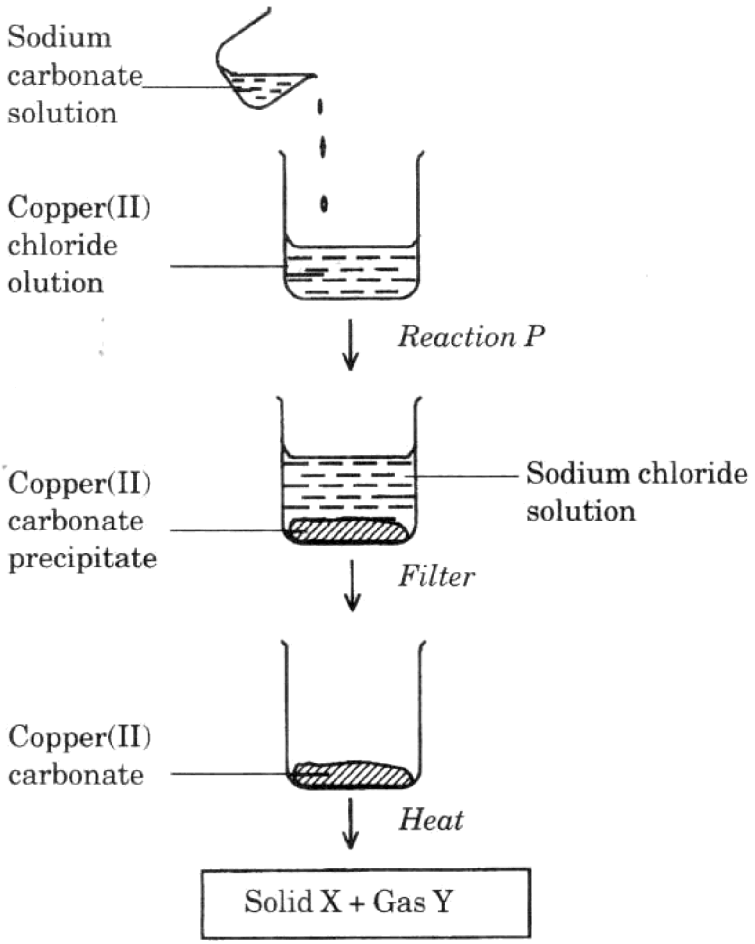


Figure 8.1

Qualitative analysis can be used to determine the presence of cations and anions in solutions. Describe chemical test that can be used to verify the ions in each solution. [10M]

(c) A pupil carried out an experiment to investigate the chemical changes that occur to copper (II) chloride as a result of reaction P. The result of the experiment is shown in figure 8.2.



(i) The chemical equation for reaction P is as follows:

$$CuCl_2 + Na_2CO_3 \rightarrow 2NaCl + CuCO_3$$

Excess sodium carbonate is added to 50 cm^3 of 0.5 mol dm^{-3} copper (II) chloride. Given that the relative molecular mass of $CuCO_3$ = 124.
Calculate the mass of copper(II) carbonate precipitate formed. [2M]

(ii) Name solid X and state its colour. [2M]

(iii) Name gas Y and describe a method to verify its identity. [2M]

----------oooOO aĎaŽ OOooo----------

[SPM07-07]

(a) The following are three examples of sulphate salts that can be prepared in laboratory.

- Potassium sulphate, K_2SO_4
- Lead (II) sulphate, $PbSO_4$
- Zinc Sulphate, $ZnSO_4$

(i) From these examples, identify the soluble and insoluble salts. [2M]
(ii) State the reactants for the preparation of the insoluble salt in 7(a)(i). [2M]

(b) With the aid of a labelled diagram, explain the crystallisation method for preparing an insoluble salt from its saturated solution. [6M]

(c) Table 7 shows the observations from some tests carried out on salt X.

Test	**Observation**
I : Heating of salt X solid	A metal oxide is formed and a brown gas is given off.
II : Salt X solution is mixed with excess aqueous ammonia.	A white precipitate which is insoluble in excess aqueous ammonia is formed

Table 7

Based on the information in table 7:

(i) Identify an anion test that is present in Test I and describe a chemical test to verify the anion. [4M]

(ii) Identify two cations that are present in Test II and describe a chemical test to verify the cations. [6M]

----------oooOO aĎaŽ OOooo----------

[MRSM11-09]

(*a*) Diagram 9.1 shows the preparation of lead(II) sulphate from lead(II) oxide.

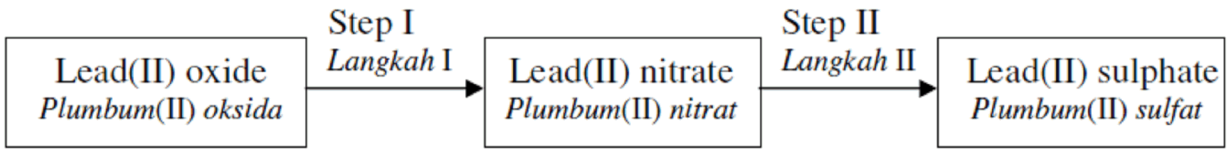


Diagram 9.1

(i) Explain why lead(II) sulphate cannot be prepared directly from lead(II) oxide. [2M]

(ii) Based on Diagram 9.1, describe Step I and Step II used in the preparation of lead(II) sulphate. In your answer, include observation and equations involved. [8M]

(*b*) Diagram 9.2 shows the steps involved to confirm the presence of anion and cation in solid lead(II) carbonate.

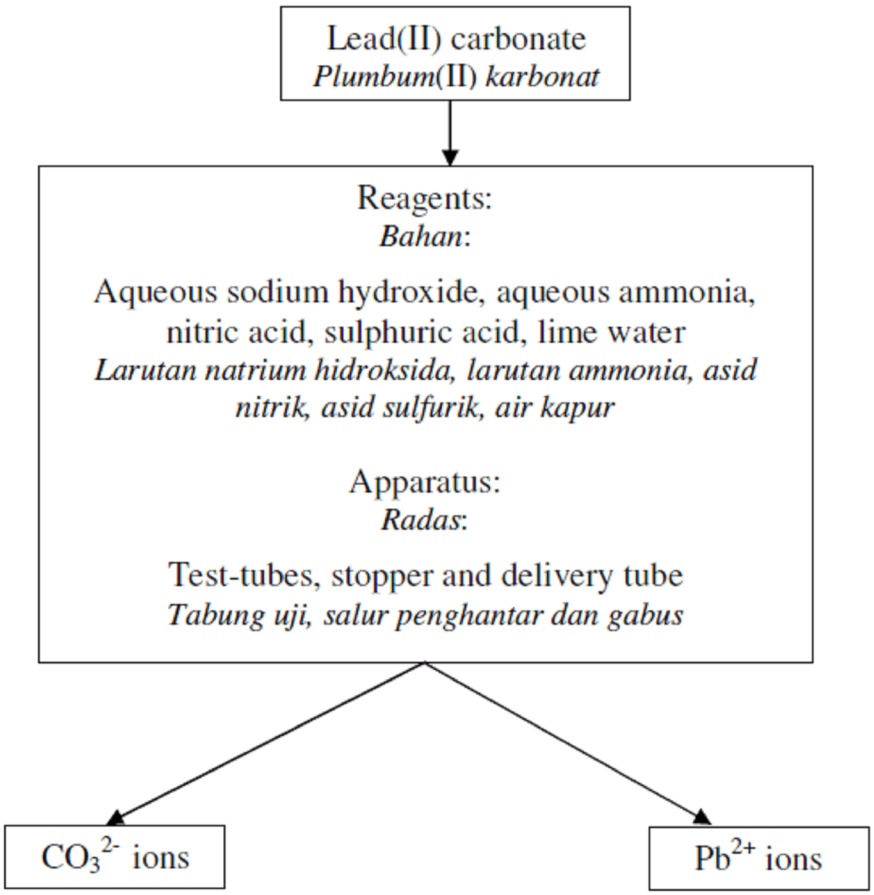


Diagram 9.2

Using all reagents provided, describe the methods used to confirm the presence of ions and observation involved. [10M]

----------oooOO aĎaŽ OOooo----------

[SPM03-10]

(a) A farmer discovered that his vegetables were not growing well because the soil was poor and acidic. As a chemistry student, you can help the farmer. [2M]

(b) Diagram 7 shows an incomplete flow chart of cation and anion test for salt X

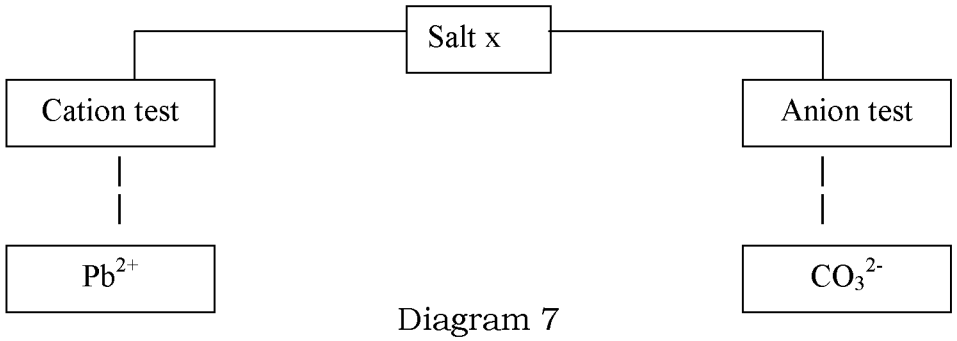


Diagram 7

Use the reagents listed below and complete the flow chart to confirm that salt X contains Pb^{2+} ions and CO_3^{2-} ions. Include your observations. [8M]

REAGENTS Dilute hydrochloric acid, dilute nitric acid and lime water

(c) You are required to prepare dry magnesium chloride salt. The chemicals supplied are:

- magnesium sulphate solutions
- dilute hydrochloric acid
- potassium carbonate solution

Describe a laboratory experiment to prepare the salt. In your description, include the chemical equation involved. [10M]

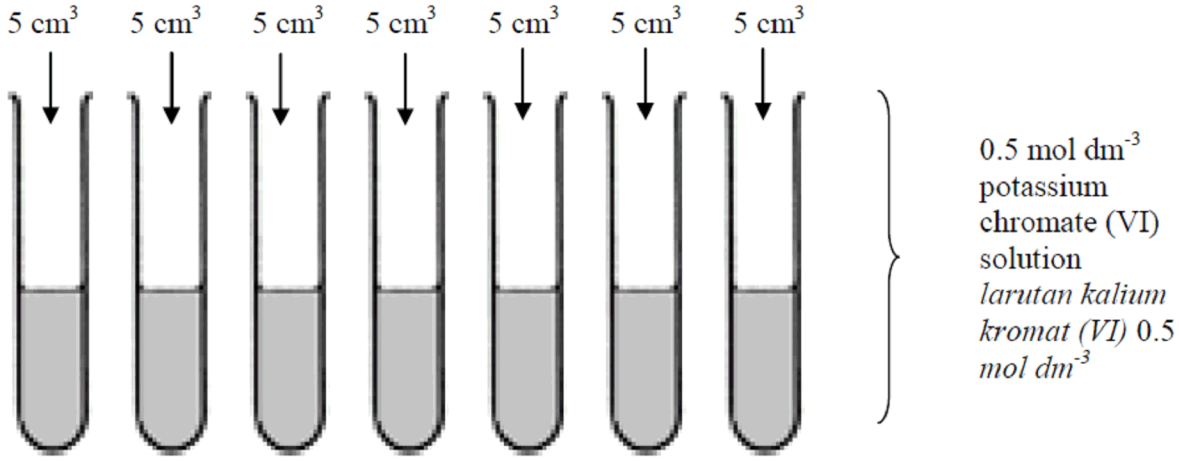
----------oooOO aĎaŽ OOooo----------

Structure {Paper03}

[SBPtrial11-02]

Diagram 2 shows Step I and Step II in an experiment to construct an ionic equation for the formation of barium chromate(VI).

Step I



Step II

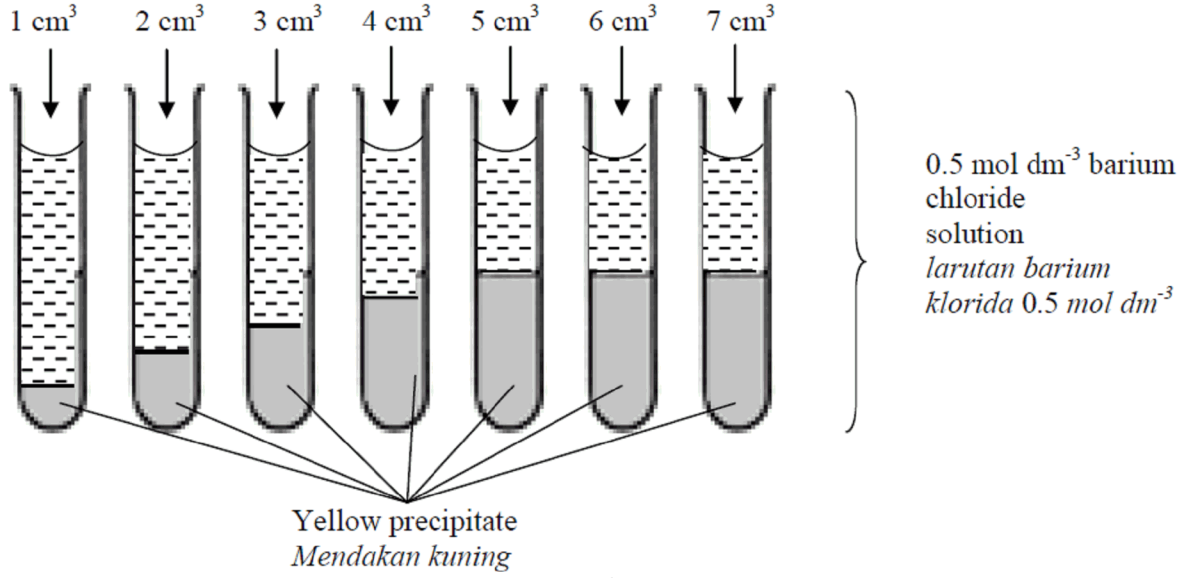


Diagram 2

0.5 mol dm^{-3} barium chloride, $BaCl_2$ solution was added to each test-tube containing 5.0 cm3 potassium chromate(VI), K_2CrO_4 solution according to the volumes shown in Step II. Each test tube is stoppered and shaken well. Yellow precipitate of barium chromate(VI) is formed.

Table 2 shows the results for this experiment.

Test tube	1	2	3	4	5	6	7
Volume of 0.5 mol dm-3 barium chloride solution/cm3	1.0	2.0	3.0	4.0	5.0	6.0	7.0
Height of barium chromate (VI) precipitate/cm	.....	.....	.....	.....	.....	.....	.....

Table 2

(a) Using a ruler, measure the height of yellow precipitate in test tube 1 to 7 and record the height of the precipitate in Table 2. [3M]

(b) Draw a graph of height of precipitate against volume of barium chloride on the graph paper provided on page 7. [3M]

(c) Based on the graph above, state the volume of barium chloride solution 0.5 mol dm^{-3} for reacts completely with 5 cm^3 of potassium chromate(VI) solution and calculate the number of mole of barium chloride solution is needed to reacts completely with 1 mole potassium chromate(VI) solution. [3M]

.....

(d) Write an ionic equation for the reaction between potassium chromate(VI) solution and barium chloride solution. [3M]

.....

(e) State the operational definition for the precipitation reaction of barium chromate(VI) . [3M]

.....

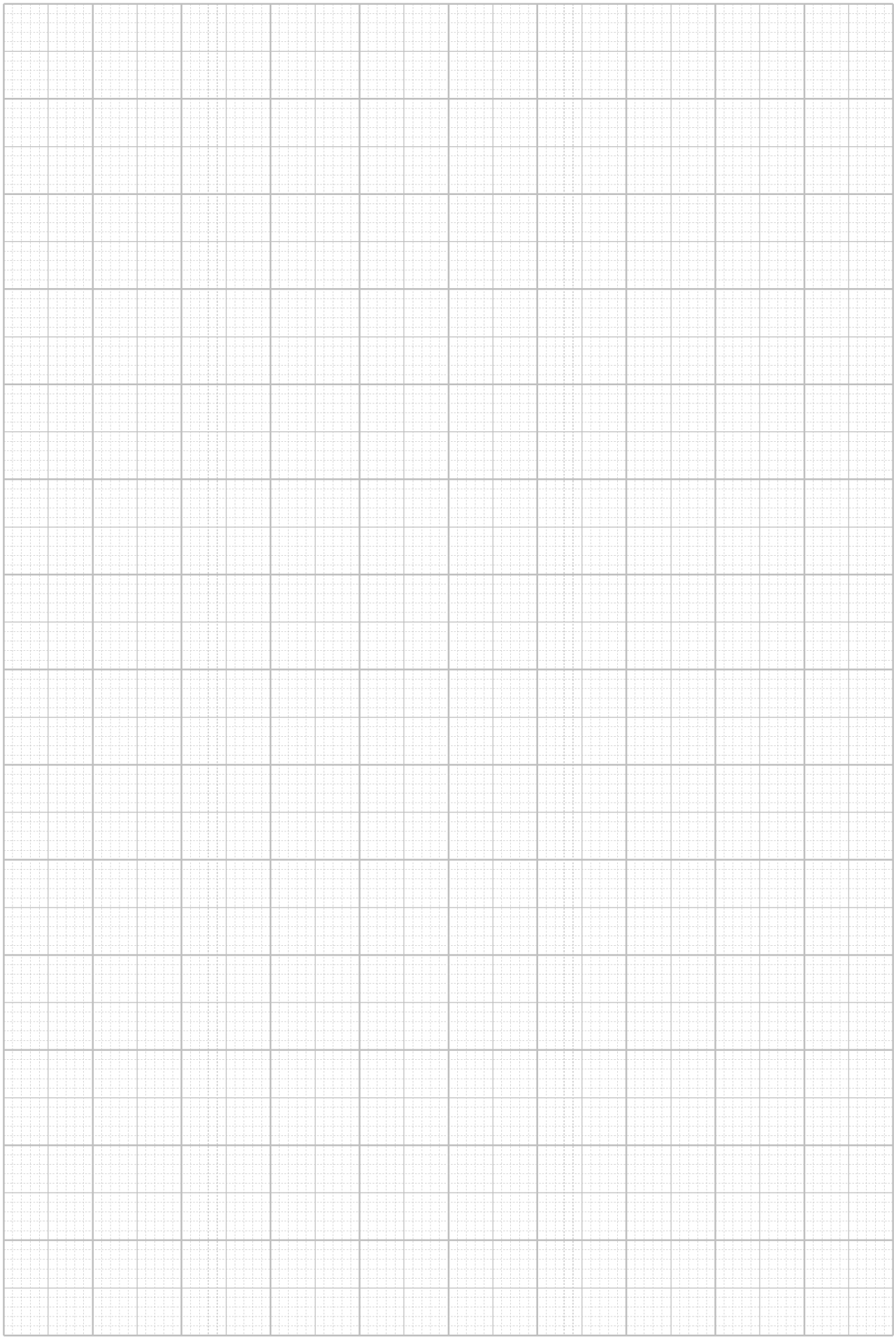
.....

(f) Classify the following salts into soluble salts and insoluble salts. [3M]

Sodium carbonate, Na_2CO_3 , Lead(II)sulphate, $PbSO_4$

Silver chloride, AgCl ; Magnesium nitrate, $Mg(NO_3)_2$

Soluble salts	**Insoluble salts**



[MRSM10-01]

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

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

Step II : 1.00 cm^3 of 1.0 mol dm^{-3} silver nitrate solution was added to test tube P from a burette.

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.

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.

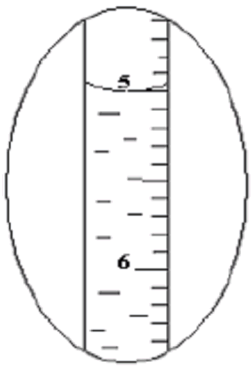
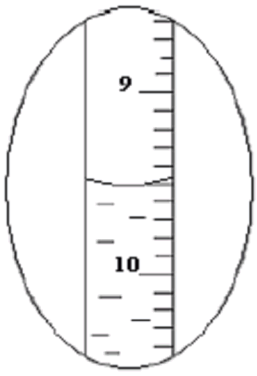
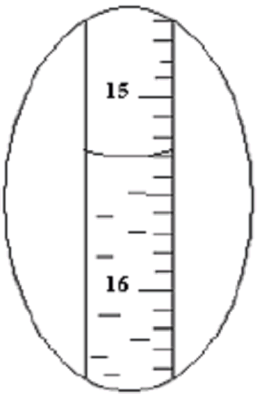
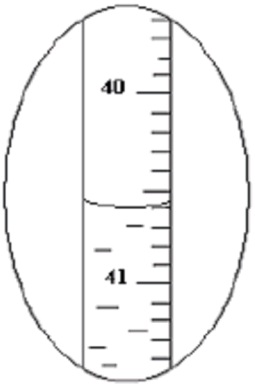
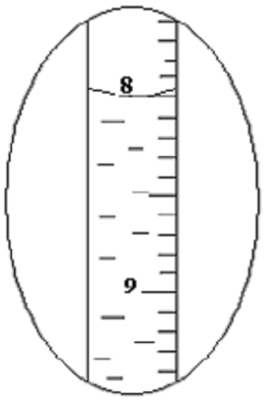
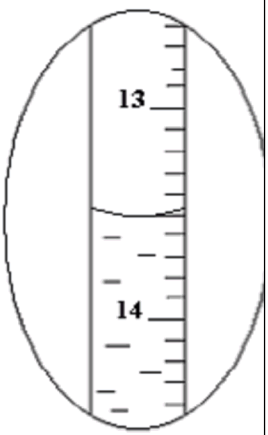
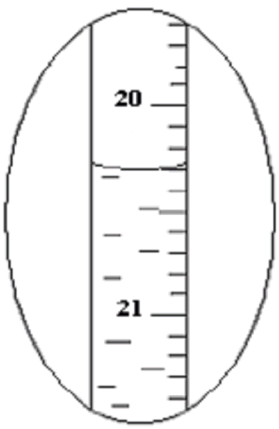
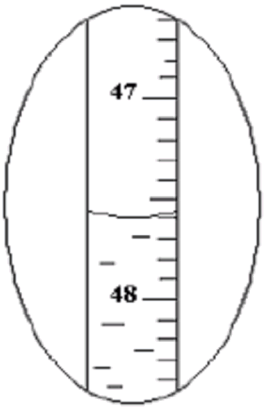
Test tubes	R	S	T	V
Initial reading	 ..... cm^3	 ..... cm^3	 ..... cm^3	 ..... cm^3
Final reading	 ..... cm^3	 ..... cm^3	 ..... cm^3	 ..... cm^3

Diagram 1

Test tube	P	Q	R	S	T	U	V
Volume of silver nitrate/ cm^3	1.00	2.00	.....	.....	.....	6.00	.....
Height of precipitate/ cm	1.0	2.0	3.0	4.0	5.0	5.0	5.0

Table 1

(*a*) Record the burette readings in the spaces provided in Diagram 1. [3M]

(*b*) Complete Table 1. [3 M]

(*c*) (i) State the variables involved in this experiment. [3 M]

Manipulated variable : .....

Responding variable : .....

Constant variable : .....

(ii) State the hypothesis for the experiment. [3 M]

.....

.....

.....

(*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. [3 M]

(*e*) State what is observed regarding the height of the precipitate. [3 M]

.....

.....

.....

(*f*) (i) On the graph in (*d*), mark and write the minimum volume of silver nitrate solution needed for complete reaction with 5.00 cm^3 of 1.0 mol dm^{-3} potassium chloride solution. [3 M]

.....

(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.

(iii) Write the ionic equation for the precipitation of silver chloride. [3M]

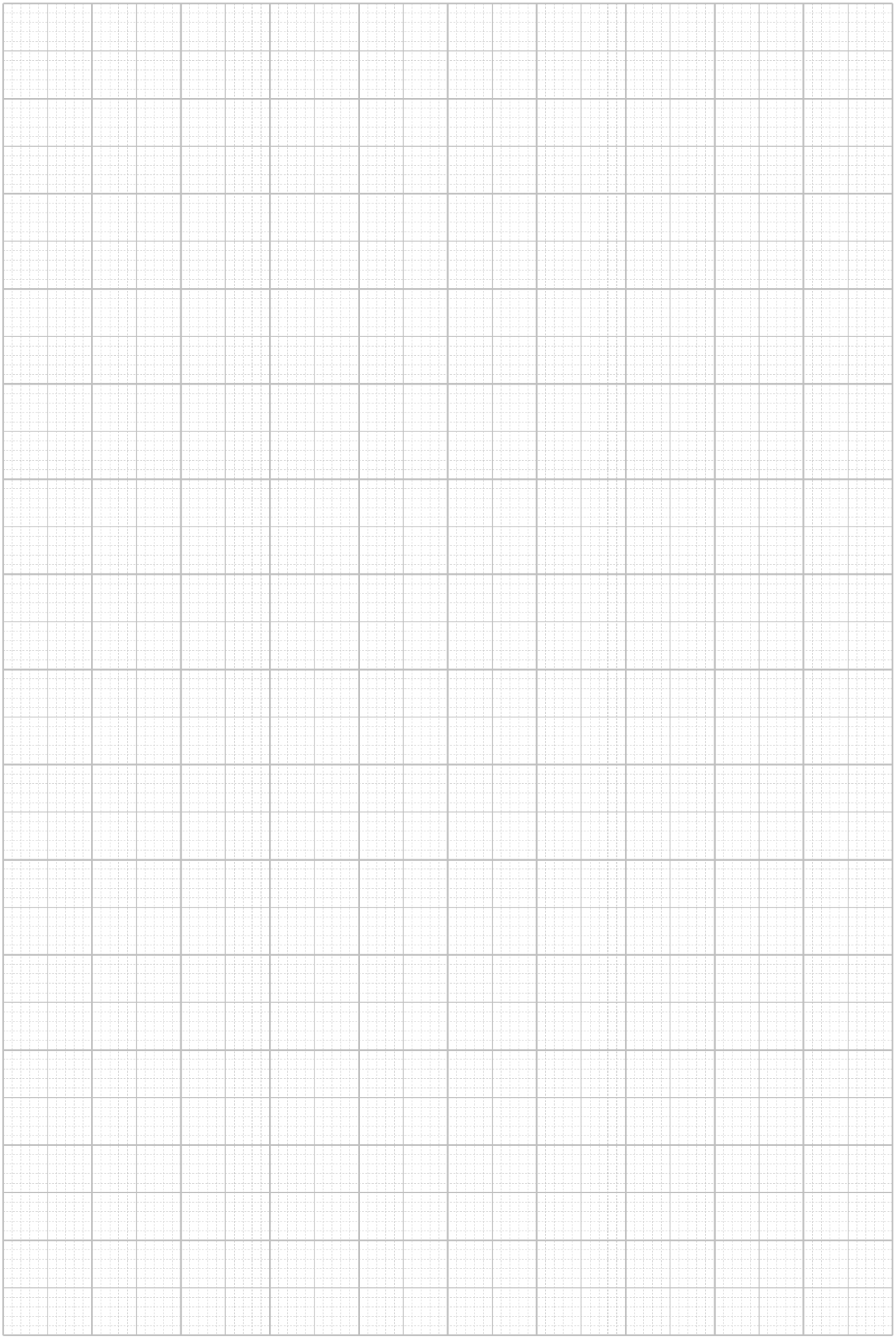
.....

(*g*) Give the operational definition for double decomposition reaction. [3M]

.....

.....

(*h*) Classify the ions found in silver nitrate solution and potassium chloride solution into anions and cations. [3 M]



[SPM03-02]

A student has carried out an experiment to construct an ionic equation for the formation of lead (II) iodide. The experiment was carried out according to the following steps.

Step I: 5.0 cm^3 of potassium iodide solution 1.0 mol dm^{-3} was poured into each test tube labelled P, Q, R, S, T, U and V

Step II: 0.5 cm^3 of lead (II) nitrate solution 1.0 mol dm^{-3} was added into test tube p.

Step III: step II was repeated for test tube Q, R, S, T, U and V using the volumes in the tables 1.

Step IV: all the test tubes were put in the rack to allow lead (II) iodide to precipitate.

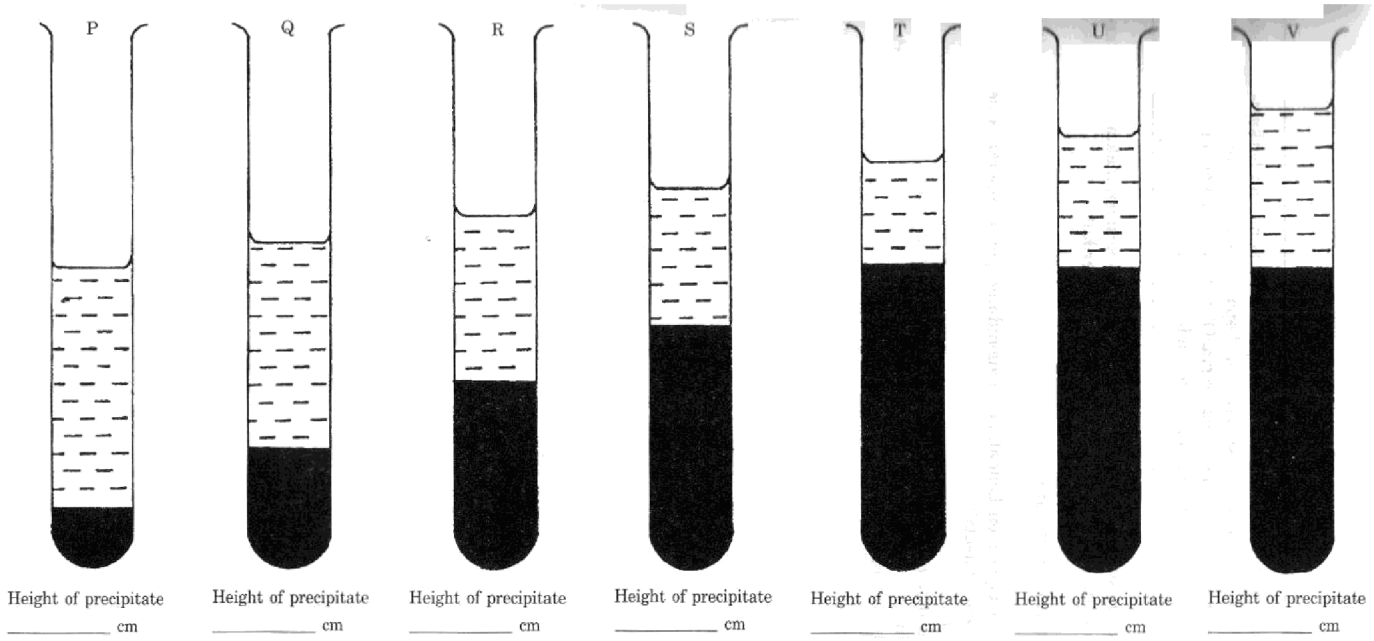


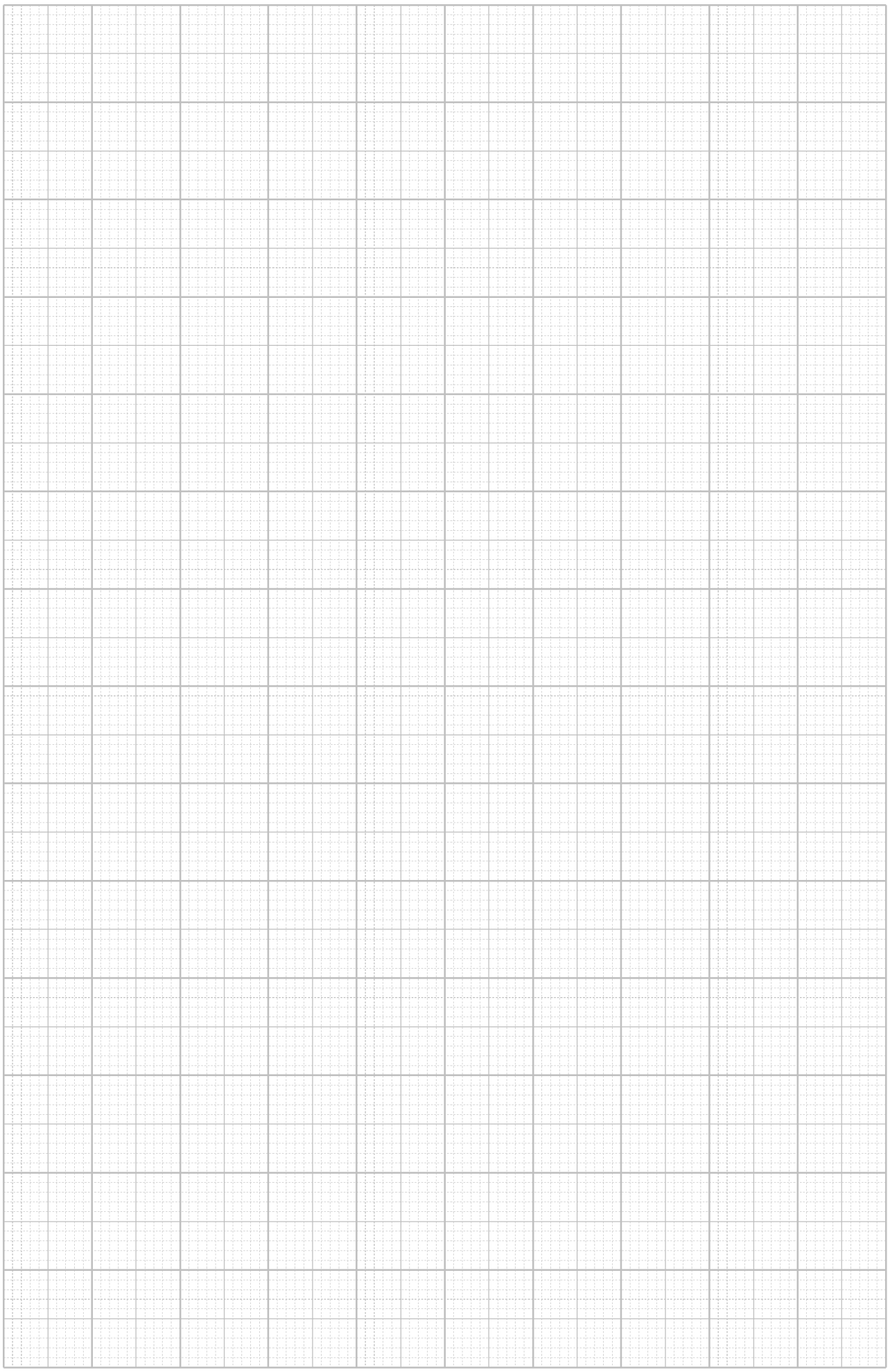
Diagram 2

Test tube	P	Q	R	S	T	U	V
Volume of lead (II) nitrate solution 1.0 mol/dm^3	0.5	1.0	1.5	2.0	2.5	3.0	3.5

Table 1

(a) Diagram 2 shows seven test tubes for the above experiment. Using the ruler given, measure the height of lead (II) iodide precipitate is test tube PQRSTU and V in diagram 2. Record the height of the precipitate in table 1.

(b) Based on table 2, draw a graph of the height of the precipitate against the volume of lead (II) nitrate solution on the graph paper.



(c) On the graph that you have drawn in (b)

(i) Mark and write the minimum volume of lead (II) nitrate solution needed for the complete reaction with 5.0 cm^3 of potassium iodide solution 1.0 mol dm^{-3}.

.....

(ii) Using the volume obtained in (c)(i), show the calculation for obtaining the number of moles of Pb^{2+} ions and I^- ions that are required for the formation of lead (II) iodide. Then calculate the number of moles of I^- ions that has reacted with 1 mole of Pb^{2+} ions.

(iii) Write the ionic equation for the formation of lead (II) iodide.

.....

(d) What can you observe about the height of the precipitate in Diagram 2?

.....

.....

.....

(e) What is your inference based on your answer in (d)?

.....

.....

.....

(f) Categories the ions found in the lead (II) nitrate solution and the potassium iodide solution used in this experiment into positive and negative ions.

Essay {Paper03}

[SPM11-02]

Diagram 2 shows eight tubes containing lead(II) iodide precipitate which is formed when lead(II) nitrate solution reacts with potassium iodide solution.
Lead(II) iodide is an insoluble salt.

The ionic equation for this reaction is:

$$Pb^{2+}_{(aq)} + 2I^{-}_{(aq)} \rightarrow PbI_{2(s)}$$

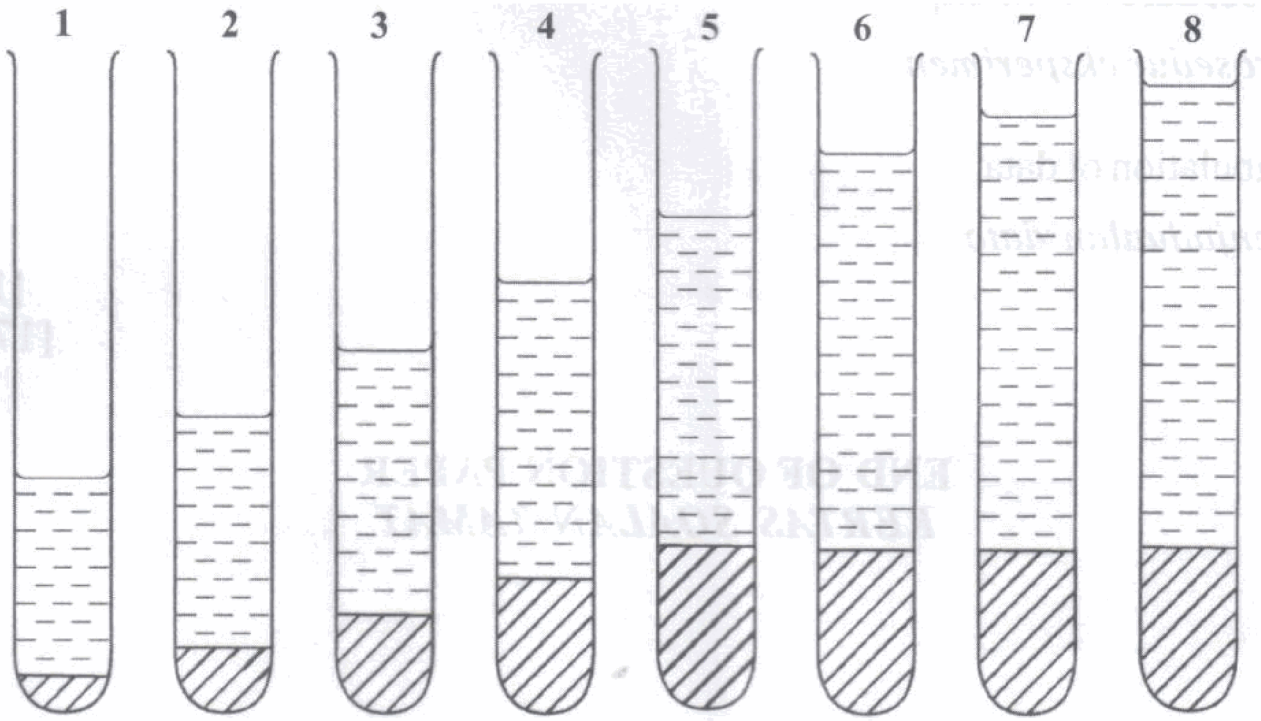


Diagram 2

Based on Diagram 2, plan **one** laboratory experiment to construct the ionic equation for the formation of lead(II) iodide as given in the above ionic equation.

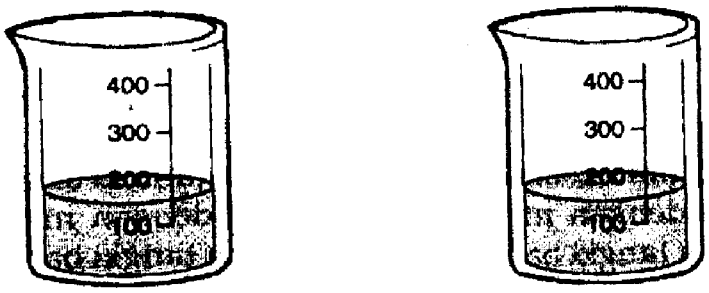
Your planning should include the following aspects:

(a) Problem statement
(b) All the variables
(c) Statement of the hypothesis
(d) List of substances and apparatus
(e) Procedure for the experiment
(f) Tabulation of data

[17 marks]

[SBPmidyearF508-03]

Diagram 3 shows two beakers containing colourless solution labelled A and B.



Beaker A Beaker B

Diagram 3

You are told that the two colourless solutions are calcium nitrate and magnesium nitrate. You are required to label correctly the name of each solution in the containers. Design an experiment to identify which is calcium nitrate and which is magnesium nitrate solution by using aqueous of ammonia solution as a reagent.

Your answer should include the following: [17M]

(a) Problem statement
(b) Hypothesis
(c) All variables
(d) List of materials and apparatus
(e) Procedure
(f) Tabulation of data