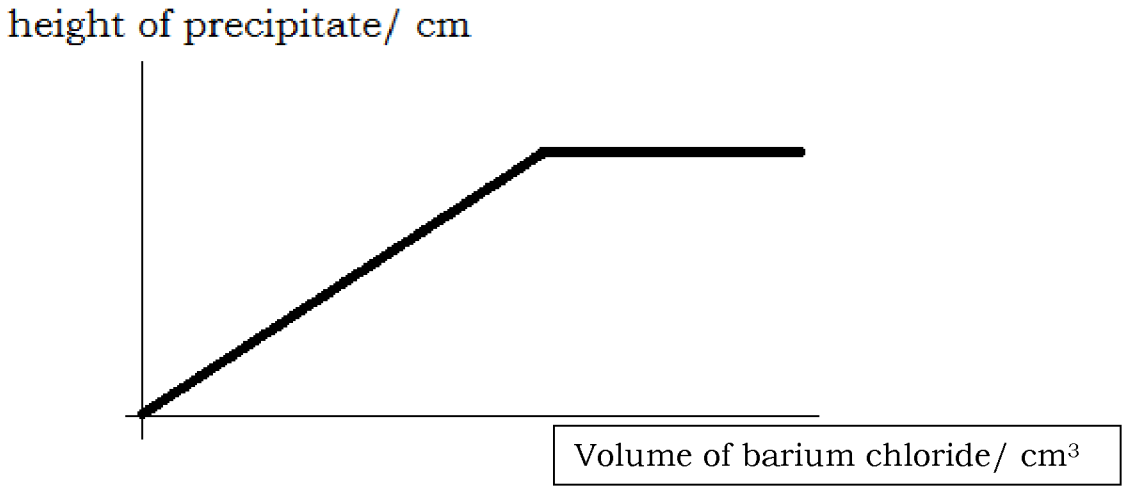
Structure {Paper03}

[SBPtrial11-02]

(a)

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

(b)



(c) 5.0 cm^3 of barium chloride solution

Mol barium chloride solution = MV/1000
= 0.5 X 5/1000 = 0.0025 mol

Mol potassium chromate(VI) solution = MV/1000
= 0.5 X 5/1000 = 0.0025 mol

Ratio of $BaCl_2$ react with potassium chromate(VI) solution
0.0025 mol to 0.0025 mol
Then 1 mol react with 1 mol

(d) $Ba^{2+} + Cr_2O_7^{2-} \rightarrow BaCr_2O_7$

(e) When 0.5 mol dm^{-3} barium chloride, $BaCl_2$ solution was added to each test-tube containing 5.0 cm^3 potassium chromate(VI), K_2CrO_4 solution, the high precipitate increases until it 5 cm^3 of barium chloride, $BaCl_2$ added. After that, no more increases of height precipitate

(f)

Soluble salts	**Insoluble salts**
Sodium carbonate, Na_2CO_3 Magnesium nitrate, $Mg(NO_3)_2$	Lead(II)sulphate, $PbSO_4$ Silver chloride, AgCl

[MRSM10-01]

(*a*)

Test tubes	R	S	T	V
Initial Reading/cm^3	5.00	9.50	15.30	40.60
Final Reading/cm^3	8.00	13.50	20.30	47.60

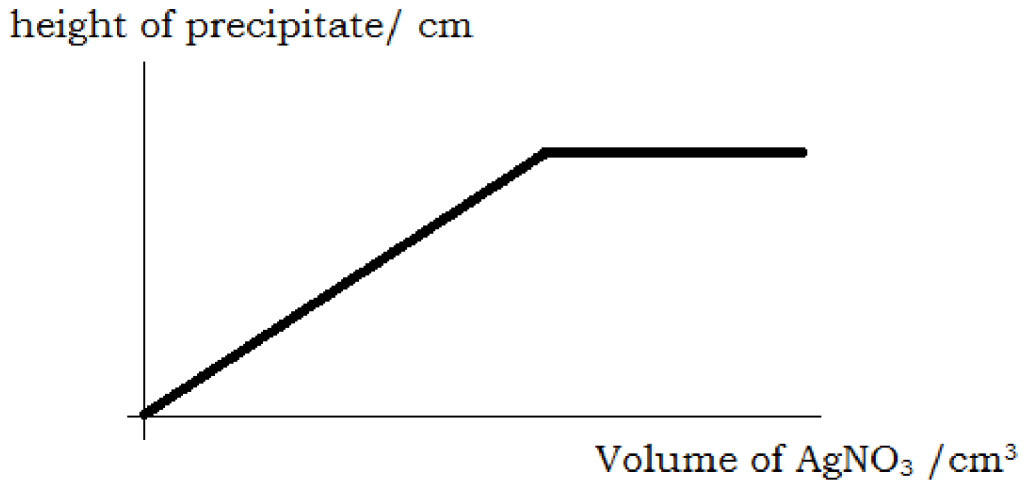
(*b*)

Test tube	**P**	**Q**	**R**	**S**	**T**	**U**	**V**
Volume of silver nitrate/ 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 and concentration of potassium chloride // Concentration of silver nitrate// size of test tubes

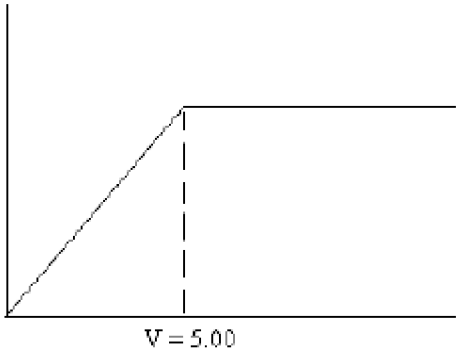
(ii) When volume of silver nitrate solution added increases, the height of precipitate increases and then becomes constant

(*d*)



(*e*) Height of precipitate increases from test tube P to T. Then becomes constant

(*f*) (i)



(ii) Mol Ag+ = MV/1000 = 1.0 X 5/1000 = 0.005 mol
Mol Cl- = MV/1000 = 1.0 X 5/1000 = 0.005 mol

1 mol Ag+ requires 1/0.005 X 0.005 = 1 mol Cl-

(iii) $Ag^+ + Cl^- \rightarrow AgCl$

(*g*) 1. potassium chloride solution reacts with silver nitrate solution
2. to form solid silver chloride/ silver chloride precipitate

(*h*)

Cations	**Anions**
Ag+, K+, H+	Cl-, NO_3-, OH-

[SPM03-02]

(a)

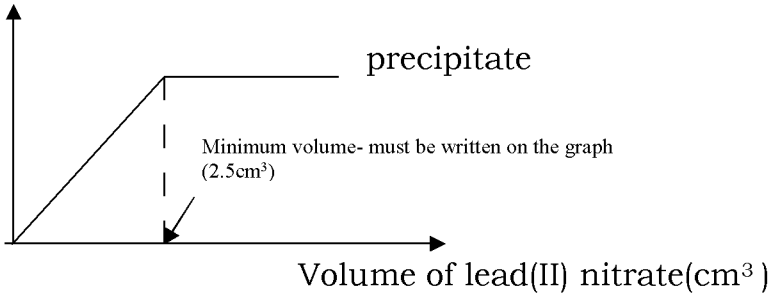
Test Tube	P	Q	R	S	T	U	V
Volume of lead(II) nitrate solution 1.0 mol dm^{-3}/cm^3	0.5	1.0	1.5	2.0	2.5	3.0	3.5
Height of lead(II) iodide precipitate /cm	1.1	2.2	3.4	4.4	5.5	5.5	5.5

Table 1

(The diagram given is not to scale - *please refer to the original SPM question paper for* accuracy of readings)

(b)
1. label of the x-axis – volume(cm^3)
2. label of the y-axis – height of precipitate(cm)
3. uniform scale
4. size of graph more than 50%
5. all points are transferred correctly
6. smooth graph

(c) (i) Suggested answer:



(ii) No. of mole (Pb^{2+}) = $\frac{2.5 \text{ X } 1.0}{1000}$ = 0.0025

No. of mole (I^-) = $\frac{5 \text{ X } 1.0}{1000}$ = 0.005

No. of mole of I^- reacted with 1 mol of Pb^{2+} = 2 mole

(iii) $Pb^{2+} + 2I^- \rightarrow PbI_2$

(d) The height of precipitate increases gradually from test tubes P to S
The height of precipitate in test tubes T,U,V are the same

(e) In test tubes P, Q, R, and S, more and more yellow precipitate of lead(II) iodide is formed due to the increasing amount of lead(II) nitrate added to the test tubes or potassium iodide has not completely reacted with lead(II) nitrate solution

In test tubes T,U,and V, potassium iodide/iodide ions have reacted completely or a complete reaction has taken place

(f)

Solution	**Positive ions**	**Negative ions**
Lead(II) nitrate	Pb^{2+} , H^+	NO_3^- ,OH^-
Potassium iodide	K^+ , H^+	I^-, OH^-

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