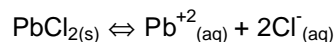

The Solubility Product Constant

Lab 26

PRE-LAB DISCUSSION

Solubility product constant is the product of ions of a slightly soluble or insoluble substance in a saturated solution. In this experiment you will determine the solubility product constant for PbCl_2 in water. Its dissolution reaction is;



The solubility product constant is experimentally determined by measuring the equilibrium concentrations of the ions in the saturated solutions. Solubility product constant, K_{sp} , for the reaction is;

$$K_{sp} = [\text{Pb}^{+2}] [\text{Cl}^{-}]^2$$

PURPOSE

To determine the solubility product constant, K_{sp} , for PbCl_2 .

EQUIPMENT

two 250mL beakers	100ml graduated	cylinder
wire gauze	iron ring	filter paper
funnel	ring stand	burner
balance		

MATERIALS

100mL PbCl_2 solution in 0.2M HNO_3	20mL of 0.5M K_2CrO_4
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PROCEDURE

1. Place a piece of filter paper in a clean, dry, 250 ml beaker.
2. Measure the mass of the beaker and filter paper to the nearest 0.01g. $m_1 = \dots\dots\dots$ g
3. Prepare a funnel and the filter paper for filtration.
4. Measure a 100ml of the saturated PbCl_2 solution and place it into the beaker.
5. Add about 20ml of 0.5M K_2CrO_4 solution to the beaker.

6. Heat the solution to the boiling point.
7. Let the precipitate settle, then carefully decant the liquid into the funnel. Wash the precipitate in the beaker at least three times with distilled water and decant into funnel.
8. Place the filter in the beaker with the precipitate.
9. Place the beaker containing the PbCrO_4 and filter paper in a drying oven.
10. Measure the mass of the beaker and its contents. $m_2 = \dots\dots\dots\text{g}$

CALCULATIONS AND QUESTIONS

1. What is the mass of PbCrO_4 ? ($m_2 - m_1$)g
2. What is the number of moles of PbCrO_4 ? ($M_w (\text{PbCrO}_4) = 223\text{g/mol}$)
3. Write the balanced net ionic equation representing the precipitation of PbCrO_4 . How many moles of Pb^{2+} ions are required to obtain the precipitate? Neglect the solubility of PbCrO_4 .
4. Write the balanced net equilibrium reaction for the saturated solution of PbCl_2 . Use the number of moles of Pb^{2+} to calculate the concentration of Pb^{2+} ions in the saturated PbCl_2 solution. What must be the $[\text{Cl}^-]$ in the same solution?
5. Calculate the value of K_{sp} for PbCl_2 .