Common Ion Effect

Solubility Equilibria

Introduction

Addition of a compound with a common ion will cause a saturated solution to precipitate the less soluble of the two compounds present.

Concepts

- Common Ion
- Solutions
- Solubility
- Precipitation

Materials (for each demonstration)

Hydrochloric acid, HCl, 12 M, 2 mL
Potassium chloride solution, KCl, saturated, 50 mL
Water, distilled or deionized, 50 mL
Beaker, 150-mL
Magnetic stirrer
Magnetic stirring bar

Safety Precautions

Hydrochloric acid is highly toxic by ingestion or inhalation and severely corrosive to skin and eyes. Wear chemical splash goggles, a chemical-resistant apron, and chemical-resistant gloves. Please review current Material Safety Data Sheets for additional safety, handling, and disposal information.

Preparation

To prepare a saturated potassium chloride solution, dissolve 20 g of potassium chloride in 50 mL of distilled or deionized water. Put a magnetic stirring bar in the solution and place the beaker on a magnetic stirrer. Stir vigorously until saturated.

Procedure

1. Add 2 mL of the concentrated hydrochloric acid solution to 50 mL of the saturated potassium chloride solution.
2. Note the immediate precipitation of potassium chloride crystals.

Disposal

The potassium chloride solution may be flushed down the drain with excess water according to Flinn Suggested Disposal Method #26b. Please consult your current *Flinn Scientific Catalog/Reference Manual* for general guidelines and specific procedures governing the disposal of laboratory waste.

Discussion

Addition of chloride ions in the form of hydrochloric acid to a saturated potassium chloride solution causes instantaneous precipitation of potassium chloride.

$$KCl(s) \quad K^+(aq) + Cl^-(aq)$$

According to LeChâtelier's principle, if a system is at equilibrium and a reactant or product is added to the system, the reaction will shift so as to reestablish equilibrium. In this case, when additional chloride ions are added, the reaction shifts to the left to compensate for the additional chloride ions present in solution.

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Connecting to the National Standards

This laboratory activity relates to the following National Science Education Standards (1996):

Unifying Concepts and Processes: Grades K–12
Evidence, models, and explanation
Constancy, change, and measurement
Content Standards: Grades 9–12
Content Standard B: Physical Science, structure and properties of matter, chemical reactions

Flinn Scientific—Teaching Chemistry™ eLearning Video Series

A video of the *Common Ion Effect* activity, presented by George Gross, is available in *Solubility Equilibria* and in *Exploring Equilibrium*, part of the Flinn Scientific—Teaching Chemistry eLearning Video Series.

Materials for *Common Ion Effect* are available from Flinn Scientific, Inc.

Catalog No.	Description
P0042	Potassium Chloride, KCl, 500 g
H0031	Hydrochloric Acid, HCl, 12 M, 100 mL
GP1015	Beaker, 150-mL
AP7235	Magnetic Stirrer, 79 5 79
AP1088	Magnetic Stirring Bar, 19 5 $^{5}/_{16}$9

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.