Common Ion Effect Revisited

Solubility Equilibria

Introduction

Crystallize potassium chlorate from a saturated solution by adding a saturated solution of potassium chloride.

Concepts

- Solubility
- Common Ion
- Crystallization
- Equilibrium
- Solutions

Materials (for each demonstration)

Potassium chlorate solution, $KClO_3$, saturated, 20 mL
Potassium chloride solution, KCl, saturated, 10 mL
Water, distilled or deionized, 30 mL
Stoppers, to fit test tubes, 2
Test tubes, large, 25-mm × 150-mm, 2
Test tube rack

Safety Precautions

Potassium chlorate is a strong oxidizer. It is moderately toxic and an irritant. It is extremely dangerous since the substance, if only slightly contaminated, will explode when exposed to moderate shock or when heated. Wear chemical splash goggles, a chemical-resistant apron, and chemical-resistant gloves. Please review current MSDS for additional safety, handling, and disposal information.

Preparation

1. To prepare a saturated potassium chlorate solution, dissolve 2 g of potassium chlorate in 20 mL of distilled or deionized water in a large test tube. Insert a stopper and shake the test tube vigorously until the solution is saturated.
2. To prepare a saturated potassium chloride solution, dissolve 4 g of potassium chloride in 10 mL of distilled or deionized water in a large test tube. Insert a stopper and shake the test tube vigorously until the solution is saturated.

Procedure

1. Decant about 1 mL of the saturated potassium chloride solution into the saturated potassium chlorate solution.
2. Note the formation of shining rhombic potassium chlorate crystals.

Disposal

Dispose of the potassium chlorate solution according to Flinn Suggested Disposal Method #12a. 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

Potassium chlorate is much less soluble at room temperature than is potassium chloride. Therefore if excess potassium ions in the form of potassium chloride are added to a saturated potassium chlorate solution, shining rhombic plates of potassium chlorate precipitate.

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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 Revisited* 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 Revisited* are available from Flinn Scientific, Inc.

Catalog No.	Description
P0182	Potassium chlorate, $KClO_3$, 100 g
P0183	Potassium chloride, KCl, 100 g
GP6035	Test Tubes, large, 25 mm 5 150 mm

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