

Potassium Salt Thermal Dissolution And Crystallization Separation Educational Unit Operations Pilot Plant

Item Number: LPK-CIRE



Introduction

This educational pilot plant allows chemical engineering students to perform potassium salt thermal dissolution and cooling crystallization experiments, integrating solubility studies, supersaturation control, and solid-liquid separation in a safe, compact, and customizable laboratory system for hands-on unit operations learning.

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Component	Specifications and Features
Dissolution Reactor	5L Jacketed Borosilicate Glass Kettle with thermal insulation wrap
Crystallization Reactor	5L Jacketed Borosilicate Glass Kettle, transparent for clear observation
Heating System	Circulating thermal oil bath (Ambient to 200°C) with digital controller
Agitation System	Dual overhead mechanical stirrers with variable speed control and digital RPM display
Separation Unit	Heavy-duty plexiglass bag filter with integrated material guide pump
Frame & Mobility	Corrosion-resistant aluminum alloy frame with lockable casters
Dimensions	≤ 1500 mm (Length) × 580 mm (Width) × 1700 mm (Height)

Experimental Module	Student Learning Outcomes	Core Academic Textbook Alignment
Solubility and Saturated Solution Preparation	Determining solubility curves, calculating mass balances, and preparing hot saturated salt solutions.	<i>Unit Operations of Chemical Engineering</i> (Solubility principles and material balances)
Controlled Cooling Crystallization	Observing nucleation, managing supersaturation, and analyzing the impact of cooling rates on crystal size.	<i>Transport Processes and Unit Operations</i> (Crystallization kinetics and mass transfer)
Fluid Agitation and Mixing	Evaluating the impact of impeller speed on dissolution rates and crystal suspension.	<i>Unit Operations of Chemical Engineering</i> (Agitation and mixing of liquids)
Solid-Liquid Vacuum Filtration	Calculating filtration resistance, cake washing efficiency, and mother liquor recovery rates.	<i>Transport Processes and Unit Operations</i> (Liquid-solid separation and filtration theory)
Jacketed Heat Transfer	Analyzing heat transfer coefficients across glass jackets during heating and cooling cycles.	<i>Chemical Engineering Design</i> (Heat transfer equipment and energy balance design)