

Gallium And Indium Selective Extraction Educational Pilot Plant

Item Number: LPK-CGIE



Introduction

Integrated pilot-scale laboratory system for engineering education bridging theoretical concepts with industrial practice enabling hands-on study of liquid liquid extraction reaction kinetics and mass transfer for selective gallium and indium separation featuring real-time IoT connectivity with integrated safety

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Educational Unit Operation / Module	Practical Learning Objectives	Textbook Correlation & Concepts
Liquid-Liquid Extraction & Separation	Determine extraction efficiency, study phase equilibria, and evaluate solvent selection for selective metal separation.	<i>Unit Operations of Chemical Engineering</i> - Liquid-Liquid Extraction - Stage Efficiency and McCabe-Thiele Method
Multiphase Reaction Engineering	Analyze reaction kinetics in stirred tank reactors, evaluate mixing performance, and determine temperature-dependent reaction rates.	<i>Transport Processes and Unit Operations</i> - Mass Transfer in Multiphase Systems - Agitation and Mixing of Fluids
Process Control & Instrumentation	Program temperature loops, configure precise reactant feed rates, and analyze transient system responses via the touchscreen interface.	<i>Chemical Engineering Design</i> - Instrumentation and Process Control - Safety and Loss Prevention
Material & Energy Balances	Perform overall and component material balances on gallium/indium streams, and calculate thermal efficiency of the heating jacket.	<i>Unit Operations of Chemical Engineering / Chemical Engineering Design</i> - Material Balances around Process Equipment - Heat Transfer in Agitated Vessels

System Component / Parameter	Specification Details	Educational & Experimental Objective
Reactor Construction	High-borosilicate glass and 316L Stainless Steel	Visual observation of liquid-liquid dispersion and phase separation.
Control Interface	15.6-inch touchscreen with integrated 5G/Bluetooth	Hands-on experience with modern industrial SCADA and PLC data acquisition systems.
Feeding & Circulation	High-precision chemical dosing and circulation pumps	Study of flow hydraulics, residence time distribution, and process dynamics.
Thermal Management	Integrated heating system with high-temperature cut-off	Demonstration of heat transfer coefficients and thermal safety control.
Environmental Safety Unit	Atmospheric protective furnace with exhaust adsorption bottle	Practical instruction on industrial green chemistry and gas scrubbing unit operations.