

Multi Functional Membrane Crystallization Educational Unit

Operations Pilot Plant

Item Number: LPK-SMC



Introduction

Integrated bench-scale membrane crystallization pilot plant for engineering education. Provides hands-on training in advanced separation technologies, combining membrane distillation crystallization and process intensification. Features variable scaling vessels, industrial-grade flow control, and interactive digital data acquisition. Customizable for university labs.

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Experimental Module	Key Process Parameters	Core Unit Operations & Textbook Correlation
Membrane Distillation & Concentration	Transmembrane temperature gradient, feed flux, permeate mass accumulation	Membrane separation processes, vapor-liquid equilibria, mass transfer resistance (<i>Unit Operations of Chemical Engineering</i>)
Controlled Temperature Crystallization	Cool-down trajectory, jacket heat transfer coefficient, crystallization induction time	Solid-liquid phase equilibria, nucleation and crystal growth kinetics, heat transfer in agitated vessels (<i>Transport Processes and Unit Operations</i>)
Process Piping & Automation	Pump calibration curves, pressure drop, solenoid valve sequencing	Process flow-sheet development, instrumentation and control, fluid transport system design (<i>Chemical Engineering Design</i>)

Feature	Specification Details
Crystallizer Vessels	Three double-layer jacketed glass crystallizers: 100 mL, 250 mL, and 500 mL
Fluid Circulation	6 remote peristaltic pumps (operating range: 0.1 to 300 rpm)
Valving System	17 high-durability PTFE solenoid valves
Wetted Materials	316L Stainless Steel, PTFE, Borosilicate Glass
Sensors & Instrumentation	Real-time temperature RTDs, inline pressure transducers, and electronic weighing sensors
User Interface	10-inch industrial-grade touchscreen with real-time data logging and export
Frame & Enclosure	Carbon steel spray-coated protective housing
Physical Dimensions	≤ 900 mm × 500 mm × 680 mm