

Multi-Component Gas Pressure Swing Adsorption Pilot Plant

For Unit Operations Education

Item Number: LPK-CBPA



Introduction

Multi-component gas pressure swing adsorption pilot plant designed for unit operations education. Features four-tower configuration, IoT touchscreen control, dual regeneration, and real-time breakthrough curve analysis for engineering training with safety interlocks and mobile frame simulates industrial PSA processes.

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Parameter	Specification
Process Configuration	Four-tower adsorption system with multi-valve routing
Applicable Gas Mixtures	Ethylene/Ethane, Carbon Dioxide/Nitrogen, etc.
Regeneration Modes	Thermal purging, vacuum desorption
Control Interface	15.6-inch IoT-compatible industrial touchscreen
Analytical Instruments	Dual online carbon dioxide gas analyzers
Safety Features	Pressure relief valves, buffer vessel, system interlocks
Structural Frame	Mobile aluminum alloy profile frame with lockable casters
Overall Dimensions	≤ 2200 mm × 580 mm × 1800 mm (L × W × H)

Educational Experimental Module	Core Learning Objectives	Textbook Concept / Terminology
Breakthrough Curve Determination	Measure concentration profiles over time to determine adsorbent saturation capacity.	Mass Transfer Zone (MTZ), Breakthrough Point, Adsorption Capacity
PSA Cycle Optimization	Analyze the effect of cycle times, pressure levels, and step sequences on product purity.	Pressure Swing Adsorption Cycle, Desorption, Purge Step
Adsorbent Regeneration Study	Compare thermal swing regeneration against vacuum desorption in terms of energy and recovery.	Thermal Regeneration, Vacuum Desorption, Sorbent Aging
Multi-Component Selectivity	Evaluate separation factors for different gas mixtures under varying feed compositions.	Adsorption Isotherms, Selectivity Coefficient, Co-adsorption