

Pressure Swing Adsorption Educational Unit Operations Pilot Plant

Item Number: LPK-BYXF



Introduction

Integrated bench-scale pressure swing adsorption pilot plant for hands-on teaching of gas-solid separation, mass transfer, and process optimization using nitrogen-oxygen model, featuring dual-column design, industrial touchscreen control, digital assessment suite, and customizable hardware and software configurations for educational laboratories.

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System Component / Parameter	Specification / Educational Function
Adsorption Column Assembly	Dual-column configuration (Column A & Column B) utilizing premium corrosion-resistant alloy, optimized for solid adsorbent packing and even gas distribution.
Gas Feed & Flow Control	Equipped with integrated flow meters and pressure regulators to manage and monitor feed air inlet conditions.
System Pressure Range	Designed for safe educational pressure swing ranges, utilizing robust pressure transmitters with digital readouts on the control panel.
Control Interface	Integrated industrial touch-screen panel with real-time process flow visualization, solenoid valve control, and cycle timer settings.
Gas Analysis Potential	Configurable for gas composition testing, allowing students to measure separation efficiency during nitrogen/oxygen production runs.
Auxiliary Equipment	Includes reliable pressure relief valves, buffer tanks for feed and product gases, and a quiet-running vacuum pump/compressor assembly.

Classic Textbook Reference	Associated Unit Operations & Theoretical Concepts	Corresponding Experimental Module
Unit Operations of Chemical Engineering	Gas-solid separation processes, adsorption equilibrium isotherms, mass transfer zones, and bed regeneration dynamics.	Dynamic adsorption breakthrough curve determination and regeneration efficiency studies.
Transport Processes and Unit Operations	Mass transfer in packed beds, gas diffusion coefficients, and transient-state concentration profiles.	Evaluation of mass transfer resistance and concentration profiles across the dual adsorbent beds.
Chemical Engineering Design	Process instrumentation and control loops, cycle timing optimization, and vessel safety relief systems.	Programming PLC cycle times, optimizing purge-to-feed ratios, and testing pressure-swing sequencing.