

Carbon Dioxide Capture And Utilization Educational Pilot Plant For Unit Operations

Item Number: LPK-TBJQM



Introduction

Educational pilot plant for carbon dioxide capture and utilization featuring four-tower adsorption, high-temperature regeneration, precise CO₂ analysis, modern touchscreen control, real-time data, and robust construction for hands-on unit operations training in university labs with curriculum alignment and safe operation.

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Parameter / Module	Technical Details	Relevant Textbook Unit Operations & Concepts
Separation Process	Four-tower adsorption/desorption system; operating pressure range: -0.1 to 1 MPa.	Gas absorption, adsorption isotherms, packed-bed hydraulics, and multi-stage separation.
Thermal System	304 stainless steel towers with electric heating jackets (up to 400°C); supports vacuum operation.	Heat transfer in packed beds, thermal regeneration of adsorbents, and vacuum desorption.
Control & Interface	15.6-inch touchscreen terminal; modular 24-signal monitoring; wireless data transmission capability.	Process dynamics, automated control loops, and digital data acquisition.
Analytical Instruments	Inline CO ₂ analyzer ($\pm 3\%$ accuracy); multi-range flow monitoring.	Material balances, species transport, and continuous concentration profile analysis.
Structural Frame	Industrial-grade aluminum alloy frame with casters; dimensions: $\leq 2200 \times 580 \times 2000$ mm.	Pilot plant design, scale-up principles, and process safety layout.