

Green Anhydrous Ethanol Refining Practical Training Pilot Plant

Item Number: LPK-IDES



Introduction

Advanced integrated pilot plant for university labs demonstrating extractive distillation to produce high-purity absolute ethanol from crude feedstock, featuring multi-column continuous operation, closed-loop solvent recycling, and customizable controls for hands-on engineering education, ideal for chemical engineering training and research.

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Parameter	Specifications / Details
Feed Material	Crude ethanol (approximately 20% to 40% concentration)
Target Product	Anhydrous (absolute) ethanol
Crude Refining Unit	Refines 20% ethanol to 95% ethanol; power or pressure-controlled reboiler
Extractive Distillation Unit	Supports extractive and ordinary distillation, solvent separation, and recovery
Footprint Dimensions (per unit)	≤ 2200 mm × 1120 mm × 2940 mm (Length × Width × Height)
Structural Frame	High-quality aluminum alloy frame with mobile casters
Control System	Integrated industrial HMI touchscreens and PLC control

Experimental Module	Key Learning Objectives	Associated Textbook & Core Concepts
Crude Ethanol Distillation	Refining low-concentration feed; determination of optimal reflux ratio and operating parameters.	<i>Unit Operations of Chemical Engineering</i> - Continuous distillation - Fractionating columns - Plate efficiency
Extractive Distillation	Addition of ethylene glycol to alter relative volatility and break the ethanol-water azeotrope.	<i>Transport Processes and Unit Operations</i> - Azeotropic and extractive distillation - Vapor-liquid equilibrium (VLE) modification
Solvent Recovery & Recycle	Separation of water and ethylene glycol for continuous cyclic reuse.	<i>Unit Operations of Chemical Engineering</i> - Reboiler heat transfer - Multicomponent separation
Industrial Process Control	Operational control (power vs. pressure modes), piping layout logic to prevent cross-contamination.	<i>Chemical Engineering Design</i> - Process flow diagram development - Piping and instrumentation design - Material and energy balances