

Carbon Material Thermal Pretreatment Multiphase Separation Educational Pilot Plant

Item Number: LPK-CJZFL15



Introduction

Educational pilot plant for carbon material thermal pretreatment and multiphase separation. Features jacketed agitated reactor, separation column, and modern controls for hands-on unit operations training in heat transfer, fluid flow, and process safety with industrial-grade materials and wireless data acquisition.

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Component / Subsystem	Technical Specifications	Experimental Modules	Academic Textbook Alignment
Jacketed Agitated Reactor	316L stainless steel, high-torque stirrer, variable speed control, integrated electric heating jacket.	- Agitation and mixing dynamics - Heat transfer through jacketed walls - Thermal decomposition and pretreatment kinetics	<i>Unit Operations of Chemical Engineering</i> (Heat Transfer to Fluids in Agitated Vessels, Mixing of Liquids) <i>Transport Processes and Unit Operations</i> (Agitation and Mixing of Fluids)
Separation Column & Condenser	Insulated fractionating/separation column with 316L stainless steel packing, reflux control.	- Multi-phase thermal separation - Condensation and vapor-liquid equilibrium (VLE) - Mass transfer efficiency	<i>Unit Operations of Chemical Engineering</i> (Distillation, Vapor-Liquid Mechanics) <i>Transport Processes and Unit Operations</i> (Gas-Liquid Separation Processes)
Receiver & Separator Vessels	Dual 316L stainless steel receivers with integrated pressure transmitters and safety relief valves.	- Gravity and phase separation mechanics - Accumulation dynamics under pressure - Process safety relief protocols	<i>Chemical Engineering Design</i> (Vessel Design, Safety Relief Systems) <i>Unit Operations of Chemical Engineering</i> (Gas-Liquid and Liquid-Liquid Separation)
Control Console & Instrumentation	15.6-inch touchscreen, PLC control, multi-point RTD sensors, pressure transducers, wireless/cloud connectivity.	- Process dynamics and control loop tuning - Real-time digital data acquisition - Remote monitoring and IoT integration	<i>Chemical Engineering Design</i> (Process Control and Instrumentation) <i>Transport Processes and Unit Operations</i> (Measurement and Control Principles)