Crude Benzene Hydrogenation Educational Unit Operations Pilot Plant

Item Number: LPK-CBJQ

Introduction

Advanced pilot plant for higher education, enabling hands-on study of crude benzene hydrogenation and gas-liquid catalytic reactions. Triple-stage reactor system with precision flow and temperature control, AI-driven PID, remote monitoring, and comprehensive safety interlocks. Customizable for curriculum integration.

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Component/Feature	Technical Specification	Curriculum & Textbook Mapping
Reactor System	Triple-stage series (deoxygenation, 1st stage, 2nd stage) in 316L Stainless Steel; Max pressure: 10 MPa	Multiphase Reactor Design, Heterogeneous Catalysis, Kinetics of Series Reactions
Flow Management	Mass flow controllers for H_2 and N_2 (Range: 0–1000 mL/min; Accuracy: ±0.5%)	Fluid Flow, Gas-Liquid Mass Transfer, Stoichiometric Flow Calculations
Thermal Control	PID-driven automatic temperature control; Programmed temperature ramping	Process Dynamics and Control, Heat Transfer in Jacketed Reactors
Safety Systems	Hydrogen gas leak sensors, automatic over-limit shutdown, 304 SS safety enclosure	Process Safety Management, Hazardous Operation (HAZOP) Studies
Control Interface	Dual-mode control (Local touchscreen + Cloud/Web remote monitoring platform)	Industrial Instrumentation, Distributed Control Systems (DCS), Remote Process Monitoring