

Residence Time Distribution And Reactor Flow Characteristics Determination Educational Pilot Plant

Item Number: LPK-RTDRF



Introduction

This versatile educational pilot plant is designed for comprehensive study of residence time distribution and reactor flow characteristics, featuring multiple CSTRs in series, a tubular reactor, variable recycle loop, and automated real-time data acquisition, perfect for hands-on chemical engineering education.

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Parameter / Module	Technical Specification / Description	Educational Focus
Reactor Array	Four transparent CSTRs in series and one vertical tubular reactor	Multi-stage mixing versus plug flow behavior
Tracer Injection System	Pulse tracer method with inline conductivity monitoring	Measurement of stimulus-response curves
Recycle Capability	Adjustable circulation loop with variable circulation ratio (\$R\$)	Study of backmixing and transition from plug flow to mixed flow
Frame & Mobility	High-quality aluminum alloy frame with lockable casters; dimensions $2200 \text{ mm} \times 580 \text{ mm} \times 2280 \text{ mm}$	Industrial-type equipment layout and space efficiency
Data Acquisition	Digital sensors linked to a dedicated control terminal with real-time software analysis	Data logging, curve fitting, and parameter calculation (\$N\$ parameter)
Customization Scope	Tailor-made software dashboards and adjustable hardware configurations	Adaptation to specific departmental research or teaching needs

Laboratory Session	Measured Parameters & Phenomena	Textbook Concept / Terminology
RTD in CSTRs in Series	Pulse response, determination of vessel count parameter (\$N\$)	Tanks-in-Series Model, Perfect Mixing, Non-Ideal Flow
RTD in Tubular Reactors	Influence of fluid velocity on tracer dispersion	Plug Flow Reactor (PFR) Model, Axial Dispersion Model
Backmixing with Recycle	Effect of variable circulation ratio (\$R\$) on RTD curves	Recycle Reactors, Intermediate Flow Patterns, Backmixing Degree