



REACTION SYSTEMS

Process Design

Reaction systems are designed and manufactured based on the users' needs such as studying a reaction kinetics at laboratory and pilot scale, catalyst screening or development. We offer TRL-RXN systems as it will provide best solution to your applications.

TRL-RXN systems consist of four main units such as upstream conditioning, reaction/sorption, downstream conditioning and analysis.

Plug Flow Reactors and Continuous Stirred Tank Reactors in our portfolio are for student laboratories in chemical engineering departments of colleges and universities.

PFR systems are designed to monitor a liquid phase reaction taking place in tubular reactor. These are designed for maximum versatility, ease of use, operator adjustable reactor temperature, reactant flow rate and concentration. All wetted parts are PTFE or SS316.

TRL-CSTR system is designed to monitor a liquid phase reaction taking place in a stirred tank. These systems are designed for maximum versatility, ease of use, operator adjustable reaction temperature and reactant flow rates. Wetted parts are PTFE and pyrex glass.

Upstream Conditioning Units

Following functions are performed here:

- > Flow rate control through mass flow control valves or volumetric flow adjustment valves for both liquid and gas samples
- > Controlled gas blending for desired reactants composition or calibration of analyzers
- > Controlled vapor generation
- > Preheating or cooling of the feed to desired temperatures
- > Pressure control
- > Software controlled flow profile option



Example of upstream conditioning unit for a custom designed reaction system, that contains gas mixer driven by software control and preheating of the mixture stream before reaction



Reaction/Sorption Units

Following functions are performed here:

- > Fixed bed, fluidized bed, plug flow, continuous stirring and batch reactors with regard to application area
- > Quartz, pyrex, stainless steel reactors from lab scale to pilot scale
- > Multizone temperature control
- > Horizontal and vertical reactor options
- > Control of temperature by software or hardware
- > Software controlled temperature profile option
- > Pressure control



Examples of different custom designed reaction systems

Downstream Conditioning Units

Following functions are performed here:

- > Temperature control of the reaction products
- > Drying and gas-liquid separation
- > Mass flow measurement
- > Mist separation
- > Flow rate control
- > Pressure control



Example of a downstream conditioning unit including rate, moisture indicator, halogen scrubber, mist trap, L/V separation and membrane drying equipment



Syngas monitoring (CH_4 , CO , H_2) system that contains gas conditioning unit and software controlled analyzer data collection

Analysis Units

Following functions are performed here:

- > Reactants and product characterization based on many techniques, including mass spectrometry, nondispersive infrared, TCD, FID, GC and chemiluminescence detectors.
- > Fast data acquisition and quantitative result calculation and presentation via software

Monitoring and Control

Following functions are performed here:

- > Temperature control by software or individual controllers
- > Software controlled temperature profile option
- > Software controlled flow profile option
- > Fast data acquisition software
- > Software controlled flow and temperature profile option
- > Integrated software for data presentation and reporting
- > Export to external data analysis software e.g. Excel
- > Safe startup and shutdown of the system through the software



Wide Range Of Applications

Catalysis Research/Development

We offer reaction systems that are designed for your catalyst research applications such as catalyst screening and development, catalytic activity and selectivity testing, TPD, TPR, TPO, TPRxn experiments, that requires control of flow rate, temperature, pressure, upstream conditions, for both heterogenous and homogenous catalyst types.



Example of a custom designed catalyst screening test system that contains software controlled conditioning units for up and down stream, two zone temperature controlled reactor, which can be adjusted both vertical and horizontal, and gas analysis unit



Example of a custom designed sorption system that contains software controlled conditioning units for up and down stream, sorption and gas analysis unit

Sorption Studies

Parameters such as temperature, pressure, gas concentrations are very important in sorption studies such as sorbent materials development, hydrogen sorption, CO₂ sequestration. We can design and manufacture sorption systems based on years of experience.

Reaction Kinetics

Our reaction systems can be the best solution for applications related to reaction kinetics that are linked to the parameters such as temperature, concentration of reactants, flow rate of reactants and reactor type.



Example of a standard designed CSTR system that contains manual controlled stirring, flow rate and temperature options

How to Order Reaction System

Please contact us for specifying the needs and requirements in four elements of the whole system as to fit in the budgetary and technical constraints. A questionnaire will be requested to be filled in to proceed ending with a quotation.

Application Areas of Our Products

Bioreaction Systems / Fermenters

Pilot and lab scale bioprocess/fermentation systems that are customized according to customer needs to provide best solutions for customers' applications such as cell culture, biofuel, microbial fermentation, waste treatment, biopolymers, biogas.



Reaction / Sorption Systems

Pilot and lab scale reaction systems, which can contain upstream and downstream conditioning, reaction/sorption and analysis units with regard to customer needs, for catalyst research/development, sorption studies and reaction kinetics.



Carbon and Nitrogen Analyzers

Excellent and unique analyzers for analysis of soil, sludge, biomass, fertilizer, foodstuff, sheet metals, water, coal and minerals for total carbon, total organic carbon, residual organic carbon, surface carbon, inorganic carbon and total nitrogen parameters.



Online TOC-Monitoring Analyzers

Analyzers with very low drift, for quality control and monitoring of total organic carbon in process water, tap water, river water, lakes, drinking water, municipal and industrial waste water.



We:

develop
design
manufacture

processes and equipment, for:

research
production
analysis

in the field of:

reaction engineering, sorption studies and catalysis research
environmental monitoring
bioprocesses

for:

development of future energy resources and processes
protection of environment



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