

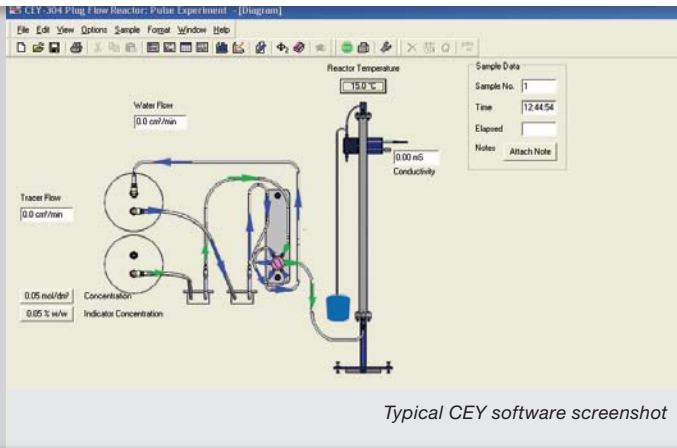


Two New Reactor Accessories for use with the Armfield CEX Chemical Reactors Service Unit. These reactors demonstrate flow patterns and reaction rates. They can be used as highly visual flow demonstration techniques, but also include the instrumentation for performing analysis of the reactions and comparing the progress of the reactions with the theory.

The CEY demonstrates step and pulse changes for Plug flow characterisation and steady state conversion for a second order reaction.

The CEZ demonstrates step change for Laminar flow characterisation and steady state conversion for second order reaction.





Typical CEY software screenshot

DEMONSTRATION CAPABILITIES - CEY

- > Determination of the residence time distribution of the reactor
- > Study of the reactor response to different perturbations: step and pulse change
- > Effect of flow rate and feed concentration on the determination of flow pattern
- > Demonstration of the flow pattern in the reactor and comparison with the theoretical model
- > Determination of the steady state conversion of a second order reaction
- > Effect of flow rate and feed concentration on the steady state conversion
- > Visual demonstration of the reactor response with tracer techniques
- > Visual monitoring of the steady state conversion for a chemical reaction

DESCRIPTION - CEY

The Armfield Plug Flow reactor is a tubular reactor made of clear acrylic, packed with glass beads and mounted on a steel frame. A static premixer at the bottom of the column provides pre-mixing of the reagents entering the reactor and improves the flow distribution. A clear acrylic sensor block is mounted on the frame for the CEX conductivity and temperature sensors.

The reagents are fed to the reactor by the CEX peristaltic pumps, using PTFE tubing.

A 6 port injection valve fitted to the CEX Reactor service Unit is used to provide the step or pulse input changes of the reagents.

Tracer experiments and conversion experiments may be demonstrated and followed visually.

Conductivity data logging allows the student to apply the flow pattern characterisation theory and compare it with the experimental results.

Conductivity data logging allows the student to apply the flow pattern characterisation theory and compare it with the experimental results.

ESSENTIAL ACCESSORIES

CEX Chemical Reactor Unit

OPTIONAL ACCESSORIES

CEX-304IFD data logging accessory
(Recommended for recording conductivity variations)

OVERALL DIMENSIONS

Reactor Unit: Height: 1.38m
Width: 0.30m
Depth: 0.25m

Feed assembly: Height: 0.416m
Width: 0.507m
Depth: 0.33m

SHIPPING SPECIFICATION

Volume: 0.5m³
Gross weight: 22kg

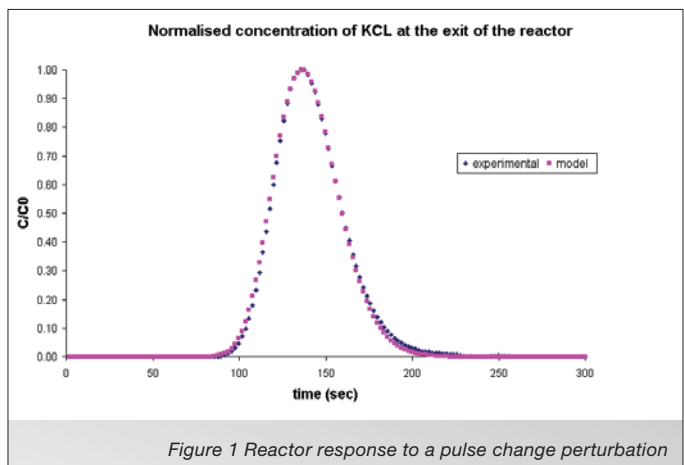
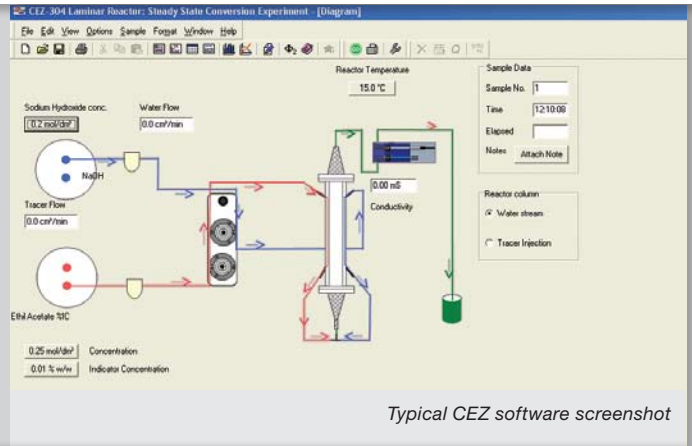


Figure 1 Reactor response to a pulse change perturbation



Typical CEZ software screenshot

DEMONSTRATION CAPABILITIES - CEZ

- > Determination of the residence time distribution of the reactor
- > Study of the reactor response to inlet perturbations: step change
- > Effect of flow rate and feed concentration on the determination of flow pattern
- > Effect of the temperature on the laminar flow characterisation
- > Demonstration of the flow pattern in the reactor and comparison with the theoretical model
- > Determination of the steady state conversion of a second order reaction
- > Effect of flow rate and feed concentration on the steady state conversion
- > Visual demonstration of the reactor response with tracer techniques and laminar flow
- > Visual monitoring of the steady state conversion for a chemical reaction

DESCRIPTION - CEZ

The Armfield Laminar Flow reactor is a tubular reactor made of clear acrylic, with two diffusers packed with glass beads located at the ends and mounted on a steel frame. A static premixer at the bottom of the column provides pre-mixing of the reagents entering the reactor and improves the flow distribution.

Heat exchangers are used to cool down the contents of the reagent vessels before performing the experiment and a cold water jacket keeps the reactor contents at constant temperature in order to maintain the laminar characteristic. A thermostatically controlled supply of chilled water is required for this, such as the Armfield CW17.

A clear acrylic sensor block is mounted on the frame for the CEX conductivity and temperature sensors.

The reagents are fed to the reactor by the CEX peristaltic pumps, using PTFE tubing. Pulsation dampers are used to ensure a smooth flow.

Tracer experiments and conversion experiments may be demonstrated and followed visually.

Conductivity data logging allows the student to apply the flow pattern characterisation theory and compare it with the experimental results.

ESSENTIAL ACCESSORIES

CEX Chemical Reactor Unit

OPTIONAL ACCESSORIES

CEX-304IFD data logging accessory
(Recommended for recording conductivity variations)

CW – 17 Chilled water accessory
(or supply of temperature controlled chilled water, typically 2L/min. at 5-18°C).

OVERALL DIMENSIONS

Reactor Unit: Height: 1.46m
Width: 0.30m
Depth: 0.25m

Feed assembly: Height: 0.416m
Width: 0.507m
Depth: 0.33m

SHIPPING SPECIFICATION

Volume: 0.5m³
Gross weight: 22kg

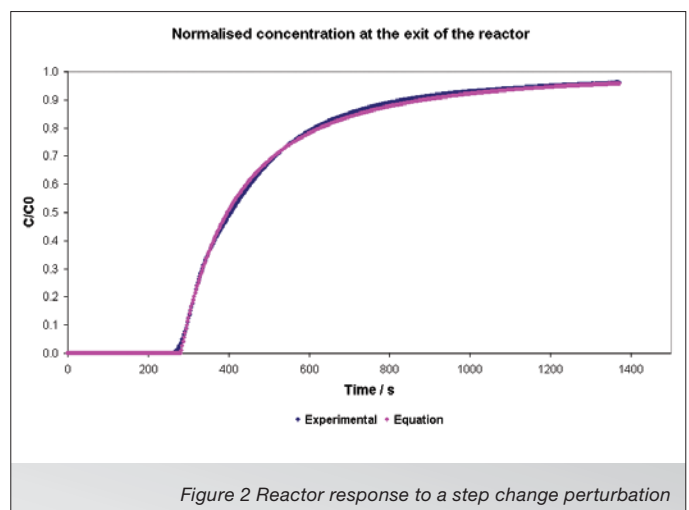


Figure 2 Reactor response to a step change perturbation

ORDERING SPECIFICATION CEY

- A small scale plug flow reactor (1 litre working volume) designed to demonstrate both flow pattern characterisation and steady state conversion in a packed tubular reactor with axial dispersion
- The reactor column is 1107mm long, packed with 3 mm diameter glass beads
- A static premixer is fitted at the base of the column
- A feed assembly is supplied with the reactor which consists of a 6- port injection valve mounted on a base plate, special lids for Service Unit reagent vessels and PTFE pipe to use with Service Unit
- The unit is mounted on a painted frame and includes a sensor block for conductivity and temperature sensors
- Can perform flow visualization where the progress of the reaction can be monitored visually using colour
- Can also perform true reactions where the progress of the reaction is recorded using the Service Unit conductivity sensor and compared with the theory
- Demonstration capabilities include:
 - o Flow pattern characterisation in a packed Plug Flow reactor with axial dispersion
 - o Steady state conversion for a chemical reaction in a packed reactor
 - o Understanding the principles of tracer techniques in flow pattern characterisation
 - o Visual monitoring of the tracer and conversion experiments using colour

ORDERING SPECIFICATION CEZ

- A small scale Laminar flow reactor (400ml working volume) designed to demonstrate both flow pattern characterisation and steady state conversion in a tubular reactor
- The reactor column is 1300mm long including diffusers packed with glass beads
- A static premixer is fitted at the base of the column
- Reactor column is jacketed with easy connections for recirculating cooling system
- A feed assembly is supplied with the reactor which consists of two pulsation dampers mounted on a base plate, special lids for Service Unit reagent vessels and PTFE interconnecting pipe
- Stainless steel coils are mounted on the reagent vessel lids to cool their contents. Quick release connectors allow easy supply of cold transfer medium to the coil and reagents
- The unit is mounted on a painted frame and includes a sensor block for conductivity and temperature sensors
- Can perform flow visualization where the progress of the reaction can be monitored visually using colour
- Can also perform true reactions where the progress of the reaction is recorded using the Service Unit conductivity sensor and compared with the theory
- Requires a Service Unit
- Demonstration capabilities include:
 - o Flow pattern characterisation in a Laminar flow reactor
 - o Steady state conversion for a chemical reaction with laminar flow
 - o Understanding the principles of tracer techniques in flow pattern characterisation
 - o Visual monitoring of the tracer and conversion experiments using colour



Head Office:
 Armfield Limited
 Bridge House, West Street,
 Ringwood, Hampshire.
 BH24 1DY England
 Telephone: +44 1425 478781
 Fax: +44 1425 470916
 E-mail: sales@armfield.co.uk

U.S. Office:
 Armfield Inc.
 436 West Commodore Blvd (#2)
 Jackson, NJ 08527
 Telephone: (732) 928 3332
 Fax: (732) 928 3542
 E-mail: info@armfieldinc.com

Scan QR code* to download the latest version of this datasheet or click: www.armfield.co.uk/cey-cez

* Scan with mobile smartphone or webcam with barcode scanning software installed.



An ISO 9001 Company

Innovators in Engineering Teaching Equipment

learn more! www.armfield.co.uk

