

## CEZ Plug flow reactor

The CEZ Plug flow reactor demonstrates step and pulse changes for plug flow characterisation and steady-state conversion for a second order reaction. It is a tubular packed column reactor made of clear acrylic and mounted on a steel frame. A static premixer at the bottom of the column provides premixing of the reagents entering the reactor to improve the flow distribution.

A clear acrylic sensor block is mounted on the floor standing frame and houses the CEXC conductivity and temperature sensors. The reagents are fed to the reactor by the CEXC feed pumps using PTFE tubing. A six-port injection valve fitted to the CEXC 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.

### Experimental content

- ▶ Determination of residence time distribution of a Laminar flow reactor
- ▶ Flow pattern characterisation - Step change
- ▶ Flow pattern characterisation - Pulse change
- ▶ 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 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 monitoring of the steady state

### Ordering Specification

- ▶ A small-scale plug flow reactor for use with the CEXC designed to demonstrate both flow pattern characterisation and steady-state conversion in a packed tubular reactor with axial dispersion
- ▶ The reactor column is 1044mm long with a 1l working volume. It is packed with 3mm diameter glass beads
- ▶ A feed assembly is supplied with the reactor which consists of a six-port injection valve mounted on a base plate and a feed vessel assembly with heat exchangers for cooling for use with the CEXC and the CW-17
- ▶ The reactor assembly is mounted on a painted frame and includes a sensor block for the conductivity and temperature sensors from the CEXC
- ▶ 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 CEXC conductivity sensor and compared with the theory

### Requirements

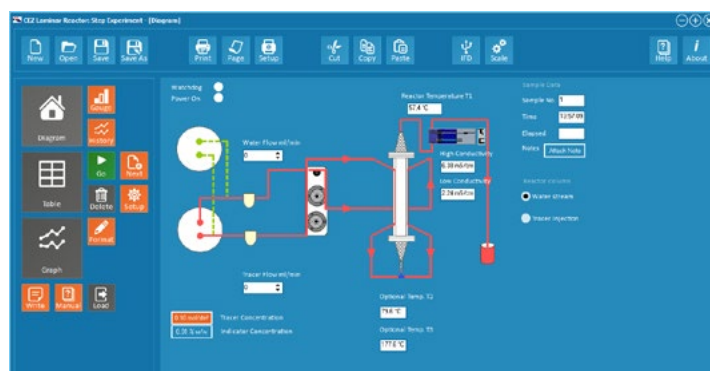
### Scale



Requires CEXC Base Unit to operate

#### Consumables:

- ▶ 500ml of 2M Hydrochloric acid
- ▶ 10mg Crystal Violet
- ▶ 50ml Ethyl Acetate
- ▶ 20g NaOH Sodium Hydroxide
- ▶ 20mg Indigo Carmine



CEZ Software screen capture

### Overall dimensions

Length	1.00m
Width	0.50m
Height	0.50m

### Packed and crated shipping specifications

Volume	0.5m <sup>3</sup>
Gross weight	22Kg

### Ordering codes

CEZ