

LABTRIX®

FAST REACTION DEVELOPMENT RESULTING IN SCALABLE FLOW CHEMISTRY METHODS

PRODUCT DESCRIPTION

The Labtrix® system is a fully-automated, standardized, "plug-and-play" platform for laboratory based reaction screening, optimization and kinetic data determinations using flow chemistry. Labtrix® can be used to perform syntheses at temperatures ranging from -15 °C to +195 °C and at pressures of up to 25 bar. Labtrix® can be used to evaluate many reaction parameters in a short period of time, employing very little raw material.

BENEFITS

Speed:

Reaching a steady state is rapid thanks to the small reactor volumes which enable fast changes in temperature and flow rate. Literally hundreds of reaction conditions can be explored in a day!

Flexibility:

The system is delivered with 5 different pre-defined micro reactors, enabling a wide variety of synthetic reactions to be evaluated. Optional reactors are available for biphasic (l/l & g/l) as well as heterogeneous catalysis.

Glass reactors:

The reactors supplied with Labtrix® are fabricated using Schott borosilicate D263 glass, which affords excellent chemical compatibility for a wide range of synthetic transformations.

Extreme conditions:

Syntheses can be performed in a pressurized system (< 25 bar), over a wide temperature range (-15 to +195 °C) enabling facile access to extreme reactions conditions. While maintaining all commonly used organic solvents in the liquid phase.

Multiple input/step syntheses:

The variety of reactors supplied with the system enables reactions ranging from those employing two to five solution inputs allowing multi-step or multi-input syntheses to be performed on a single reactor.

Auto-sampling:

As the system is capable of producing multiple samples in a short period of time, automatic sample collection allows the system to be operated unattended.

Data-logging:

Automatic parameter logging enables archiving of the reaction conditions employed.

Customization:

Upon request, customized reactors can be produced to meet the needs of a special user.

CE qualified



SYNTHETIC ROUTE DEVELOPMENT

The speed of this micro reactor system makes it ideal for:

- Component searches
- Reaction scouting and optimization
- Kinetic data determinations
- Process feasibility studies
- Process validation
- Additive screening

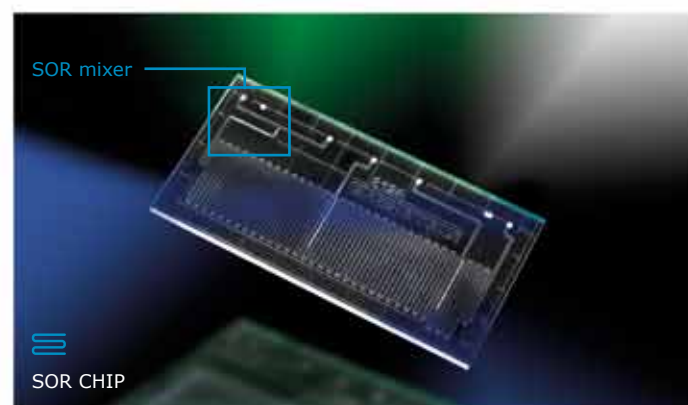
...and doing so with very small amounts of material

The speed and automation of this system enables the chemist to perform an exhaustive reaction screen, producing a truly optimized method suitable for translation into continuous production process.

METHOD SCALABILITY

Being able to quickly characterize and understand a reaction is valuable in itself, but many will want to transfer such a method to larger scale. A flow chemistry method that cannot be transferred to a production method is then of little use. On the other hand, developing on a production scale reactor ("meso reactor") can waste time and reagents.

Labtrix uses the same SOR ("Staggered Oriented Ridges") mixers as the Chemtrix production reactors; affording predictable process scale up!



EXAMPLES OF REACTIONS PERFORMED WITH LABTRIX®:

- **Highly exothermic reactions**
- good heat transfer, high purity.
- **Synthesis of compounds with solid supported catalyst**
- no loss of catalyst, higher catalyst efficiency, analytically pure product and efficient catalyst recycle.
- **Biphasic reactions (l/l and g/l)**
- **Multi-step Synthesis**
- less reaction steps, higher purity and no purification steps needed in between steps.

Detailed examples of performed reactions in flow chemistry by Chemtrix are available in our library at www.chemtrix.com.

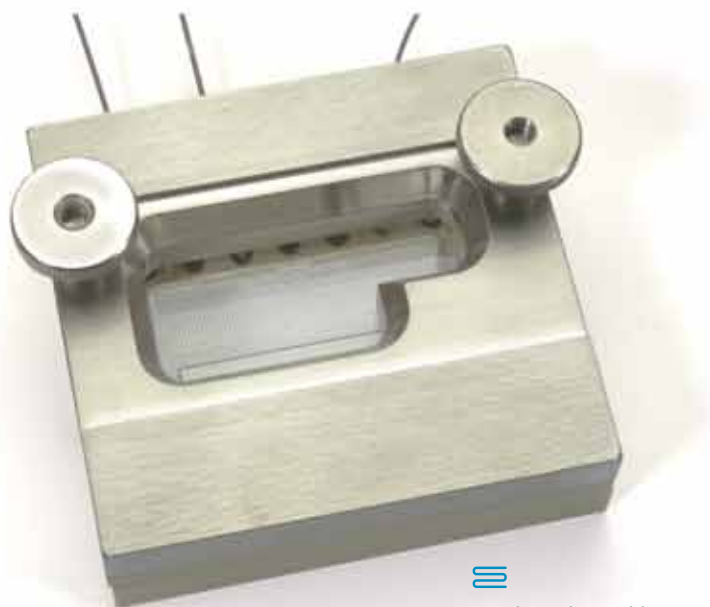
Also available on www.chemtrix.com are application notes and whitepapers on several topics and reactions performed using flow chemistry.

SPECIFIC EXAMPLES

- Manipulation of Grignard Reagents within Labtrix Reactors
- Butyl lithium chemistry

CHEMICAL RESISTANCE

Solvent	Compatibility System Parts
Acetone	✓ Peek
Ethanol	✓ Peek
Methanol	✓ Peek
Hexane	✓ Peek
DCM	✓ Peek
Ethyl acetate	✓ Peek
Diethyl ether	✓ Peek
Tetrahydrofuran	✓ Peek
Dimethylformamide	✓ Peek
Dimethyl sulfoxide	✓ Peek
Acetonitrile	✓ Peek
Glacial acetic acid	✓ Peek
N-Methylpyrrolidine	✓ Peek
Sulfuric Acid	✓ Techtron
n-BuLi	✓ Techtron
AlCl ₃ in nitrobenzene	✓ Techtron
Nitric acid	✓ Techtron



Catalyst Chip Holder

TECHNICAL SPECIFICATIONS

System Lay out

Housing surface:

PTFE coated.

Pumps

5 (pumps 4 and 5 can be linked for continuous delivery).

Syringes

Glass syringes with PTFE plungers.

Syringe volume

typical 1 ml (up to 2.5 ml possible).

Standard Reactors

3221 1 µl SOR mixer	A+B = P1 + Q = P
3222 5 µl SOR mixer	A+B = P1 + Q = P
3223 10 µl SOR mixer	A+B = P1 + Q = P
3224 5µl+5µl SOR mixer	A+B = P1 + C = P2 + Q = P
3225 2µl+8µl SOR mixer	A+B+C = P1 + D=P2+Q=P

Other Reactors

3021 1 µl T-Mixer	A+B = P1 + Q = P
3022 5 µl T-Mixer	A+B = P1 + Q = P
3023 10 µl T-Mixer	A+B = P1 + Q = P
3024 5µl+10µl T-Mixer	A+B = P1 + C = P2 + Q = P
3025 10 µl T-Mixer	A+B+C = P1 + Q = P

3026 Catalyst Chip

(with heterogeneous catalyst)

A+B = P

Tubing

Standard PEEK (other materials available including fused silica and FEP).

Pressure Regulator (BPR)

Supplied at 25 bar, can be adjusted to different pressures.

Selection Valve

Diverts output to sample collection or to waste.

Carousel

Number of sample vials: 30 Vial type: Glass with PTFE septum.

Vial volume

2ml. Actuator moves needle up and down into vial.

Waste Bottle

Standard 60 ml.

Process Window

Residence time (τ)	Temperature (T)	Pressure (P)
t _{res} min: 1.5 sec	Tmin -15 °C	Pmin: 0 bar
t _{res} max: 50 min	Tmax +195 °C	Pmax: 25 bar

Operating modes

Manual Mode and Automatic Mode

Data logging

Possible in both Manual Mode and Automatic Mode.

Logged data

Time, Flow, Pumped volumes, Temperature, Pressure, Vial number, with a graphical process window displayed.

Labtrix is supplied with five standard reactors (see above), syringes, software and Laptop computer.