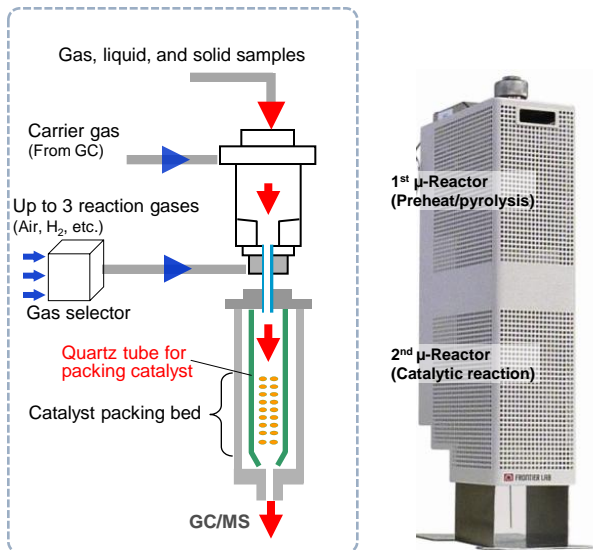


**NEW!****Rapid Screening Reactors for GC/MS**

# Tandem $\mu$ -Reactor “ Rx-3050TR ”

The  $\mu$ -Reactor system having a catalyst packed reactor is directly interfaced to a GC/MS system and is used to analyze gas-phase contact reaction products for rapid screening of catalysts. The temperatures and reaction gases (atmosphere gases) can be changed without effort, so that reaction conditions can be easily varied. (Single  $\mu$ -Reactor Rx-3050SR having only one catalyst reactor is also available.)



Flow scheme of Tandem  $\mu$  - Reactor and exterior view

## FEATURES

### 1) Catalysts screening with all sample forms (see figures below)

Catalyst reaction products can be monitored through online-MS analysis mode. Also, GC/MS analysis can be performed at desired reactor temperatures.

### 2) Micro-Reactors capable for rapid heating/cooling

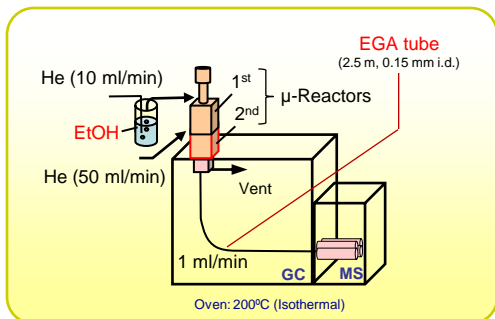
The micro-Reactors feature with multi-linear temp. programs and multi-stepwise temp. programs (up to 8 steps). The ramp rate can be set from 1°C to max 200 °C/min, while the temperature can be controlled from 40°C to 700°C.

### 3) Rapid switching of catalyst reaction tubes

Switching catalysts can be accomplished in a few minutes using the proprietary quartz reaction tube (i.d. 3 mm, o.d. 4 mm, length 78 mm).

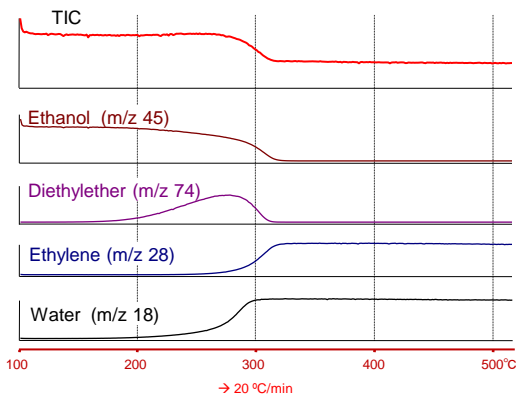
## Online – MS analysis

Catalytic reaction products were monitored when the reaction temperature was raised at a constant ramp rate. The amount of ethanol sharply dropped at around 280°C, while that of diethylether increased. Also, the formation of ethylene and water was observed.



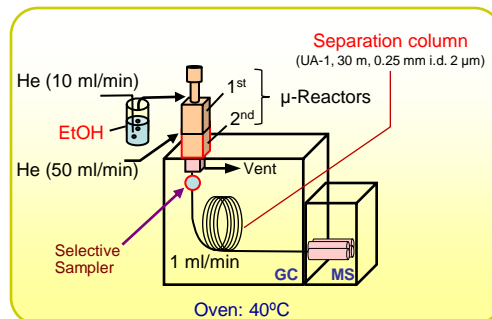
1<sup>st</sup>  $\mu$ -Reactor: 100°C, 2<sup>nd</sup>  $\mu$ -Reactor: 100-500°C (20 °C/min)

Catalyst: H-ZSM-5 (20% coating on Al<sub>2</sub>O<sub>3</sub>, 20/30 mesh)



## GC/MS analysis of selected temperature zones

Based on the online-MS analysis results, the volatiles released from each temperature zone were introduced to a separation column and analyzed. It was observed that as the reactor temperature was raised, ethylene and water were formed while the amount of ethanol formed sharply dropped.



1<sup>st</sup>  $\mu$ -Reactor: 100°C, 2<sup>nd</sup>  $\mu$ -Reactor: 100-400°C

Catalyst: H-ZSM-5 (20% coating on Al<sub>2</sub>O<sub>3</sub>, 20/30 mesh)

