

[A new technique for the rapid characterization of catalysts: Tandem micro-reactor–gas chromatography/mass spectrometry](#)

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Abstract:

The design of a tandem micro-reactor is discussed. A tandem micro-reactor, consists of two reactors (upper and lower), which are individually temperature-controlled. The upper reactor (1st reactor) is used to preheat a gas, vaporize a liquid, or thermally decompose (i.e., pyrolyze) organic solids in order to form a vapor phase sample. The catalyst reaction tube is packed with a catalyst and placed in the lower reactor (2nd reactor). Vapors from the 1st reactor flow into the reaction tube in the lower reactor, where they react with the catalyst. A mass flow controller allows selection of one to three reactant gases that can be introduced to the sample vapors exiting the upper reactor prior to entering the lower reactor containing the catalyst bed. The reaction products exiting the lower reactor flow directly into the gas chromatograph for analysis. The catalyst is evaluated by noting what compounds are formed and their relative distribution using mass spectrometer detection. The transformation of cellulose, glycerol, and Jatropha “press cake” illustrate the value and convenience of using the tandem micro reactor to rapidly characterize a catalyst or a series of catalysts.

\* Excerpted from online journal website (Click the title)

Frontier Labs products used:

Multi-Shot Pyrolyzer