

### **547c The Effect of Microreactor Geometry on Performance**

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The objective of this paper is to understand how microreactor geometry affects performance. In particular, the performance of posted and channel microreactors is compared for a simple test reaction  $2 \text{NH}_3 \rightarrow \text{N}_2 + 3 \text{H}_2$ . We find that geometry plays an important role in performance. For example at a temperature of 550 C and a residence time of 0.2 seconds, a posted reactor gives about 50% conversion while a straight channel reactor gives 98% conversion. Experimentally, the conversion in the posted reactor is as expected for a CSTR, while the conversion in the channel reactor is as expected for a PFR. Flow visualization using smoke to image the flow shows little backmixing in the channel reactor, while the posted reactor shows considerable mixing. RTD measurements show a narrow residence time distribution for the channel reactor. In contrast, the posted reactor shows a broad residence time distribution with many fluctuations. This result suggests that the presence of posts can induce considerable backmixing in a microreactor, even though the flow is laminar.