“Using DynoChem to reduce batch cycle time in a gas-liquid reactor and commission a new unit”

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Mature processes usually migrate from their original definition as operating personnel tweak charges and process parameters to adjust to changes in raw material quality, productivity requirements, utility delivery, and even downstream constraints. When a product is made at more than one plant, there may be multiple versions of a supposedly identical process. We will discuss a process run at two plants where the last step was an extended hold to meet a tight specification on the residual concentration of one of the starting materials. One plant relied on higher reaction temperature to attain a faster reaction and attain the material specification. The other plant ran at a lower temperature but with higher excess raw material. What is the better strategy for reducing cycle time and minimizing unwanted byproducts for these two existing plant in addition to a proposed new third plant?

The key to the problem was in understanding the process chemistry, which turned out to be much more complicated than its simple stoichiometry:

A + B -> C + D

Using a combination of ReactIR data, RC-1 results, and HPLC analysis, we built a reaction pathway scheme and Dynochem kinetic model that allowed us to identify and focus on the optimum processing conditions.