*flow*CAT™ reactor for “tuning” stereoselective hydrogenation of APIs

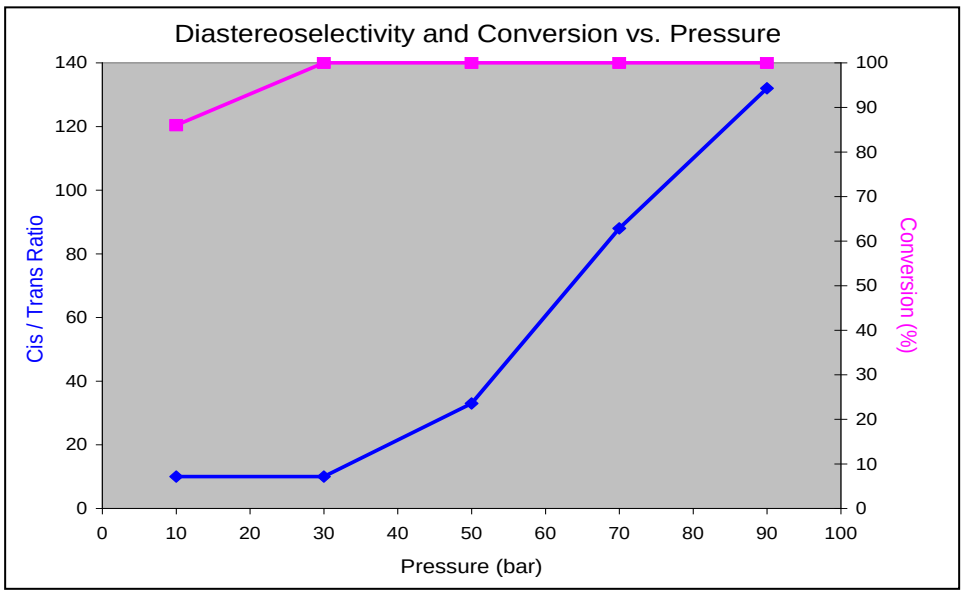
Hydrogenation of organic substrates to achieve desired product slates can be difficult and expensive using conventional stirred reactors. This becomes especially difficult where stereoselectivity needs to be controlled and Joel Hawkins [Pfizer Inc, August 2010] has shown that use of the flowCAT reactor system can overcome many of these difficulties due to the inherent flexibility of control and it’s accessibility for use by non-specialist chemists as both a development tool and a prep-scale production system. The below reaction was specifically evaluated;

Experiments were performed in a standard ¼” internal diameter flowCAT reactor with automatic control of substrate flowrate, hydrogen feedrate and working pressure & Temperature.

The reactor effluent is automatically separated into gas which is vented and liquid product that is collected. Samples can be taken and analysed separately in a GC. Unlike batch production, product-analysis can be conducted in real-time allowing experimental conditions to be altered and conditions to be optimised live – accelerating reaction development and minimising wasted time and raw materials.

Some pertinent results are summarised in the plot below.

The plot demonstrates that for a fixed catalyst loading (and without any physical changes to the experimental set up), it was possible to “tune” the product slate from a cis to trans ratio of 10 to nearly 140 by varying the pressure, and conversions of close to 100% were achieved in almost all cases.



Pfizer were able to produce nearly 100g/day of the particular product slate, using a solution flow of 1ml/minute at a pressure of 90bar; the catalyst was still fully active at the end of run.