Question 75: In your experience, how does the shape of an FCC catalyst particle impact the fluidization properties of the catalyst? What other properties are important to monitor?

ALEXIS SHACKLEFORD and **SHAUN PAN** (BASF Corporation)

The key catalyst properties affecting fluidization are particle size distribution, particle density, and particle shape. Fluidization studies have shown that a change in catalyst shape from spherical to oblong gives a 19% reduction in deaeration rate, due to more drag force with an oblong particle: meaning, itis harder to defluidize this material. However, catalyst with irregular particles and sharp edges, such as attrition generated particles, are harder to unlock and fluidize. Fluidization equations, as appear in the literature, often drop out the shape factor since it is difficult to determine, including the Abrahmsen and Geldart Umb / Umfequation (1980) and Coltters and Rivas (2004).

The variable that affects catalyst fluidization the most is the quantity of less than 45 microns particles (or fines) in catalyst. A catalyst with a range of particle size flows more smoothly than one of uniform size. The smaller particles fit between the larger ones, acting as a lubricant to make flow easier. Improvements in fluidization can also be made by a reduction in e-cat density and a change in particle shape. A reduction in the 80+ microns fraction has an influence, but it is not a major factor.

The following important properties should also be closely monitored:

1. ABD

2. 0-to-45-micron fines content,

3. APS (average particle size), and

4. Attrition, as irregularly shaped particles with sharp edges do not fluidize well.

Tags

Catalysts

Year

2016