The application of inverse gas chromatography to investigate diffusion resistance in FCC catalysts

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Fluid Catalytic Cracking (FCC) **catalysts** are used to convert heavy oil fractions (boiling points >360°C) into lighter products such as gasoline and liquefied petroleum gas [1]. The diffusion rates of feedstock molecules and intermediate products in the FCC catalysts have relevance for the resulting conversion and product selectivity levels [2]. Since the cracking reactions take place in the gas phase in a riser reactor a corresponding method for diffusion measurements (gas-phase, transport diffusion [3]) was developed by means of inverse gas chromatography. In some cases the determined effective diffusion coefficients allowed to explain the catalytic properties of FCC catalysts where traditional analytical tools such as x-ray diffraction and nitrogen sorption reach their limit.
Case studies are presented showing diffusion in FCC catalysts and their catalytic performance when (1) zeolite crystallite size in an FCC catalyst is varied and when (2) an FCC catalyst is contaminated with Fe.

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