# Aromatic hydrocarbon selectivity as a function of CaO basicity and aging during CaO-catalyzed PET pyrolysis using tandem μ-reactor-GC/MS

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Abstract:

During the tandem pyrolysis of poly(ethylene terephthalate) (PET) and catalytic conversion of the PET pyrolysates over calcium oxide (PET/CaO process), the relationship between catalyst deterioration and the aromatic hydrocarbon selectivity was elucidated. Using a tandem micro (μ)-reactor-gas chromatography/mass spectrometry (TR-GC/MS) system, PET was pyrolyzed at 450ºC in the 1st μ-reactor and the PET pyrolysates were refined over one of two CaO catalysts with different basicities at 700ºC in the 2nd μ-reactor. Strongly basic CaO enhanced benzene production via decarboxylation, resulting in 83.6% selectivity for aromatic hydrocarbon products. This selectivity decreased with repeated runs over the strongly basic CaO, while oxygen-containing compounds such as benzophenone and benzoic acid increased. The surface morphology changes observed by scanning electron microscopy indicated that CaO was thoroughly sintered with repeated use, which reduced its basicity. The less-basic CaO effected diminished carboxyl-unit surface adsorption and suffered deteriorated deoxygenation ability. Thus, this study clearly demonstrates that CaO deterioration (by sintering during repeated PET/CaO processing) and CaO basicity strongly influence reaction selectivity.



Frontier Labs Products used:

Tandem μ-Reactor (RX-3050TR)