Catalytic pyrolysis of lignin using a two-stage fixed bed reactor comprised of in-situ natural zeolite and ex-situ HZSM-5

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Abstract:

The two-stage catalytic pyrolysis of lignin over in-situ natural zeolite (NZ) and ex-situ HZSM-5 was examined using a tandem fixed bed reactor. The physicochemical properties of the catalysts, HZSM-5 and NZ were characterized by N2 adsorption-desorption and temperature programed desorption of ammonia. The overall performance for the catalytic pyrolysis of lignin was evaluated by the comparing lignin conversion, aromatic formation, and amount of coke deposited from the two-stage catalytic pyrolysis with those from a single-stage catalytic pyrolysis with ex-situ HZSM-5. Compared to the single-stage catalytic pyrolysis, the two-stage catalytic pyrolysis produced a larger amount of aromatics with a smaller amount of coke due to the pre-catalytic effect of NZ. These positive effects caused by the use of the two-stage catalyst were maximized by increasing the amounts of in-situ natural zeolite and the temperature of the ex-situ HZSM-5 catalyst bed to 600ºC.

Frontier Labs Products used:

Rx-3050TR