

[Catalytic co-pyrolysis of yellow poplar wood and polyethylene terephthalate over two stage calcium oxide-ZSM-5](#)

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Abstract:

This study examined the catalytic co-pyrolysis of yellow poplar wood and polyethylene terephthalate over basic calcium oxide and acid zeolites, such as HY (SiO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub>: 30), H $\beta$  (25), HZSM-5 (23), to maximize the yields of aromatics using thermogravimetric analysis and tandem  $\mu$ -reactor-gas chromatography/mass spectrometry. The maximum decomposition temperature of polyethylene terephthalate on the catalytic thermogravimetric analysis over HZSM-5 (452 °C) was reduced by co-feeding with yellow poplar wood to 444 °C because of its catalytic property and the effective interaction between the catalytic co-pyrolysis intermediates of yellow poplar wood and polyethylene terephthalate. Non-catalytic co-pyrolysis produced smaller amounts of large molecular polyethylene terephthalate pyrolyzates because of the more effective secondary cracking and deoxygenation. Calcium oxide was effective in the deacidification and acid zeolites were efficient in aromatics production during the catalytic co-pyrolysis of yellow poplar wood and polyethylene terephthalate. Among the acid zeolites, HZSM-5 showed the highest efficiency on benzene, toluene, ethylbenzene, and xylenes (BTEXs) production, followed by H $\beta$  and HY because of its strong acidity and proper pore size. The experimental MS intensities of BTEXs obtained from the catalytic co-pyrolysis of yellow poplar wood and polyethylene terephthalate over HZSM-5 ( $1083 \times 10^6$ ) were larger than their theoretical value ( $998 \times 10^6$ ). Compared to the single stage catalytic co-pyrolysis of yellow poplar wood and polyethylene terephthalate over ex-situ HZSM-5, the two-stage catalytic co-pyrolysis over in-situ calcium oxide and ex-situ HZSM-5 produced the much larger amounts of BTEXs during seven times sequential experiments.

\* Excerpted from online journal website (Click the title)

Frontier Labs Products used:

Tandem micro-Reactor (Rx-3050TR)