

BTX Production via Selective Hydroconversion of Naphthalene-rich Petrochemical by-Products

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As the oil reserves are limited, heavy aromatic sources, for example LCO(light cycle oil), PFO(pyrolysis fuel oil) and others, have been required to upgrade. The C_{10}^+ heavy aromatics from p-xylene plants are also a representative of by-product from petrochemical industries, which includes alkyl benzene, naphtho-benzene, and polycyclic aromatics such as naphthalene, alkyl-naphthalene, methyl-biphenyl, and dimethyl-biphenyl etc. In this study, we postulated a two-step catalytic process to convert aromatic-rich by-products into high-value BTX. To achieve high per-pass yield of BTX from aromatic-rich fractions, it is important to convert the 2- and 3-ring aromatics into 1-ring products in high selectivity followed by selective hydrocracking of 1-ring aromatics into BTX. The process C_{10}^+ aromatics was hydrogenated and the hydrogenated product was used as the feed for hydrocracking test. In the HYD step, naphthalenes in process C_{10}^+ aromatics showed the highest naphthalene conversion at 350°C, 4MPa, and WHSV = 0.7 h⁻¹, which gave rise to the highest tetralins yield without decalins and methyl decalins formation. In the HYC step at WHSV = 2 h⁻¹, 400-450°C, 4MPa, and xylene-rich BTX was formed in high yield and selectivity.