Mechanistic investigation of *n*-propylbenzene disproportionation

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n-Propylbenzene (PB) disproportionation to benzene and the dipropylbenzene isomers is of industrial importance due to high demand for the production of peroxide chemicals and engineering plastics. To date, it is proposed that the n-PB disproportionation proceeds by either the monomolecular propyl-transfer reaction (S_{N1}) or the bimolecular diphenylpropane (DPP)-mediated reaction pathway mechanism (S_{N2}). No studies, however, have experimentally verified the existence of mono-propylated DPP (mpDPP) reaction intermediates. During this reaction, here we show that mpDPP species act as real reaction intermediates of the n-PB disproportionation over the large-pore zeolite LaNa-Y, which can be considered as direct evidence for the S_{N2} reaction mechanism.