Biomimetic Hydrolysis of p-Nitrophenyl Alkanoates with Functionalized Mesoporous Silicas

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Multifunctional groups such as dihydroxyl, imidazole, carboxyl, ethylene diamine, and isobutyl groups were grafted onto this hexagonally ordered nanopore surface mimicking a triads of Ser 195, His 57, Asp 102 of chymotrypsin and these five groups were required for enhanced catalytic activity toward the hydrolysis of esters. The optimum catalytic hydrolysis of p-nitrophenyl acetate (PNPA) has been observed on 12% isobutyl grafted catalyst under neutral Tris-HCl buffer. Here we report the hydrolysis of p-nitrophenyl alkyl esters (alkanoates) with various alkyl chain lengths using the above-mentioned catalyst. The rate enhancement by hydrophobic association between a catalyst and a substrate has been well documented in the literature. However, a systematic examination of hydrolysis as a function of substrate hydro-phobicity on immobilized catalysts onto ordered nanopores in micellar catalytic environment has not been reported. The biomimetic catalysis for p-nitrophenyl alkanoates with multifunctionalized nanoporous silica was demonstrated.