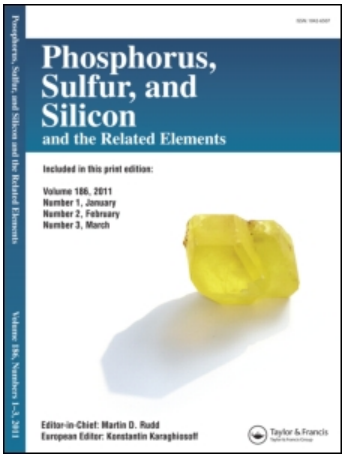

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Enzymatic Hydrolysis of N-Acylated 1-Aminophosphonic Acids

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ENZYMATIC HYDROLYSIS OF N-ACYLATED 1-AMINOPHOSPHONIC ACIDS

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Penicillin acylase from *E.coli* (EC 3.5.1.11) was found to hydrolyse N-phenylacetylated 1-aminoalkylphosphonic acids and their esters. Enzyme preferentially converts the *R*-form of the substrates: the ratios of the bimolecular rate constants of penicillin acylase-catalysed hydrolysis of *R*- and *S*- forms of 1-(N-phenylacetamino)-ethylphosphonic acid and its dimethyl- and diisopropyl- esters are 58000, 2600, 1800; these derivatives were shown to have the greatest values of the catalytic constants for enzymatic hydrolysis of all known substrates of penicillin acylase: 237, 148, and 134 s^{-1}; corresponding values of Michaelis constants are $3.7x10^{-5}$, $6.8x10^{-4}$, and $6.2x10^{-4}$ M. The kinetics of the enzymatic hydrolysis of 1-(N-phenylacetamino)-ethylphosphonic acid was investigated up to high degrees of conversion. The inhibition of penicillin acylase by high concentrations of the *R*-form of the substrate (with substrate inhibition constant 0.07 M) and competitive inhibition by the reaction product phenylacetic acid (K_i=$3.5x10^{-5}$M) was observed. Penicillin acylase was shown to possess quite broad substrate specificity among N-acylated 1-aminoalkylphosphonic acids and was found to be capable of hydrolysing 1-(N-phenylacetamino)-substituted 2-phenylethyl-, 1-phenylmethyl- and 3-methylbutylphosphonic acids with high efficiency and enantioselectivity.