Expression of a Cold-adapted Lipase from Janthinobacterium sp.

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The gene encoding lipase from Janthinobacterium sp. PAMC25641 was cloned into a pET28a(+) vector and heterologously expressed in Escherichia coli BL21 (DE3). The amino acid sequence deduced from the nucleotide sequence (930 bp) corresponded to a protein having 309 amino acid residues with a molecular weight of 32.7 kDa and a pI of 5.55. Recombinant E. coli harboring the Janthinobacterium lipase gene were induced by addition of isopropyl-β-D-thiogalactopyranoside. Ni2+-NTA affinity chromatography was used to purify the lipase, which had a specific activity of 107.9 U/mg protein. The effect of temperature and pH on the activity of lipase was measured using p-nitrophenyl octanoate as a substrate. The stability of the lipase at low temperatures indicated it is a cold-adapted enzyme. The lipase activity was increased by Na2+, Mg2+, and Mn2+, and decreased by Zn2+ and Co2+. Analysis of the lipase activity using various p-nitrophenyl esters showed a strong preference toward short acyl chains of the esters, indicating the ability of the cold-adapted lipase to hydrolyze short-chain esters.