Metabolic Control Analysis of L-Cysteine Producing Strain TS1138 of *Pseudomonas* sp.

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Abstract—A kinetic model describing the biosynthesis of L-cysteine by *Pseudomonas* sp. TS1138 has been developed. The two enzymes catalyzing this pathway, L-cysteine synthetase (CS) and L-cysteine desulfhydrase (CD), follow Michaelis–Menten kinetics with noncompetitive inhibition of CS by L-cysteine. From measurements of intermediates and end products that were made during L-cysteine enzymatic synthesis, metabolic control analysis of the pathway was carried out using the kinetic model. The elasticity coefficients and the flux control coefficients were calculated, and the analysis revealed a shift in the flux control from CS to CD during the reaction. The findings further implicate potential targets and strategies for increasing L-cysteine production; for example, the strain TS1138 could be manipulated by site-directed mutagenesis to reduce CD activity.

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