

Overproduction of Aromatic Amino Acids from Cyanobacteria

Shujun Dong, Arnav Deshpande, and John A. Morgan
Davidson School of Chemical Engineering, Purdue University

ABSTRACT

L-phenylalanine, L-tyrosine and L-tryptophan are aromatic amino acids that are widely used in industrial, agricultural and pharmaceutical applications. Currently, heterotrophic microorganisms are fed require an organic source of carbon to produce amino acids, photosynthetic bacteria are investigated. Mutagenesis by methyl methanesulfonate followed by selection on aromatic amino acid analogues produced mutants that are able to overproduce aromatic amino acids. Two mutant strains were investigated: TA1, which is a better L-phenylalanine overproducer, and 5FT1, which overproduces L-tryptophan. To test the influence of growth conditions on amino acid production, we grew mutant strains of *Synechocytis* sp. 6803 under enhanced CO₂ or glucose-rich conditions. We quantified the amount of each aromatic amino acid synthesized intracellularly and transported to extracellular medium by high performance liquid chromatography. We analysed the transient production of the aromatic amino acids to see if it is a growth related process. If it is growth related, the recommended growth method would be a fed batch reactor or a turbidostat to keep the cells at the exponential phase. If it is not growth related, we would recommend to use a batch reactor to allow cells reach stationary phase and harvest after maximum production.

KEYWORDS

Microalgae, cyanobacteria, Aromatic amino acids, L-phenylalanine, L-tyrosine, L-tryptophan