In Situ Recovery of Secondary Metabolites Using Adsorption Resins

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Abstract

Almost without exception a two to three fold increase in microbial secondary metabolite concentration was measured when adsorption resins were added *in-situ* during a submerged liquid fermentation. Anguidine was produced at a final concentration of 440 mg/L after five days in a shake flask that contained adsorption resin, compared to 300 mg/L without resin. Rapamcyin was produced at a final concentration of 87 mg/L after six days in a shake flask that had resin present, compared to 28 mg/L without resin. Ansamitocin P3 was produced at a final concentration of 24 mg/L after six days in a shake flask with resin, compared to 9.75 mg/L without resin. The increase in secondary metabolite concentration confirmed that the resins used provided a positive influence on secondary metabolite production. Adsorption resins for shake flask studies were selected based on their ability to achieve maximum adsorption of specific secondary metabolites in various fermentation systems.

A library of adsorbed concentrations was collected for the three secondary metabolites studied. The lipophilicty of the metabolite, calculated by several software packages, was compared to the polarity of the adsorption resin to generate a relationship. By using the preceding set of data it is possible to select adsorption resins that improved the produced concentrations of the target organic secondary metabolites.

The fermentation media compositions tested appeared to have no effect on the final product concentration when adsorption resins were added *in situ* during the fermentations.

Based on the lipohilictiy of the secondary metabolite and the polarity of the resins, it is possible to select a resin that achieves a high adsorption concentration of the target organic secondary metabolite.

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Nomenclature

Å	Angstroms
k_La	Overall gas-liquid volumetric mass transfer coefficient (h^{-1})
LogP	Logarithmic ratio of the concentrations of the solute in the solvent
π	*Pi*