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In Situ Recovery of
Secondary Metabolites Using
Adsorption Resins

A thesis presented in partial fulfilment of the
requirements for the degree of

Master of Philosophy

at Massey University, Palmerston North,
New Zealand

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2006

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. Rapamycin 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 lipophilicity 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 lipophilicity 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.

Acknowledgments

This thesis was undertaken with assistance from Industrial Research Limited.

It gives me great pleasure to acknowledge the many people who have assisted me throughout this work. I would like to thank my supervisors Professor Yusuf Chisti and Sarah Reader for their assistance and guidance over the course of this project.

I would like to thank Randy Greasham for providing the impetus upon which I started this work. Without his encouragement and support I would not have achieved this work.

For their support and insight over the length of this work and more I would like to thank my colleagues Max Kennedy, Tony Woolhouse, Sarah Underwood, Simon Hinkley and Yin Zhu.

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Nomenclature

\AA	Angstroms
$k_{L,a}$	Overall gas-liquid volumetric mass transfer coefficient (h^{-1})
LogP	Logarithmic ratio of the concentrations of the solute in the solvent
π	Pi