

MODELING FOR THE EXTRACTION OF SESAME SEED OIL

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ABSTRACT

The purpose of this research is to study about modeling of supercritical carbon dioxide extraction using sesame seed. The objectives of this study are to determine the effect of parameters on the extraction rate and also to find the best mathematical model for extraction of sesame seed oil. In this study there are 3 models that being tested, which are broken and intact cell (BIC) model, shrinking core (SC) model and the last one is diffusion layer theory (DLT) model. The experimental results shows that the extraction yield increased with increasing pressure and slightly increased with an increase in CO₂ flow rate but decreased with increasing temperature. The extraction data were described by the models and the calculations were compared with those experimentally obtained. From comparison of experimental data and models calculation, the shrinking core model could describe the experimental data well for all extraction condition compared to the BIC model and DLT could only describe the data at lower extraction yields well with the average absolute relative deviation (AARD) value for SC model range from 2.20 to 3.2 while DLT and BIC model have a range from 5.4 to 9.97.

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CHAPTER ONE

INTRODUCTION

1.1 OVERVIEW

Sesame (*Sesamum indicum L.*) seed oil was extracted using supercritical carbon dioxide extraction. Supercritical carbon dioxide is used in this extraction as a solvent, an alternative to conventional process using organic solvent, for example hexane, dichloromethane, and dichloroethane which are harmful to human. In this study, the effects of separation parameters such as temperature, pressure, carbon dioxide flow rate and particle size on the extraction rate of sesame seed oil were observed. Several models to describe the extraction yield are fitted with the experimental data and the best model with the lowest average absolute relative deviation (AARD) value is chosen as the best model to represent the process.

4.2 RESEARCH BACKGROUND

Sesame (*Sesamum indicum L.*) seed is the oldest and important oil seed crop. Sesame seed contains 40-50% oil, 20-25% protein, 20-25% carbohydrate and 5-6% ash (Salunkhe *et al.*, 1992). Because of its composition, sesame seed has become one of the main sources of edible oil as it has the highest content of fats and oils among other seeds oil. Apart from that, sesame seed oil also being used for massage and health treatment for the