CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME IV

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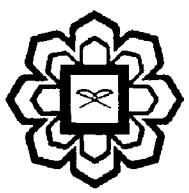

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CHAPTER 16

PURIFICATION OF SKIM LATEX PROTEIN USING CARBON NANOTUBES AS THE CHROMATOGRAPHIC MEDIA

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ABSTRACT

Skim latex is the by-product of latex concentrating process. Skim latex contain large portion of aqueous phase which is called skim latex serum. Studies show about 23.6% of skim latex serum is protein. In order to recover and purify these valuable proteins, Hydrophobic Interaction Chromatography (HIC) method is employed. However, instead of the commercially available media, carbon nanotubes (CNT) were used as the chromatographic media. This experiment aimed at optimizing the process parameters in running HIC. Three running parameters (pH, buffer concentration, and concentration of neutral salts) are chosen in the optimization process. The experimental design was carried out using Central Composite Design method. The response for the experiments is the area under graph of the elution chromatogram which is the measure of the interaction between skim latex proteins and CNTs. The absorbance at 280nm has linear relations with the protein concentration. The maximum total area under graph is achieved when HIC was conducted by running at pH 9, with buffer concentration of 100 mM along with 2 M ammonium sulfate as the neutral salt. The total area under this condition is 3.29 absorbance units (AU). Bradford protein assay and SDS-PAGE were done in order to further confirm that the compound purified is protein.

Keywords: carbon nanotubes, hydrophobic interaction chromatography, skim latex protein, purification, column chromatographic media

INTRODUCTION

Malaysia is one of the major producers of natural rubber. Natural rubbers are produced either in the form of dry rubber or latex. The production of latex in 2008 is recorded to be 153,709 tones. Natural rubber latex is not shipped directly because of its high water content. Most of the industrialist would prefer to concentrate latex before transporting since it is much more economical to do so. About 10-15% of the natural latex solution is eluted as byproduct of which known as skim latex (Blakely, 1997). Skim latex contains very insignificant amount of dry rubber particle and most often pretreated prior to discharging it into the environment.

Study reported that the skim latex contained about 7% total solid content and 5% dry rubber content. Upon rubber coagulation skim latex serum is obtained. This serum is composed of various components such as amino acids, lipids and carbohydrates. The largest group present in the serum, which accounts for almost half the total weight of serum is the