

Cellulose extraction from palm kernel cake using liquid phase oxidation

Abstract

Cellulose is widely used in many aspect and industries such as food industry, pharmaceutical, paint, polymers, and many more. Due to the increasing demand in the market, studies and work to produce cellulose are still rapidly developing. In this work, liquid phase oxidation was used to extract cellulose from palm kernel cake to separate hemicellulose, cellulose and lignin. The method is basically a two-step process. Palm kernel cake was pretreated in hot water at 180°C and followed by liquid oxidation process with 30% H₂O₂ at 60°C at atmospheric pressure. The process parameters are hot water treatment time, ratio of palm kernel cake to H₂O₂, liquid oxidation reaction temperature and time. Analysis of the process parameters on production cellulose from palm kernel cake was performed by using Response Surface Methodology. The recovered cellulose was further characterized by Fourier Transform Infrared (FTIR). Through the hot water treatment, hemicellulose in the palm kernel cake was successfully recovered as saccharides and thus leaving lignin and cellulose. Lignin was converted to water soluble compounds in liquid oxidation step which contains small molecular weight fatty acid as HCOOH and CH₃COOH and almost pure cellulose was recovered. © School of Engineering, Taylor's University College.