

Comparative study of cellulose extraction processes from palm kernel cake

Abstract

Palm kernel cake (PKC) is one of palm oil industry by-products which are rich in edible cellulose, which can be used as potential source in food and pharmaceutical industry. The extraction of cellulose from PKC involved essentially delignification and hemicellulose removal processes. In this study, three delignification and two hemicellulose removal techniques were comparatively investigated. Response surface methodology (RSM) with D-optimal design was used for the analysis. In this analysis, delignification techniques, hemicellulose removal techniques, and hemicellulose removal time (HRT) were chosen as process factors, whereas quantity of hemicellulose removal, cellulose yield, and cellulose purity were chosen as process responses. The comparative result obtained in this study shows that the combination of liquid phase oxidation (LPO) of delignification technique and alkali treatment of hemicellulose removal was the best method of cellulose extraction from palm kernel. The result of FTIR spectrum analysis of the cellulose produced in this study was similar to those produced commercially validating the cellulose structure. The optimum cellulose extraction method in this study shows that hemicellulose can be removed up to 24 % with cellulose yield 70 % and purity 77%.