Different Methods of Extraction of Lignin from Coconut Sawdust: The First Step of Development of Lignin-Based Polyurethane Thermoplastics

A dissertation submitted to the
Faculty of Science and Technology, Uva Wellassa University in partial fulfilment of the requirements for the award of the Degree of Bachelor of Science and Technology

By

D. D. H. C. JAYAWARDANA

Faculty of Science and Technology
Uva Wellassa University, Sri Lanka

January 2017

Abstract

Lignin is one of the major polymers found in the cell wall of plant biomass. It is a heterogeneous, high molecular weight and cross-linked polymer containing three major phenolic compounds, coniferyl alcohol, sinapyl alcohol, p-coumaryl alcohol. One approach for a value-added utilization of lignin is the synthesis of lignin-containing copolymers. One of the most utilized strategies is copolymerization to form polyurethane, where lignin serves as the hard segment in the polyurethane structure. Hydroxyl groups on lignin readily react with isocyanates to form polyurethanes. With increasing concern of the shortages of fossil resources and the impetus for reducing costs of polyurethanes, preparation of polyols from waste biomass will be an interesting subject in the polyurethane industry. Especially for Sri Lanka, it is very actual and perspective to replace petrochemicals if possible since petrochemicals are not economical due to high exportation cost. Extraction of most of the lignin from its mother source is very vital for cost reduction. In this study as a first step of the long-term research, lignin was extracted from sawdust of coconut palm (*Cocos nucifera*), which is a common waste material and identified as a rich source of lignin by two different methods; acid lignin extraction and alkaline lignin extraction. It was found that the percent yield obtained from acid hydrolysis was higher than that from alkaline method. The lignin obtained from both methods was characterized by FTIR and UV-Visible spectroscopy. Further, the phenolic OH content of the acid insoluble lignin samples were calculated.