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

D.D.H.C. Jayawardana, Thusitha N. Etampawala

Department of Science and Technology, Uva Wellassa University, Badulla, 90000, Sri Lanka

Lignin is one of the major polymers found in the cell wall of plant biomass. It is a heterogeneous cross-linked polymer, which has a high molecular weight and contains three major phenolic compounds; coniferyl alcohol, sinapyl alcohol and p-coumaryl alcohol. These phenolic groups lead to guaiacyl, syringyl, and p-hydroxyphenyl propane type units. Furthermore, lignin may contain free hydroxyl groups in its structure. Therefore, it is hypothesized that lignin obtained from waste biomass could be utilized as a replacement for petrochemical based polyols in the manufacturing of polyurethane. With increasing concern about 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 advantageous and perspective to replace petrochemicals if possible since petrochemicals are not economical due to high exportation cost. *Cocos nucifera*, generally named as coconut, is a hardwood species making it a low cost raw material for obtaining polyols. Sawdust is considered to be the remaining, left after the processing of coconut timber. Generally, this fall off materials remain as wastage product with no industrial value and usually dumped into the environment without control. In the 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 methods; acid lignin extraction and alkaline lignin extraction. It was found that the yield obtained from acid hydrolysis (24%) was higher than that from alkaline method (2%). The lignin obtained from both methods was characterized by FTIR and UV-Visible spectroscopy. Further, 3.04% of phenolic OH content of the acid insoluble lignin samples was identified.

Keywords: Lignin, Klason, Soxhlet, Polyurethane