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Oxidative decomposition of lignin for materials of resin

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Recently, the beneficial use of unused biomass has been examined because global environmental conservation was an important subject in relation to the countermeasure for global warming and the exhaustion of oil resources. Lignin, one of the main components of biomass, prohibits the progress of applications because of its complex structure. Lignin is also obtained as a byproduct from paper pulp industry and is hard to use because that is quite denaturalized. In this study, we tried to depolymerize alkali lignin using hydrogen peroxide and the material for resin was prepared as utilization of lignin. Alkali lignin (Aldrich) was fractionated into acetone-soluble and -insoluble by extraction at room temperature. 1.0 g of the insoluble fraction, 0.5 ml-10 ml 30wt% hydrogen peroxide was mixed in a beaker. The beaker was immersed in an oil bath preheated to 60°C and reaction time was 24h. After reaction, product solid was fractionated by acetone extraction operation at room temperature. Molecular weight distribution (MWD) of this aceton-soluble of lignin was measured by high-performance liquid chromatography (HPLC), and average molecular weights were calculated from MWDs. Aceton-soluble of lignin obtained by oxidation treatment, hexamine were mixed. Heat of curing reaction of the mixture was measured by differential thermal analysis (DTA). From the results, it was found that the number and weight basis average molecular weights decreased with increasing the amount of hydrogen peroxide. This might be because degradation of alkali lignin was promoted with hydrogen peroxide. The maximum yield of aceton-soluble was about 25 wt%. DTA profiles for the acetone-soluble of treated lignin and novolak (standard curing agent) shows exothermic reaction associated with curing in both cases for the treated lignin and novolak. It was assumed that resin could be prepared using the treated lignin as materials.

Biography

Isao Hasegawa was graduated from the School of Industrial Chemistry, Kyoto University in 1999. He received his PhD in 2007 under the supervision of Professor Kazuhiro Mae. At present, he is an Associate Professor at the Department of Chemical, Energy and Environmental Engineering of Kansai University and his research interests focus on the development of the new thermochemical conversion of biomass, pretreatment methods and pyrolysis kinetics.

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