Identification of functional groups of sustainable bio-oil substrate and its potential for specialty chemicals source

Abstract

This paper describes the basic analytical technique used in characterizing bio-oil into various components in terms of function groups as well as assessing its thermal behaviour. Pyrolysis, being one of the most widely used techniques in converting biomass was employed to get bio-oil from empty palm fruit bunches (EPFB).The bio-oil obtained was characterized using Fourier Transform Infrared (FTIR) while the thermal behaviour were assessed using Thermogravimetric analysis (TGA) and Differential Scanning Calometry (DSC). The results showed a great range of functional groups of phenol, alcohols, ketones, aldehydes, carboxylic acids, alkanes, alkenes and aromatic in the FTIR spectrum. The onset thermal temperature of thermal decomposition from TGA result is 32°C corresponding to about 13.4281 mg and the amount of residue was found to be 3.9969mg which shows that the bio-oil losses weight very fast; a characteristic of lighter product which strongly support combustion. The stages on DTG curve, in the degradation, which °Ccurred at temperature range between 70-90°C, correspond to the removal of light hydr°Carbons (such as aldehydes, alcohols and carboxylic acids) and moisture content in the bio-oil. The glass transition temperature, Tg, was found to be 53.63°C indicating that the bio-oil tested is less rigid and hence requires less force delivery. The characterization results indicate that the bio-oil obtained from oil palm EFB can be a potentially valuable source of fuels and chemicals feedst°Cks. Utilization of biooil for fuels and chemicals manufacture can significantly reduce or eliminate the harmful effects of fossil based products on the environment.