Aging and consistency characterization of bio-binders from domestic wastes

ABSTRACT

This research findings, exhibits the chemical and consistency characterization of the bio-binder produced from domestic waste (DWBO-binders) as compared with petroleum-asphalt binders. Samples of the base asphalt and DWBO modified binders were characterized by running the rotational viscosity (RV). Moreover, the elemental analysis as well as fourier transform infrared (FTIR) spectroscopy tests were utilized to validate the chemical compositions and bond initiations that caused changes in stiffness and viscosity of the asphalt modified with DWBO from those of base asphalt binders. Three factors have been found to be influenced by the use of DWBO-binder, viz; i. reduction in viscosity of asphalt binders which led to reduction of asphalt pavement construction costs by reducing mixing and compaction temperatures, ii. increasing workability, and iii. reducing greenhouse emissions and the toxic effect of binder compared with petroleum-based asphalt binders. Bio-oil from domestic waste was found to be a promising candidate as a modifier for petroleum-asphalt binder. The results of this laboratory study indicates that the inclusion of DWBO have increased the aging induces of the control asphalt binders.

Keyword: Bio-oil; Bio-asphalt; Chemical properties; FTIR; Rotational viscosity