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Investigation on Compatibility Property Between Aggregates and Bitumen Modified with Untreated and Treated Waste Cooking Oil

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Abstract:

The superior performance of asphaltic concrete exhibited the good adhesion bonding between binder-aggregates interaction in bituminous mixture. However, the issue of compatibility properties in modification of binder with waste cooking oil (WCO) arises since the poor mechanical performance of asphalt mixture is globally recorded thus reflected the weakness of adhesion bonding inside the pavement material. In fact, the potential of high adhesiveness binding properties is affected by the chemical theory which is chemical composition thereby effecting to the surface microstructure arrangement in bituminous mixture. Therefore, it is vital to conduct the morphology and microstructure observation in order to obtain a comprehensive understanding on the behaviour of the internal structure in pavement material that influencing the adhesion performance. The identification of chemical composition is determined by using Gas Chromatography-Mass Selective (GC-MS). Meanwhile, the surface microstructure observation for asphalt mixture is performed with Field Emission Scanning Electron Microscope (FESEM). Results showed that the incompatibility characteristic is revealed based on the GC-MS result, which discovered the identification of polar compounds in control binder and treated WCO while untreated WCO is recognised as a non-polar compound. The FESEM image illustrated that the more compacted structure arrangement existed in treated WCO mixture compared to the control and untreated WCO mixtures.

Keyword: Adhesion; Chemical composition; Surface microstructure