

PHYSICOCHEMICAL PROPERTIES OF MODIFIED KADUNA REFINERY BITUMEN WITH BAMBOO AND ROSEWOOD FIBERS

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ABSTRACT

The principal limitation of bitumen as an important technological material is its unpredictable thermally dependent properties and other undesirable characteristics that result in its poor service performance. The possibility of using bamboo and rosewood as cheap locally available materials for modifying the refinery bitumen in Nigeria to better properties for applications was conducted with results presented herein. Dry bamboo and rosewood were separately ground to powders of 75 μ m sieve mesh size and sequentially additively blended in different amounts of 0 to 20% by weight with prepared samples of the bitumen. The basic physicochemical properties of the blended samples were determined to know their respective values in relation to the unmodified bitumen sample. Appropriately determined flash point, fire point, penetration, softening point, viscosity, relative density, and weathering resistance properties in accordance to ASTM or IS standard test procedures indicated marked improvement in the properties with the 10 to 20% bamboo and rosewood contained bitumen samples. Notably, the 15%-bamboo and 15%-rosewood contained samples produced a lot better of the properties than the rest with the bamboo sample as the most practicable. X-ray fluorescence (XRF) analyses of the two samples were conducted to know the distinct chemical compositions that underlay improvement of their properties and scanning electron micro-structural (SEM) analyses to understand compatibilities of the additives with the bitumen. The XRF results showed that the additives altered the percentage compositions and number of 15 chemical species in the unmodified bitumen to 17. Regular smoother microstructures devoid of marked abnormalities and indicative of very high compatibilities of the additives with the bitumen were observed by SEM analysis of the samples.

Keywords: Nigerian bitumen, development, low exploitation, research, modification, progress.