CHANGES IN ASPHALT CHEMISTRY AND DURABILITY DURING OXIDATION AND POLYMER MODIFICATION

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ABSTRACT

The Gulf Countries' environmental conditions are very severe. The temperature zoning study indicate that more than half of Gulf areas experience a maximum seven consecutive days pavement temperature of 76°C (Al-Abdul Wahhab et al., 1997). This has resulted in damage to the road networks in the form of cracking, rutting and deformation. Polymer modification of asphalt is required to increase the resistance to permanent deformation at relatively high temperatures without adversely affecting the properties of the asphalts at low temperature. In this work chemical and performance-related properties of fresh, oxidized, and polymer modified asphalts were evaluated. The physical properties and performance characteristics of asphalts were found to depend on the chemical composition of asphalt. The interactions of polar functionalities actually present or formed during oxidative aging or due to polymer modification, influence the viscosity and related flow properties. The changes in composition of fresh, oxidized and polymer-modified asphalts can be clearly identified from Infrared spectroscopy. NMR spectroscopy enables detailed information about the Carbon-and-hydrogen-types and average molecular/structural parameters of asphalt without separating it into different components.