

Abstract

Aim of this research work is evaluate use of natural antioxidants (lignin) in retarding ageing of bitumen. Lignin was extracted from rice husk using a base solution of hydrogen peroxide. Rice husk is obtained from a local rice mill in Kanpur and the process of proximate analysis was carried out as per Chesson Datta method in Transportation Laboratory, IIT Kanpur. Normal oven heat ageing, thin film oven test (TFOT) and Rolling thin film oven test (RTFO) were performed on VG 30 samples mixed with extracted and commercial lignin to study different aging conditions. Cannon manning viscometer, Dynamic Shear Rheometer and the Fourier Transform Infrared Spectroscopy was performed on these bitumen samples along with MSCR to evaluate basic physical properties, rheological properties and chemical composition of bitumen. Fourier transform infrared spectroscopy is used to evaluate extent of ageing in bitumen by identifying different ageing indicators in bitumen mixed with lignin samples. The rutting resistance of Lignin modified bitumen at the high temperature which was obtained from the bitumen verification and the RTFO aged verification tests was evaluated using Multi stress creep recovery test which was performed at ART laboratory, Mathura. The DSR test resulted that adding Lignin affected high temperature rutting performance as the complex shear modulus increased on ageing and the phase angle reduces.

Keywords: Long Term Ageing, Short Term Ageing, Fourier Transform Infrared Spectroscopy (FTIR), Spectrometric Indices, Normalization Methods for Data Interpretation, Dynamic Shear Rheometer (DSR), Complex Modulus, Phase Angle.