

EVALUATION OF AGING IN ASPHALT CORES AT ROOM TEMPERATURE USING LOW FIELD NUCLEAR MAGNETIC RESONANCE

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ABSTRACT

In this paper, an innovative methodology that estimates the relative aging of asphalt cores is introduced. Asphalt concrete samples with different porosities (4, 7, and 10 percent) and aging conditions (unaged, 3-month, and 6-month aged) were investigated with Low Field Nuclear Magnetic Resonance (NMR) at room temperature. Unaged samples and samples with 4 percent air voids showed the highest amplitudes in the T_2 distributions, which correspond to the lowest viscosities, which imply a lower aging extent. The results were as expected, since oxidation reactions increase the viscosity and a higher percent air voids facilitates oxygen access. The advantage of the Low Field NMR analysis of aging compared to traditional methods is that it does not require binder extraction and is more accurate than analyses relying on mechanical measurements. Therefore, this method could be applied to assess aging of pavements throughout their life.