

Permanent Deformation Resistance of Asphalt Mixtures with Red Mud as a Filler

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Abstract : Red mud is a waste resulting from the processing of bauxite to alumina, the raw material of the production of aluminum. The large quantity of red mud generated and inadequately disposed in the environment has motivated researchers to develop methods for reinsertion of this waste into the productive cycle. This work aims to evaluate the resistance to permanent deformation of dense asphalt mixtures with red mud filler. The red mud was characterized by tests of X-ray diffraction, fluorescence, specific mass, laser granulometry, pH and scanning electron microscopy. For the analysis of the influence of the quantity of red mud in the mechanical performance of asphalt mixtures, a total filler content of 7% was established. Asphalt mixtures with 3%, 5% and 7% red mud were produced. A conventional mixture with 7% stone powder filler was used as reference. The asphalt mixtures were evaluated for performance to permanent deformation in the French Rutting Tester (FRT) traffic simulator. The mixture with 5% red mud presented greater resistance to permanent deformation with rutting depth at 30,000 cycles of 3.50%. The asphalt mixtures with red mud presented better performance, with reduction of the rutting of 12.63 to 42.62% in relation to the reference mixture. This study confirmed the viability of reinserting the red mud in the production chain and possible usage in the construction industry. The red mud as filler in asphalt mixtures is a reuse option of this waste and mitigation of the disposal problems, as well as being an environmentally friendly alternative.

Keywords : asphalt mixtures, permanent deformation, red mud, pavements

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