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Effect of nanomaterials on physical and rheological properties of asphalt binder used in Jordan

Mohammad Ali Khasawneh
Jordan University of Science and Technology, Jordan

Asphalt material has properties that made it an important material in the construction of highways and roadways for a long time. These properties tend to change when asphalt is exposed to traffic loading at different temperature and aging conditions which may lead to pavement distresses. To reduce these distresses different materials were used as modifiers such as polymers, resins, rubber, fibers, sulfur, chemical agents, and metal complexes. Properties that could be modified include adhesion, ductility, viscosity, friction, temperature sensitivity, oxidation resistance, aging resistance and consequently rutting and cracking resistance. In this study, nanotechnology that has been gradually penetrated into the field of asphalt to improve its performance was utilized. Nanomaterials were chosen as main modifiers due to their high surface area that refers to the size of nanomaterial particles. It was also used with styrene-butadiene-styrene (SBS) as a secondary modifier. The effect of nanoclay and nanocarbon materials on asphalt physical and rheological properties at different temperature and agingconditions were studied to estimate how reduction in rutting and crackingis made possible on the asphalt utilized in Jordan. Nanomaterials were blended with base asphalt and polymer-modified asphalt at different percentages using the high shearing process to determine the optimum nanomaterial content. Afterwards, base asphalt, polymer-modified asphalt and nano-polymer-modified asphalt were subjected to conventional and SuperPave asphalt testing to detect improvements and/or changes in asphalt physical and rheological properties. The results of the study indicated general improvement in asphalt binder physical and rheological properties.

Biography

Mohammad Ali Khasawneh has completed his PhD in Civil Engineering at the age of 27 years from The University of Akron, Akron, Ohio, USA. He served as an Assistant Professor for four and a half years at Ohio Northern University, Ada, Ohio, USA and is currently an Assistant Professor at Jordan University of Science and Technology in Irbid, Jordan. He has published more than 15 papers in reputed refereed journals and peer-reviewed conferences and has been serving as a member of several committees.

mkhasawneh@just.edu.jo