Extended Abstract
Volume 10:1, 2021

Journal of Material Sciences & Engineering

ISSN: 2169-0022 Open Access

Nano Asphalt Production Using Microemulation and Sonication Method: Yield Optimization Using Surface Response: A Review Article

Riny Yolandha Parapat

Itenas Bandung-TU, Germany

The largest natural asphalt deposit in the world is located in Buton Island (Indonesia) which is around 677 million tons. Efforts in utilizing the Asbuton rock to produce asphalt as the replacement of petroleum asphalt have been carried out by other researchers, but they only produced a conventional type of asphalt. Also, in general, the method that was used is quite expensive. The conventional asphalt in road pavement is unable to withstand traffic loads and excessive temperatures, resulting in deformation. This research is about making nano asphalt from Asbuton rock with using a combination of microemulsion technique and sonication. The advantage of this technique is the effectiveness of the process in producing the nano asphalt that is by extracting the asphalt from the pores of Asbuton rock simultaneously forming (in-situ) the nanoparticles. Experimental variables that are varied in this study are the temperature, oil fraction, type of solvent, particle size, and type of surfactant (HLB). To find the optimum Yield of nano asphalt, the involved variables are simulated and optimized by using Factorial Design, Pareto Diagram, and Response Surface methods. The comprehensive results from the simulation are presented in this report including the significant variables which were optimized to produce the optimum Yield of nano asphalt. The optimum Yield of nano asphalt theoretically generated from Response Surface ranged between 80 – 99.90%. The results of validation with experiments using optimized variables show the similarity between the optimum Yields and the simulated Yields value. The produced nano asphalt was investigated by Transmission Electron Microscopy (TEM), Scanning Electron Microscopy (SEM), Infrared Spectrophotometer (IR) and X-Ray Diffraction (XRD) to prove the quality of nano asphalt. Lately, the utilization of polymer nanocomposite for development of strong black-top combinations has been progressively supplanting the use of polymer-altered covers. In this examination, the enhancement of nanosilica and fastener content for nanocomposite-altered black-top combinations has been analyzed to get ideal amounts for elite properties. Reaction Surface Methodology (RSM) was applied for the improvement dependent on focal composite plan (CCD). Cooperation impacts of two autonomous variable components, nanosilica and fastener content, on nanocomposite quality, volumetric and execution properties were breaking down utilizing CCD plan. The reactions were investigated utilizing RSM, and models were created to fit the test results for expectation of the reactions. The outcomes demonstrate that the individual impacts of nanosilica and cover content are both significant for execution improvement. In light of the mathematical streamlining, 1.5% nanosilica and 5% folio content were discovered to be the ideal qualities. Additionally, the mean blunder got from enhancement results are altogether under 5% for all reactions, showing that anticipated qualities concur with exploratory outcomes and the created models fit to the test results. Besides, the investigation inferred that for composite black-top blend plan with elite properties, advancement utilizing RSM is an awesome methodology.