

Recycling of Low-Quality Waste Aggregate with Plastic Coating for Asphalt Production

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The plastic waste has become a major threat to the environment. Finding a proper disposal method for plastic waste is the need of hour. Plastic shows some bituminous characteristics, so it can be used as a coating material on an aggregate surface. Concurrently, considerable amount of aggregate in the construction industry is discarded as waste because of its low quality. Such unacceptable properties of aggregate can be improved by coating aggregate surface with polythene. In this research, the mostly available aggregate type in Sri Lanka, namely Hornblende Biotite Gneiss with low mechanical properties, which is out of requested international standards were initially coated with polythene by changing the polythene content percentage wisely, 0%, 5%, 10% and 15% according to the weight of aggregate using dry method to prepare Plastic Coated Aggregate(PCA). Laboratory experiments revealed that, mechanical properties such as Los Angeles Abrasion Value, Aggregate Impact Value and Aggregate Crushing Value of PCA's were achieved requested international standard values at 10% polythene content. Hence aggregate surface is covered with a polythene film, bonding ability of bitumen with polythene is relatively unknown. Therefore, above mentioned PCA's were secondly coated with bitumen by changing the bitumen content percentage wisely, 4%, 5% and 6% according to the weight of aggregate to investigate the bonding and strength characteristics. Three laboratory tests, namely Marshal Stability test, Bitumen Extraction test, Stripping Value test were conducted. 7.5KN of maximum stability value was observed in the sample with 15% polythene and 6% bitumen contents by showing 49% increasement of stability compared with other samples. Only 85% of bitumen could be extracted in 15% PCA's, predicting higher bonding ability is resulting at higher polythene contents. No stripping of bitumen was observed in 10%, 15% PCAs'. Therefore, this study revealed that waste aggregate can be recycled by preparing PCA to produce asphalt.

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