

Desiccation induced shrinkage of compacted lateritic soil treated via enzymatic induced calcium carbonate precipitation technique

ABSTRACT

Exploring the biological process to enhance the engineering properties of soil have received enormous recognition in recent years. Enzymatic induced calcium carbonate precipitation (EICP) is one of the bio-inspired methods of utilizing free urease to precipitates calcite from urea and calcium ions for bettering the geotechnical properties of poor soils. In this research, the EICP technique was used to improve the volumetric shrinkage strain of compacted soil liner. In this work, the residual soil was treated with various concentrations of cementations ranging from 0.25 to 1.0 M, and the soil was subjected to Atterberg limit tests, compaction test using British standard light (BSL) and reduced British standard light (RBSL) and desiccation drying volumetric shrinkage strain test. The study's findings revealed a remarkable improvement in the liquid limit and plasticity index of the treated residual soils compared to natural soil. It was also found that the volumetric shrinkage strain of the treated soil reduces progressively from 5.24% of natural to 1.49% at 1.0 M cementation solution when the soils were prepared at 0% OMC and BSL compaction effort. Based on the consideration of permissible VSS of less than 4%, the best treatment was obtained at 1.0 M for both BSL and RBSL prepared samples. Similarly, the best compaction plane is found in the treated with 1.0 M cementation solution.