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Compressibility for industrial waste materials with various mixing proportions and settlement analysis

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Solid waste materials are highly heterogeneous depending on various waste compositions, making it difficult to understand their engineering characteristics. The purpose of study is to find out effects of waste compositions and mixing proportions on the optimization of the dry density of solid waste materials. In this study, totally 6 different waste materials, un-burnable domestic waste, un-burnable industrial waste, incineration ash, crushed concrete, organic sludge and inorganic sludge, were used as tested materials. The purpose of study is to find out effects of waste composition and mixing proportions on the compaction and to optimize the maximum dry bulk density of the waste samples to reduce the landfilling space requirement with least settlement of the final landfills. Standard compaction/proctor test results showed that maximum dry bulk densities of the incineration ash (1.53-1.74 g/cmˆ3) and crushed concrete (1.37-1.52 g/ cmˆ3) were higher than the inorganic sludge (0.76 g/ cmˆ3) and organic sludge (0.90 g/ cmˆ3) respectively. The maximum dry bulk density for the mixed sample with ratio of 2:6:2 and 2:2:6 (1.65g/ cmˆ3) dry mass basis were 2.17 times greater than that of inorganic sludge. Consolidation properties determined with modified oedometer apparatus with 10cm diameter and 10cm height to incorporate the coarser fractions of the waste materials, showed that compression index (Cc) of the sludge was 0.21 which reduced significantly 0.04 and 0.02 in that of 1:1:1 and 5:2:3 mixed samples respectively. A simple settlement analysis was carried out using measured consolidation parameters, assuming 10-m thick of waste layer below 3-m soil capping. Three different waste layers, only sludge, two mixed samples of concrete and sludge, three mixed samples (sludge, crushed concrete and incineration ash), were tested in the analysis. Results showed that the final settlement for the three mixed samples was 8 times lower than that of the sludge sample.

キーワード: Solid waste, Sludge, Compaction, Consolidation, Compressibility, Settlement
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