

Compaction and consolidation characteristics for representative industrial wastes in Japan

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Waste disposal sites have important role for human activity. Because, it is difficult to build new disposal sites in Japan due to the lack of land, effective use of limited space in existing waste disposal sites is essential. The control of geotechnical properties for waste materials such as compaction and consolidation are key factors for reducing disposal space. In this study, compaction and consolidation characteristics for waste materials of sludge ($D < 2.0 \text{ mm}$), crushed concrete ($2.0 \text{ mm} < D < 9.5 \text{ mm}$), and incineration ash ($D < 2.0 \text{ mm}$) were investigated with their different mixing proportions based on mass ratio. Standard proctor compaction test was carried out according to JIS A 1210. Consolidation test was carried out by using the mixed waste samples ($D < 2.0 \text{ mm}$) based on JIS A 1217.

For the compaction characteristics of two mixed and three mixed samples, relationship between maximum dry density and mixing proportion of crushed concrete and/or incineration ash showed strong positive linear relation. Crushed concrete and incineration ash have completely different particle size distribution, however, the mixed samples of sludge and crushed concrete and/or incineration ash showed almost same compaction characteristics. Coefficient of compression for the mixed sample of sludge and incineration ash gradually decreased with increasing the mixing proportion of incineration ash, while for the mixed sample of sludge and crushed concrete, they drastically decreased with increasing the mixing proportion of crushed concrete. For the three mixed samples, they drastically decreased with increasing the mixing proportion of crushed concrete and/or incineration ash. Also, coefficient of volume compressibility and coefficient of consolidation for the samples containing crushed concrete clearly decreased and increased, respectively, as compared to the sludge. Therefore, the mixed sampled containing crushed concrete showed different consolidation characteristics.

Keywords: Compaction, Consolidation, Sludge, Crushed concrete, Incineration ash, Mixed waste materials