

The Effect of Potassium Hydroxide on Fine Soil Treated with Olivine

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Abstract : The possibility of improving the shear strength of unsaturated clayey soil with the addition of olivine was investigated in this paper. Unconsolidated undrained triaxial tests (UU), under different cell pressures (namely: 100 kPa and 200 kPa), with varying percentages of olivine (10% and 20% by weight) and with one day, 28 days, and 56 days curing times, were performed to determine the shear strength of the soil. The increase in strength was observed as a function of the increase in olivine content. An olivine content of 25% was determined as the optimum value to achieve the targeted improvement for both cure times. A comparative study was also conducted between clay samples treated with only olivine and others in the presence of potassium hydroxide (KOH). Clay samples treated with olivine and activated with potassium hydroxide (KOH) had higher shear strength than non-activated olivine-treated samples. It was determined that the strength of the clay samples treated with only olivine did not increase over time and added resistance only with the high specific gravity of olivine. On the other hand, the samples activated with potassium hydroxide (KOH) added to the resistance with high specific gravity and the chemical bonds of olivine. Morphological and mineralogical analyzes were carried out in this study to see and analyze the chemical bonds formed after the reaction. The main components of this improvement were the formation of magnesium-aluminate-hydrate and magnesium-silicate-hydrate. Compared to older methods such as cement addition, these results show that in stabilizing clayey soils, olivine additive offers an energy-efficient alternative for reducing carbon dioxide emissions.

Keywords : ground stabilization, clay, olivine additive, KOH, microstructure

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