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Stabilization of Lead and Zinc Contaminated Clay Soils with Metakaolin

Soil pollution due to various factors is one of the world's problems in different countries, especially industrialized countries, which has attracted much attention in the form of various researches. To solve this problem, in this study, metakaolin was used to stabilize low-plasticity (CL) clay contaminated with lead and zinc nitrate. The present study consists of two main stages. The first stage examines the soil to identify the most critical concentrations of contaminated soils and soils contaminated with lead nitrate and zinc nitrate in a ratio of 1: 1 and with concentrations of 1000, 5000 and 10000 ppm with a curing time of 7 days. The results obtained in the first stage showed that increasing the concentration of pollutants has a negative effect on soil geotechnical parameters, which can be reduced to the maximum uniaxial compressive strength and reduced soil CBR resistance. This step aimed to identify the most critical concentration of contaminated soil, which was 100 ppm. The second stage examines the resistance tests of contaminated soil with a concentration of 10000 ppm and its stabilization with metakaolin at a rate of 5% by weight and with a curing time of 7, 14 and 28 days. The purpose of curing time is to investigate the effect of time on soil geotechnical parameters during the presence of metakaolin in the soil. In general, according to the results of these experiments, the maximum uniaxial compressive strength and soil CBR strength increased with increasing curing time. As the curing time increases, the soil adhesion increases and consequently the compressive strength of the soil increases.

Keywords: lead (II) nitrate, Zinc nitrate, metakaolin, Pozzolan, Soil contamination.

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