

Evaluation on Mechanical Stabilities of Clay-Sand Mixtures Used as Engineered Barrier for Radioactive Waste Disposal

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Abstract : In this study, natural bentonite was used as natural clay material and samples were taken from the Kalecik district in Ankara. In this research, bentonite is the subject of an analysis from standpoint of assessing the basic properties of engineered barriers with respect to the buffer material. Bentonite and sand mixtures were prepared for tests. Some of clay minerals give relatively higher hydraulic conductivity and lower swelling pressure. Generally, hydraulic conductivity of these type clays is lower than 10^{-12} m/s. The hydraulic properties of clay-sand mixtures are evaluated to design engineered barrier specifications. Hydraulic conductivities of bentonite-sand mixture were found in the range of 1.2×10^{-10} to 9.3×10^{-10} m/s. Optimum B/S mixture ratio was determined as 35% in terms of hydraulic conductivity and mechanical stability. At the second stage of this study, all samples were compacted into cylindrical shape molds (diameter: 50 mm and length: 120 mm). The strength properties of compacted mixtures were better than the compacted bentonite. In addition, the larger content of the quartz sand in the mixture has the greater thermal conductivity.

Keywords : engineered barriers, mechanical stability, clay, nuclear waste disposal

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