ABSTRACT

The research area, Samigaluh Sub-district, Kulon Progo Regency is located in the west of Yogyakarta City which is one of the areas that often experienced landslide disaster in Indonesia. In order to mitigate this problem, electro-kinetic method was used to strengthen the weathering soil of tuff breccia and andesite breccia for slope stability experiment. As the methodology of the research, rainfall experiments, electro-kinetic bench scale experiments and laboratory analysis such as soil index properties, direct shear test, XRD and SEM analysis were mainly conducted. Two rainfall experiments and four electro-kinetic experiments with different electrolyte solution (calcium chloride or pure water) were conducted and aluminum plates were used as electrodes under 13V electric current. As a result, the Atterberg's limit of all soil samples after rainfall experiments increased in liquid limit (6.5% and 9%) and plastic limit (19% and 24%) respectively. The value of cohesion and internal friction angle after rainfall experiment decreased significantly with cohesion (14% and 17.7%) and internal friction angle (53.45% and 35%). After the electro-kinetic treatment, the pH value of the anode decreased and the pH value of the cathode increased significantly. The Atterberg's limit of soil after treatment were decreased with liquid limit (34.3-45.21%), plastic limit (33.65-41.9%) and plasticity index (1.25-5%). The shear strength of the soil after treatment is between 58.57 and 87.86 kPa and the increasing degree is 70.17-103%. The greatest increasing of shear strength was at the cathode part for all systems of soil. Based on the XRD analysis, there is no mineral changes before and after electro-kinetic treatment. According to SEM photos, there is changes in soil fabric after electro-kinetic treatment. The factor of safety (FS) of slope stability analysis after electro-kinetic treatment was increased significantly.

Keywords: *soil of tuff breccia and andesite breccia, electro-kinetic treatment, chemical solution, slope stability analysis*

ABSTRACK

Daerah penelitian, Kecamatan Samigaluh, Kabupaten Kulon Progo terletak di sebelah barat Kota Yogyakarta yang merupakan salah satu daerah yang sering mengalami bencana longsor di Indonesia. Untuk menanggulangi masalah ini, metode elektro-kinetik digunakan untuk memperkuat tanah pelapukan breksi tuf dan breksi andesit untuk percobaan stabilitas lereng. Sebagai metodologi penelitian, percobaan hujan, percobaan skala elektro-kinetik dan analisis laboratorium seperti sifat-sifat indeks tanah, uji geser langsung, XRD dan analisis SEM terutama dilakukan. Dua percobaan curah hujan dan empat percobaan elektro-kinetik dengan larutan elektrolit yang berbeda (kalsium klorida atau air murni) dilakukan dan pelat aluminium digunakan sebagai elektroda di bawah 13V arus listrik. Akibatnya, batas Atterberg dari semua sampel tanah setelah percobaan hujan meningkat dalam batas cair (6,5% dan 9%) dan batas plastik (19% dan 24%) masing-masing. Nilai kohesi dan sudut gesekan internal setelah curah hujan percobaan menurun secara signifikan dengan kohesi (14% dan 17,7%) dan sudut gesekan internal (53,45% dan 35%). Setelah perawatan elektro-kinetik, nilai pH anoda menurun dan nilai pH katoda meningkat secara signifikan. Batas tanah Atterberg setelah perawatan menurun dengan batas cair (34,3-45,21%), batas plastik (33,65-41,9%) dan indeks plastisitas (1,25-5%). Kekuatan geser tanah setelah perawatan adalah antara 58,57 dan 87,86 kPa dan tingkat peningkatannya adalah 70,17-103%. Peningkatan terbesar kekuatan geser berada di bagian katoda untuk semua sistem tanah. Berdasarkan analisis XRD, tidak ada perubahan mineral sebelum dan sesudah perawatan elektro-kinetik. Menurut foto SEM, ada perubahan dalam kain tanah setelah perawatan elektro-kinetik. Faktor keamanan (FS) analisis stabilitas lereng setelah perawatan elektro-kinetik meningkat secara signifikan.

Kata kunci: *tanah breksi tufa dan breksi andesit, perawatan elektro-kinetik, larutan kimia, analisis stabilitas lereng*