Thematic Session 32

Clays in geotechnical applications

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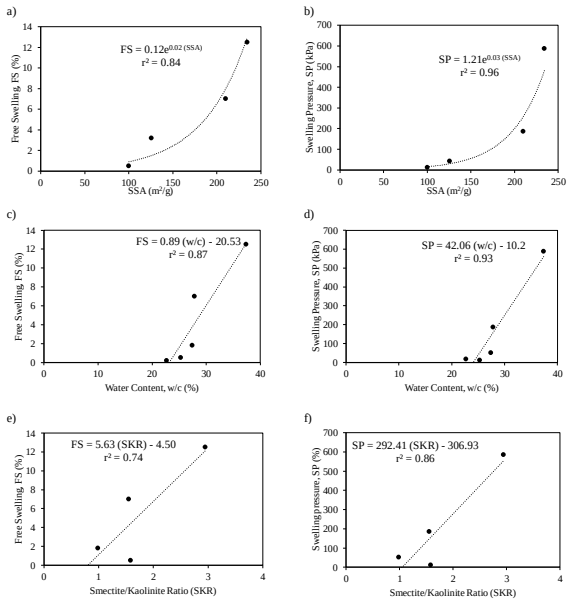
Clayey soil, clay-soil mixtures and clay minerals play a very important role in geotechnical applications since clay in general has a low strength, high compressibility, high plasticity, high swelling potential and relatively low coefficient of permeability. These geotechnical properties of clay almost always need to be improved prior to its use in geotechnical projects related to highway construction, dam, slurry trench, landfill liner, and underground waste repository sealing as well as in the oil industry. Since clay minerals are electrochemically active, they affect the soil microstructure and hence, it is also very important to understand the relationship between clay mineralogy and geotechnics. This session seeks contributions to aid in understanding the improvement of the geotechnical properties of clayey soils, clay-soil/rock mixtures (i.e., bentonite-sand, bentonite-crushed rock, mixtures of clay and various material(s), etc.) and clay minerals in geotechnical projects related to highway construction, dam, slurry trench, landfill liner, underground waste repository sealing and oil industry utilized bentonite/mud along with understanding the relationship between clay mineralogy and geotechnics. Improvement of the geotechnical properties might involve a decrease/increase in plasticity and swelling potential, an increase in strength that increases workability, a decrease in the coefficient of permeability, etc.

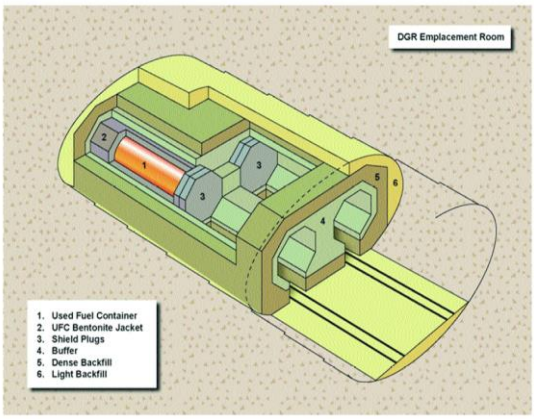
Keywords: Clay geotechnics, Clay barriers in landfills, Clay in sealing waste repositories, Clay mineralogy-geotechnics relationship, Clay geotechnics in the oil industry.

Potential Journals: Applied Clay Science, Clays and Clay Minerals, Clay Minerals.



Relationships between a) FS and SSA, b) SP and SSA, c) FS and w/c, d) SP and w/c, e) FS and SKR, f) SP and SKR. SSA: specific surface area, FS: free swelling, SP: swelling pressure, w/c: water content, SKR: smectite/kaolinite ratio for Orta clay, Çankırı, Turkey (Source: Akgün, H., Türkmenoğlu, A.G., Kelam, A.A., Yousefi-Bavil, K., Öner, G., Koçkar, M.K., 2018, Assessment of the effect of mineralogy on the geotechnical parameters of clayey soils: A case study for the Orta County, Çankırı, Turkey, Applied Clay Science, 164:44-53.

(a)



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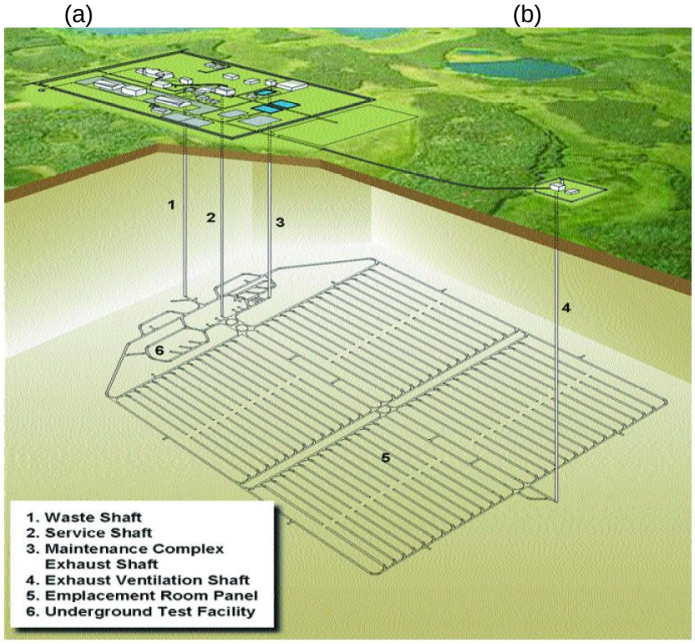

(c)

An example of conceptual design of (a) used fuel container, (b) engineered barrier in the emplacement room of a (c) underground nuclear waste disposal repository, often referred to as deep geological repository (DGR) (Witherspoon PA, Bodvarsson GS (2006) Geological challenges in radioactive waste isolation: fourth worldwide review, Earth Sciences Division, Ernest Orlando Lawrence Berkeley National Laboratory, Berkeley, California, Publication LBNL-59808) as quoted by Akgün, H. and Koçkar, M.K., 2018, Evaluation of a sand bentonite mixture as a shaft/borehole sealing material, Applied Clay Science, 2018, 164: 34-43.