



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student : JAGORI DUTTA

Roll Number : 11610406

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Thesis Title: A study on the effect of salts on the swelling, hydraulic and consolidation behaviour of bentonites

Name of Thesis Supervisor(s) : Dr. Anil Kumar Mishra

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SHORT ABSTRACT

Due to rapid urbanization and industrialization, the geoenvironment and groundwater reserves in most parts of the world are getting damaged due to the harmful effect of pollutants disposed off into the geoenvironment. Due to its high swelling capacity, contaminant adsorption capacity and low hydraulic conductivity, bentonite is primarily used as a liner material in waste containment. This work was carried out to study the effect of inorganic salts and heavy metals present in leachates on the behaviour of bentonites. Two bentonites of different mineralogical composition were studied for their change in the index properties, free swelling, swelling potential, swelling pressure, hydraulic conductivity and consolidation parameters due to the presence of various inorganic salts and heavy metals of various concentrations, individually as well as combination of each other. The results showed that salt has a definite effect on the free swelling, swelling potential, swelling pressure, hydraulic conductivity of the compacted bentonite. The liquid limit, free swelling, swelling potential and swelling pressure of the bentonites decreased with an increase in the salt or heavy metal ion concentration. Irrespective of the initial compaction condition, the hydraulic conductivity of the bentonite increased with an increase in the salt concentrations. The compression index (C_c), coefficient of volume change (m_v), and time required for the 90% of consolidation (t_{90}) of the bentonites decreased; whereas, coefficient of consolidation (c_v) increased with the increase in salt concentration indicating specimens consolidated faster in salt solution in comparison to water. A comparison between the two bentonites showed that salt has a significant effect on Bentonite-B. Bentonite-B, which has a high liquid limit, swelling capacity, SSA, CEC and ESP and termed as high quality bentonite, undergoes a large change in liquid limit, free swelling, swelling pressure and hydraulic conductivity due to increase in the salt concentration.