
Characterization of Naturally Occurring Clay Deposits in Ampara District, Sri Lanka

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Man recognized the importance of solid mineral resources, since the dawn of time. Clay has its unique properties such as strong cation exchange capacity, swelling behavior, specific surface area, adsorption capacity, etc and these superior properties make the clay be used in many applications including in the cement industry. Therefore, it is important to study the mineralogical contents and physical and chemical properties of clay using different analytical techniques. Clay deposits are commonly found in various parts of Sri Lanka. However, only a few deposits have been studied in detail. The aim of this research is to study the properties of clay at Irakkamam in Ampara district to determine its potential as an alternative pozzolan in concrete. This clay mineral could be used as a substitute for the Portland Cement and the replacement of this material will reduce the cost and emission of greenhouse gases. The chemical composition and the morphology of the clay were analyzed by XPS and SEM, respectively. The FT-IR analysis was performed to identify the functional groups of the raw clay. The semi quantification of clay minerals was done using X-ray diffraction (XRD). According to XRD analysis, the primary clay minerals are vermiculite and kaolinite, although it also contains cordierite and quartz as non-clay minerals. Cation exchange capacity (CEC) of this clay is 122 meq/100 g. The raw clay's SEM pictures revealed a well-defined layered structure with polygonal sheets, flaking borders, and substantial vermiculite layer crystals. IR bands observed at 1114 cm^{-1} and 1025 cm^{-1} were assigned to stretching vibrations of Si-O-Si and Si-O in amorphous silica respectively.

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