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Investigation of the elemental composition of sand along the eastern coastal region of Sri Lanka

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The eastern coastal region of Sri Lanka is abundant in valuable sand deposits. However, lack of knowledge regarding the elemental composition of this sand hinders its conversion into a wanted industrial raw material. This research focuses on conducting X-ray diffraction (XRD) elemental analysis in specific areas situated along the eastern coast of Sri Lanka. XRD spectroscopy serves as the primary method for identifying the elemental composition of these samples. The sample collection includes materials from Nilaveli, Irrakkakandy, Kumpurupiddi, Salappaiyaru, and Kuchchaveli in the Trincomalee coastal area. The samples underwent grinding using a steel roller, after which the ground soil samples were sieved through a mesh with a 1mm sieve size. Any remaining samples were further ground until they could pass through the 1mm sieve mesh entirely. These steps were iteratively performed with reduced sieve sizes of 0.5mm, 0.4mm, and 0.2mm. The fine sand samples with particle size less than 0.2mm underwent die pressing at a pressure of ten metric tons to produce the pellet sample. The electrical properties of mineral sand were examined using the *Keithley 2400* with a two-probe method. The results indicated that samples collected from Kumpurupiddi, Salappaiyaru, and Kuchchaveli displayed linearity in their current-voltage (IV) graphs, attributable to the presence of iron and aluminum. Nilaveli and Irrakkakandy region samples exhibit maximum conductivity. X-ray diffractometry was employed to determine the sand samples' phase composition. The XRD outcomes unveiled that the Trincomalee coastal line sample contained mineral constituents such as Ilmenite ($FeTiO_3$), Zirconia ($ZrTiO_4$), Albite (SiO_2), and Monazite. The Nilaveli samples primarily featured Titanium and iron as its elemental components. In Irrakkakandy and Kumpurupidi, silicon and Zirconium were identified as the primary elements, while silicon was the predominant element in the Salappaiyaru and Kuchchaveli samples.

Keywords: Mineral, Illuminate, Keithely, XRD