

## Selective Removal of Iron Oxide in Sri Lankan Laterite

W.A.I.A.T. Goonetilleke<sup>1</sup>, D.T. Jayawardana<sup>2</sup> and A.S. Ratnayake<sup>1</sup>

<sup>1</sup>*Department of Science and Technology, Uva Wellassa University, Badulla, Sri Lanka*

<sup>2</sup>*Department of Forestry and Environmental Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka*

Fe-rich laterite uses as the main alumina source in cement manufacturing process. The high iron content in laterite increases the limestone consumption. Therefore, this study is focused to investigate the effect of pH, temperature and sonication time for Fe removal. The Fe removal from laterite was examined along with Cd and Mn. The loss of mass on ignition (LOI), moisture, pH, elemental and mineralogical characterization of raw and treated laterite were determined by using Atomic absorption spectroscopy, X-ray diffraction (XRD) and Fourier-transform infrared instruments. The particle size (63  $\mu\text{m}$ ) and the solid-to-liquid ratio (1:10) were constant, for the whole experiment. The pH range was prepared using HCl acid and NaOH at 300 K for 1800 s, while the temperature and sonication time were examined with 313, 333, 353 and 373 K for 3600 s and 600, 900, 1800, 2700 and 3600 s at 300 K, respectively. The pH, moisture, and LOI of raw laterite were 5.69, 15.80% and 16.56%, separately. The Fe and Mn removal efficiencies were increased when the pH from 5 to 1 and the efficiency was negligible when pH 6-10. Cd removal efficiency was increased when pH 1-10. All elements removal efficiencies were increased 313-373 K. Fe and Mn got high efficiency at 900 s and Cd was recovered within a short time with sonication. XRD results revealed goethite, hematite and magnetite are main Fe-rich minerals. The effective pH for Fe, Cd and Mn were 1 (17.6 ppm), 7 (0.18 ppm) and 1 (2.05 ppm), respectively. The Fe and Mn removal efficiencies were greatly influenced by hydrogen ion concentration and Cd removal was influenced by hydroxyl ion concentration. The optimal condition of Fe for industrial applications is pH 1 with 333 K temperature or pH 1 with 900 s sonication time. The optimal condition for Mn is pH 1 with 900 s sonication time and Cd can dissolve effectively with basic pH conditions under high temperatures.

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