CONVERSION OF EPPAWALA APATITE INTO NON-TOXIC HYDROXYAPATITE NANOPARTICLES

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Apatite deposit located at Eppawala, locally known as Eppawala Rock Phosphate (ERP) is the largest economically important mineralization in Sri Lanka. Previous analytical data show that ERP is basically composed of fluor- and chlor- apatite as major components. A very high economic value can be added to this resource by its synthesis to non-toxic medical grade hydroxyapatite (HA) nanoparticles which has a high global demand and market value. Therefore, our attempt in this study is to synthesize non-toxic HA nanoparticles from ERP using an effective simple technique.

The HA nanoparticles were synthesized through a process of calcination at 1100°C, concentrated nitric acid digestion, recrystallization of the digested product in a urea medium at 300°C followed by hydrothermal treatment at pH 10 for 3h at 150°C. The resultant calcium pyrophosphate nanoparticles were revealed in X-ray Diffraction (XRD) and (Fourier-Transform Infrared spectroscopy) FTIR results. Removal of impurities of F^- and Cl^- was confirmed using (Energy-dispersive X-ray spectroscopy) EDX spectra. MTT (3-(4,5-dimethyl thiazol-2-yl)-2,5-diphenyl tetrazolium bromide) assay confirmed that the synthesized HA nanoparticles are non-toxic. Subject to further process refinement, this could be one of the long awaited value-addition breakthroughs for ERP.

Keywords: Eppawala apatite, Combustion, Hydrothermal treatment, Hydroxyapatite