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Mineralogical, chemical and solubility variations in the Eppawala phosphate deposit of Sri Lanka – a case for selective mining for fertilizers

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Abstract

The Eppawala phosphate deposit of Northcentral Sri Lanka is a large deposit with an estimated reserve of more than 40 000 000 metric tonnes of the ore. Field observations at Eppawala have helped to recognize several types of phosphate material on the basis of colour, texture and structure. Laboratory studies have established variable apatite mineralogies, P_2O_5 compositions and consequent variations in solubility in different segments of the phosphate body. In some selected phosphate samples from Eppawala the combined aluminium and iron percentages ($Al_2O_3 + Fe_2O_3 = R_2O_3$) and MnO_2 showed remarkably low values in contrast to earlier reported high values. The single apatite crystals which form at least 30% of the ore with P_2O_5 values of more than 40% and R_2O_3 contents in the range of 1% suggest their suitability for wet process production of phosphoric acid. On the basis of our findings selective mining is recommended for the Eppawala ore which is currently mined indiscriminately without due consideration being given to the heterogeneity and the anatomy of the deposit.