

METHODS TO PRODUCE SOLUBLE FERTILIZERS FROM EPPAWALA APATITE

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The method suited for beneficiation of apatite depends on availability of energy and raw materials. If energy is cheap, the ideal process is to react apatite with silica and coke to obtain elemental phosphorous which can be easily converted into phosphoric acid. This technique will find wide applicability in future if new methods of harnessing energy are acquired. The process that requires the least amount of energy is the use of sulphuric acid to produce superphosphates. Unfortunately sulphur or pyrites needed for the manufacture of sulphuric acid are depleting and becoming more and more expensive. An alternative is to use hydrochloric or nitric acid. Nitric acid manufacture requires hydrogen (generally fossil fuel based) for producing ammonia which is oxidised to nitric acid. Hydrochloric acid is a by-product of sodium hydroxide industry and the chief objection for its use has been the hygroscopic nature of the beneficiated product. The double decomposition of hydrochloric acid treated apatite with ammonium sulphate is found to yield a non-hygroscopic fertilizer. The above method seems to be practical for all ores containing ~ 35% or more of P_2O_5 . In the case of higher quality ore (~ 40% P_2O_5) chemical engineering problems are minimal and simplifications become possible. The inferior ore heavily contaminated with Fe and Mn is probably unsuitable.

Dahanayake et al., have stressed that the heterogeneity of the Eppawala deposit needs selective mining. If this is accomplished, even conventional methods of beneficiation may also be adopted for immediate production of phosphate fertilizer from the Eppawala ore. High quality ore may be used to produce phosphoric acid by the wet process.

As basic sources of nitrogenous fertilizer, Sri Lanka should also consider the manufacture of ammonia and nitric acid. If ammonia is available, high analysis fertilizers can be obtained from hydrochloric or nitric acid treated apatite. Nitric acid processes have another advantage as they are largely independent of the contaminants in the ore.

If ammonia is available, methods could also be found to produce magnesium ammonium phosphate using dolomite.