

PROCESS CHARACTERIZATION OF A LOW-GRADE PYROPHYLLITE FROM NAMBULAPULAKUNTA, ANANTAPUR, ANDHRA PRADESH

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Abstract

A composite mix of low-grade pyrophyllite samples from the pyrophyllite mine at Nambulapulakunta [NP Kunta] village and Mandal in Anantapur district, Andhra Pradesh was subjected to mineralogical and chemical characterization studies followed by a diagnostic amenability test consisting of crushing the material to – 1mm, intensive attrition scrubbing desliming by centrifugal classifier followed by wet high-intensity magnetic separation of the scrubbed classified products. The low-grade pyrophyllite composite material assayed 25.50% Al_2O_3 , 51.20% SiO_2 , 5.00% Fe_2O_3 , 5.95% MgO , 0.30% CaO , 1.20% Na_2O , 4.20% K_2O , 0.50% TiO_2 , 5.30 % LOI. It contained mainly fine-grained pyrophyllite [45-50%] associated with subordinate amounts of fine-grained phlogopite and feldspar [20-25%], with minor amounts of quartz [10%], kaolin [10%], gibbsite [8%], and iron oxide minerals [8%]. The diagnostic amenability process yielded a non-mag scrubbed classified slime concentrate assaying 30.00% Al_2O_3 , 60.00% SiO_2 , 1.00% Fe_2O_3 , 7.00% LOI and a $\text{SiO}_2/\text{Al}_2\text{O}_3$ ratio of 2 with 53.1 % Al_2O_3 . Recovery was at 40.0 wt.% yield meeting specifications of the refractory and ceramic industry. Detailed flotation tests are recommended to reduce dilution by other alumina bearing minerals. The WHIMS non-mag of the scrubbed classifier underflow sand at 40 wt.% yield may also be used as a product in fiber glass industry. The low-grade pyrophyllite is amenable to all the product recovery processes with minimal waste, and water requirements, thus conserving the pyrophyllite resource in the region leading to sustainable development of the region.

Keywords: pyrophyllite, attrition, wet high-intensity magnetic separation [WHIMS]