

A CIRCULAR ECONOMY PLAN FOR THE NEUTRALIZATION OF ACID MINE DRAINAGE USING SOLID MINING WASTE

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ABSTRACT

Rapid technological development has launched a proportional increase of raw materials demand which is expected to reach an upper limit of availability in the very near future. The growth of population, the rise of living standards and the low-carbon transition are some of the parameters which further enhance the problem. From another point of view, intense mining turns to become an environmental and economic problem requiring the management of large volumes of mining wastes. An ideal solution to face such situation is the adoption of circular economy approaches where the produced wastes can be considered as alternative secondary sources of useful materials. Therefore, development of appropriate processes to transform solid mining wastes into added value products or recovery of valuable compounds gains significant interest in research studies.

In this work, the chromite mining by-product, namely the ultrabasic rocks, has been examined as a pH regulator of acidic effluents e.g. for the neutralization of acid mine drainage. Ultrabasic rock samples were collected from the Vourinos mining area (Kozani region), where a chromite enrichment mineral plant is located. Experimental part included the homogenization, grinding and grain size classification of the sample. A fine powder fraction (<100 μm) was evaluated by contact with acidic matrices consisting of H₂SO₄ solutions with concentrations in the range 0.01-0.5 M. Results indicated a good potential for the solid waste to neutralize the acidic matrix and represent an alternative to the otherwise used lime. The optimum solid to H₂SO₄ concentration ratio was determined for 5 g of mineral waste with 0.01 M of H₂SO₄ when contacted for 24 h.

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