

Comparison of mine water neutralisation efficiencies of different alkaline generating agents

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ABSTRACT:

Acid mine drainage is formed from the oxidation and hydro-geo-chemical weathering of sulphide bearing minerals. These minerals originate from mining and natural processes. This has led to the formation of a very acidic mine drainage enriched with Al, Fe, Mn and sulphate. The low pH of mine water promotes the leaching of residual toxic and hazardous chemical species from the surrounding parent rocks. Due to the potency of AMD to harm the environment and degrade its intrinsic values, this mine effluent requires a prudent management and an effective treatment option prior release to different receiving compartments of the environment. The present study was therefore designed with the aim of evaluating the efficiencies of different alkaline generating agents for acid mine drainage (AMD) treatment. To fulfil the goals of this study, a comparative study was undertaken using limestone, lime, hydrated lime, magnesite, periclase, brucite, soda ash and caustic soda. Bench scale laboratory studies were undertaken. The experiments were done at 60 mins of mixing, 1 g: 100 mL S/L ratios, and ± 25 °C room temperature and mixing at 650 rpm using overhead stirrers. The experimental results revealed that the pH of AMD increased after contacting different neutralizing agents. Chemical species were also removed from an aqueous system using different agents. Using pH as an indicator, the neutralisation efficiencies varied as follow: caustic soda \geq hydrated lime \geq lime \geq cryptocrystalline magnesite \geq periclase \geq soda ash \geq brucite \geq limestone. This study advised on the best and effective pre-treatment agents and options that can be used by different mining houses.