

Efficiency of Polyacrylamide Polymers in Settling Aggregate Mining Tail Water

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Abstract: Water reuse and recycling systems in aggregate mining operations require assisted flocculation to meet in-process and environmental quality standards. Determination of the most efficient and effective flocculant is a crucial step in the process, affected by both polymer and suspension characteristics. This paper presents the results of studies on the behaviour of aggregate tail water from Vega Minerals Quarry amended with a range of polyacrylamide (PAM) flocculants. The tail water was highly turbid with ~ 37 g solid L^{-1} . Particle distribution favoured the clay range, but there was an influential amount of larger particles. Settling rate increased with increasing concentration for all polymers, being greatest for the high charged, high molecular weight anionic PAM. Optimum rates were not achieved for the concentration range used. However, the anionic polymers showed significantly faster settling rates than the cationic and non-ionic polymers. Turbidity was responsive to increasing polymer concentration, showing an inverse relationship compared to settling rate. The lowest reduction in turbidity was measured for DF 2468 (cationic PAM) at 10 mg L^{-1} . Stabilisation effects were observed for the anionic PAMs at doses greater than 4 mg L^{-1} , with the lower charged PAM showing overall lower turbidity. The low charged, lower molecular weight anionic PAM is recommended for treatment of these tail waters.

Keywords: Polyacrylamide (PAM), Flocculation, Tail water, Turbidity