

Potential use of industrial wastes in the treatment of mine wastes: A case study of legacy mine sites in Tasmania

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AMD Treatment Method

Carbonate and hydroxide-bearing industrial wastes can potentially treat acid and metalliferous drainage (AMD) produced via the oxidation of sulfide-bearing mining wastes. The potential use of green liquor dregs (GLD), wood ash, coal ash, red mud as well as scallop, mussel and oyster shells as AMD remedies for six mine sites in Tasmania was evaluated using mineralogical and geochemical analyses. A new bench-scale accelerated kinetic leach test was developed using 55 mm diameter Buchner funnels. 82 cells including controls were established with each funnel filled with 20 g in a 7:3 weight ratio of milled (<75 μm) mine waste to industrial waste (both blended and as cover layers). The cells were irrigated with deionized water every second day for 1 month and after every 10 days thereafter until 100 days had elapsed.

Discussion of Results

The initial geochemical characterization classified the untreated mine wastes as potentially acid-forming and the industrial wastes as acid neutralizing with net acid generation (NAG) pH values ranging from pH 1.9 to 5 and pH 5.8 to 10.1 respectively. Blending of the industrial and mine wastes was most effective for acid neutralization, however, the pH difference when compared to multi-layering and top covering was mostly <1.0 pH unit. Overall, GLD showed the greatest capacity for treating AMD, whilst the wood ash was least effective. Our findings highlight that there are potential benefits in using industrial waste for AMD control (e.g., co-disposal of waste, environmental and economic sustainability). However, the potential applicability of local industrial wastes as AMD ameliorates requires site-specific investigations.