Using Alum Synthesized from Recycled Scrap Aluminum to Investigate a Purification Method for Phosphate-Enriched Freshwater Ecosystems

Patel, Viraj

The purpose of the experiment was to synthesize an alum from recycled aluminum materials and investigate its use in purifying phosphate-enriched Chlorella cultures. A protocol was followed that synthesized alum from scrap recyclable aluminum (foil, soda, and food cans), potassium hydroxide, and sulfuric acid. Alum from soda can proved to be most pure based on a melting point test. 6 different types of BOD bottles containing various treatments of Chlorella culture were then set up. Bottle 1 was exposed to dark (used to measure respiration rate), Bottle 2 was light only, Bottle 3 was light enriched with phosphate, Bottle 4 was light enriched with phosphate and 1.05 grams alum, Bottle 5 was light enriched with phosphate and 1.05 grams calcium hydroxide, Bottle 6 was light enriched with phosphate and triple the original concentration of alum. The bottles were left for 24 hours and then had dissolved oxygen (DO) concentrations measured using the Winkler Method, which were then used to calculate productivity values. Ultimately, it was found that phosphate addition does increase algal productivity, as does adding a small amount of alum and calcium hydroxide. Tripling the alum concentration saw a decrease in productivity though. Higher DO and productivity levels refer to algal bloom (beginning sign of eutrophication); lower DO and productivity values refer to less algal bloom and less signs of eutrophication. SEM bar analysis points that further testing must occur to increase statistical significance of data. Nonetheless, it can be concluded that a recycled alum does hold purification potential, but for adequate results to be observed, a proper dosage of alum needs to be determined prior to use.