The Electrolytic Extraction of Dawsonite From Ocean Water: Efficient Saltwater Mineral Recovery Through Electrolysis

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As humans gain an increasing reliance on environmentally harmful devices such as cars and factories, organisms in the ocean experience life-altering adversity. To decrease the significance of emission-formed ocean alteration, we tested a lesser known method of carbon sequestration known as electrolysis. Three variables, time (5-15 min.), distance (1-2 in.), and voltage (1-3 9V batteries), were tested on 100mL of distilled water, 0.2 mol CO_2 and 0.05 mol NaCl and ranked based on dawsonite, a fire retardant, production and pH change. Through 54 trials, each combination of variables was tested and the data was collected and analyzed through correlation models, two-tailed t-tests, and prediction models. The study showed that trial 16 (1 in, 1 battery, 10 min) produced a far larger amount of dawsonite than all trials except for trial 18 (1 inch, 3 batteries, 10 minutes) through a t value of 0.11. However, a correlation coefficient (0.03) showed that batteries had minimal effect on results, allowing for trial 16 to be deemed most efficient due to minimal energy requirements. To further convey that trial 16 is the most efficient, scalable experiments were performed that showed that when the variables were scaled by 0.5, 2, and 3, the yield increased accordingly. Further experiments will be conducted to show the point of maximal efficiency and efficient aluminum type.

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