Zapping the Pollutants! Electro-Oxidation for Pollution Control

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This experiment deals with the application of electro-oxidation for the generation of sodium hypochlorite (NaClO) from salt (NaCl) water for utilization in destruction of Cyanobacteria (blue-green algae) in water. To perform the experimentation, a control group consisting of freshwater and an experimental group consisting of five different salinities (5 g/L, 10 g/L, 15 g/L, 20 g/L) were electro-oxidized for 60 minutes. Cyanobacteria contaminated water was then treated with the five different samples produced. After 15 trials, electro-oxidation produced an average hypochlorite concentration of 991 mg/L with a salinity of 20 g/L with a production rate of 16.52 mg/L per minute. After treating Cyanobacteria with the five different water samples, the most concentrated hypochlorite solution was the most effective destroying 4583.3 cells/mL per minute. Prior treatment, the algae contaminated water had an average of 285,00 cells/ mL. After treatment, the average Cyanobacteria concentration was 10,00 cells/mL. The most concentrated hypochlorite solution removed 96.5% of Cyanobacteria particles from the water. Based upon the linear curve formed from data, at a salinity of 14 g/L, after 60 minutes, 99.9% of Cyanobacteria will be destroyed. As shown from data, the production of NaClO from salt water for utilization in water disinfection is a viable treatment. Optimization studies for larger, efficient production of NaClO are recommended in the future. Future experiments involve designing a cost effective system that utilizes solar power for electro-oxidation and efficiently produces Sodium Hypochlorite for water disinfection.

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