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PII: S0304-3894(17)30773-2
DOI: https://doi.org/10.1016/j.jhazmat.2017.10.024
Reference: HAZMAT 18929

To appear in: *Journal of Hazardous Materials*

Received date: 29-6-2017
Revised date: 29-9-2017
Accepted date: 11-10-2017

Please cite this article as: Belal Bakheet, Md Ashraful Islam, John Beardall, Xiwang Zhang, David McCarthy, Electrochemical inactivation of Cylindrospermopsis raciborskii and removal of the cyanotoxin cylindrospermopsin, Journal of Hazardous Materials https://doi.org/10.1016/j.jhazmat.2017.10.024

Electrochemical inactivation of *Cylindrospermopsis raciborskii* and removal of the cyanotoxin cylindrospermopsin

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Highlights

- The efficiency of electrochemical oxidation of filamentous cyanobacteria and its related toxin was studied.
- Influence of varied current densities on the cyanobacterial inactivation was investigated.
- The role of electro-generated oxidant were studied and discussed

Abstract

Much attention has been paid to ways of removing toxic cyanobacteria and cyanotoxins from water prior to its use due to public health concerns. The efficacy of treating the toxic filamentous cyanobacterium *Cylindrospermopsis raciborskii* (*C. raciborskii*) by electrolysis with a boron-doped diamond (BDD) in Chloride-free solution was investigated. At optimum current, about 87 and 93 % removal of cell density at 60 and 180 min and about 72 and 90 % of Chl *a*, respectively. Additionally, a physiological test (F_V/F_m) indicated that cells were completely inactivated in 45 min. Furthermore, initial total cylindrospermopsin concentration 1.83 µg/L was also degraded to below the detection limit (<0.05 µg/L) in 30 min. Hydroxyl radical (•OH) played the major role in cell inactivation, however, Na_2SO_4 also played a minor role in algae removal due to the formation of $SO_4^{\bullet -}$ and subsequently $S_2O_8^{2-}$ by BDD electrode. The results of this study suggest that BDD electrochemical treatment of algae in Chloride-free water is feasible.

Keywords: Electrochemical treatment

- *Cylindrospermopsis raciborskii*
- Cylindrospermopsin