Efficiency Evaluation of Water-bloom Removal Using R-110 Coagulant Originated from Natural Materials

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Abstract

Due to the effect of recent climate changes such as drought and abnormally high temperature, emergence of algae in eutrophicated lakes or rivers has become severe in Korea. Mass propagation of floating algae, which turns water color green, is referred to as water-bloom, and *Microcystis, Anabaena, Oscillatoria*, and *Aphanizomenon* sp. classified as blue-green algae (or *cyanobacteria*) are known as the microorganisms causing water-bloom. More importantly, the species classified as blue-green algae produce cyanotoxins which are naturally hazardous substances and discharge toxic substances to the surrounding water by dissolving cells. In this study, a coagulant (R-119; MCE Korea Inc.) developed in Korea by using natural materials was applied to water-bloom removal in lakes or rivers, and the removal efficiency was evaluated. In particular, the optimal concentration of a coagulant used for the removal of a large-scale water-bloom in a river may be determined by first investigating the water-bloom concentration distribution and range, and the optimal kind of coagulant may be used according to the generated water-bloom concentration to reduce the quantity of coagulant used. For this, a water tank of a size of 100 cm×60 cm×60 cm (L×W×H) was filled with the water from a river with water-bloom to compare the removal efficiency. The removal efficiency of algae was monitored by using Multiparameter Portable Fluorometer (MODERNWATER AlgaeChek). In addition, factors such as TOC, UV254, and chlorophyll-a were analyzed to investigate the change of the algae and organic substances in the water. The structural variation was investigated by using excitation emission matrix (EEM) fluorescence spectroscopy (AQUALOG, Horiba). The methods used in this study may enable to verify the effect of the newly developed natural coagulant, rapidly determine coagulant dose and monitor the algae removal efficiency so that the quantity of coagulant utilization may be reduced.

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