Chlorination of Microcystis aeruginosa: cell lyses and incomplete degradation of bioorganic substance

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Abstract

The frequent occurrence of blue-green algae bloom in recent years has raised a series of troubles in water treatment processes, and has become a global common concern. We investigated the lethal effect of chlorine, one common chemical algicide, to inactivate Microcystis aeruginosa in the process. Multiple methods were employed to investigate the chlorination effect of M. aeruginosa, including cells calculation with fluorescent staining, photosynthetic pigment contents determination, organic carbon analyses, and fluorescence excitation–emission matrix analyses. The results indicated that even more significant lethal effect of cells with higher chlorine exposure, and chlorophyll-a could hardly be a competent indicator for cell inactivation. Meanwhile, incompletely degraded characteristic of bioorganic substance was reflected during chlorination. Our results offer insight into the lethal effect of M. aeruginosa by chlorination, which will be valuable for understanding both inactivation mechanisms of M. aeruginosa and degradation process of bioorganic substance.

Keywords: Microcystis aeruginosa; Chlorination; Fluorescence; Bioorganic substance