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Influence of organic matter on the secondary urban effluents disinfection by UV/H2O2

Ana R. Neves*, Jacqueline A. Malvestiti, Renato F. Dantas.

Abstract
The variation in the composition and the reactivity of the effluent can delay the inactivation of microorganisms and the degradation of organic contaminants due to the presence of reactive material that competes to react with the oxidants. In the case of advanced oxidative processes, the radicals formed, especially HO· can be affected by the organic matter reactivity (EfOM). This project proposed the study of the influence of organic matter on the efficiency of UV/H2O2 disinfection through the measurement of total coliforms and E. coli. The experiments were carried out with Miliq-water, samples from the secondary effluent treatment plant of School of Technology, University of Campinas – UNICAMP and from Águas da Serra - wastewater treatment plant (WWTP), Limeira-SP. The relation between the organic matter of the effluent and the disinfection process was studied from the coliform concentration data compared to the COD of the effluent. For samples from the Águas da Serra effluent, which presented COD of 79 mg/L, the disinfection was extremely efficient with different concentrations of peroxide and there was no indication of the presence of coliforms from the first 10 minutes of treatment. The samples from Faculdade de Tecnologia treatment plant presented COD of 96,2 mg/L and did not show total disinfection in the first 10 minutes with the peroxide concentration of 45mg/L.

Key words: *Advanced oxidation processes, disinfection, UV/H2O2*

Introduction

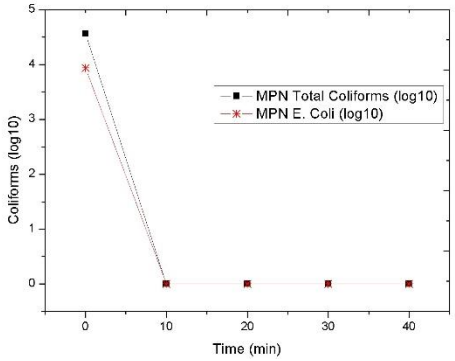
Nowadays there is a continuously increasing worldwide concern for development of alternative water reuse technologies, mainly focused on agriculture and industry. In this context, Advanced Oxidation Processes (AOPs) are considered a highly competitive water treatment technology for the removal of those organic pollutants not treatable by conventional techniques due to their high chemical stability and/or low. Numerous studies report that the UV/H_2O_2, is effective for the destruction of various pollutants however there are very few available reports on inactivation of microorganisms via OH radical oxidation (Mamane et al., 2007). Although the hydroxyl radical (HO·) is the main oxidizing agent in these processes (oxidative power: 2.80 eV) (Ikehata et al., 2006).

The objective of this research was to study the influence of organic matter and carbonate on the disinfection process of UV/H_2O_2 through the inactivation of total coliforms and *E. coli.*

Results and Discussion

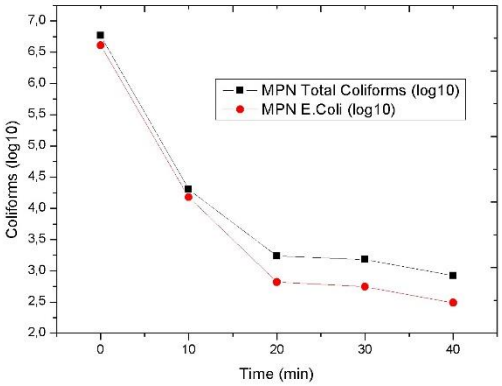
The average of Águas da Serra treatment plant COD was 79 mg/L. For these samples, the total coliform and *E. coli* were totally inactivated after 10 minutes of treatment.

Chart 1. Águas da Serra treatment plant (30mg H_2O_2/L)



The effluent from School of Technology, University of Campinas presented COD of 96.2 mg/L and the disinfection rate of the following graph for 45 mg of H_2O_2/L.

Chart 2. Faculdade de Tecnologia treatment plant (45mg H2O2/L)



Conclusions

It can be concluded that the disinfection rate in the first 10 minutes of treatment is higher for the effluent of the Águas da Serra treatment plant than for the effluent from the School of Technology, University of Campinas.

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