



Pulsed ultrasound as an energy saving mode for ultrasound treatment of surface water with terrestrial aquatic carbon

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ABSTRACT

The use of ultrasound technology in water treatment has gained great popularity in recent years owing to its benign environmental effects. The evaluation of this technology for water treatment purposes has mostly been conducted using synthetic water samples. This study however investigated the use of ultrasound for treating natural water with organic carbon predominantly derived from terrestrial sources. Ultrasound treatments were applied in continuous and pulsed modes with a range of On: Off ratios (R) and power intensity of 21.5 W/cm² for 4 min. Physio-chemical and spectroscopic measurements were applied to determine the effect of ultrasound treatments on the concentration and structure of dissolved organic carbon (DOC) in the treated water. Post-hoc statistical analysis at a significance level of 0.05 showed that the performance of pulsed ultrasound treatments at least at one of pulse settings was better than that of continuous treatment. Overall, it was found that ultrasound treatments decreased DOC in the treated water and altered its nature to become more reactive towards oxidation and electrochemical reactions. Energy and cost analysis for DOC removal have also been conducted and results showed that applying the appropriate pulse settings can reduce the cost of the treatment by more than a half.

Keywords: Pulsed ultrasound; DOC; Physio-chemical properties; Spectroscopic properties; LSD post-hoc analysis

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