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Toxic/Hazardous Substances and Environmental Engineering
Volume 48, 2013 - [Issue 12](#)

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Treatment of winery wastewater by electrochemical methods and advanced oxidation processes

Visnja Orescanin, Robert Kollar, Karlo Nad, Ivanka Lovrencic Mikelic & Stefica Findri Gustek

Pages 1543-1547 | Received 09 Jan 2013, Published online: 26 Jun 2013

 Cite this article  <https://doi.org/10.1080/10934529.2013.797267>

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Abstract

The aim of this research was development of new system for the treatment of highly polluted wastewater (COD = 10240 mg/L; SS = 2860 mg/L) originating from vine-making industry. The system consisted of the main treatment that included electrochemical methods (electro oxidation, electrocoagulation using stainless steel, iron and aluminum electrode sets) with simultaneous sonication and recirculation in strong electromagnetic field. Ozonation combined with UV irradiation in the presence of added hydrogen peroxide was applied for the post-treatment of the effluent. Following the combined treatment, the final removal efficiencies of the parameters color, turbidity, suspended solids and phosphates were over 99%, Fe, Cu and ammonia

approximately 98%, while the removal of COD and sulfates was 77% and 62%, respectively. A new approach combining electrochemical methods with ultrasound in the strong electromagnetic field resulted in significantly better removal efficiencies for majority of the measured parameters compared to the biological methods, advanced oxidation processes or electrocoagulation. Reduction of the treatment time represents another advantage of this new approach.

Keywords:

Winery wastewater electrochemical treatment ultrasound ozonation H₂O₂ COD SS electrode
iron anode aluminum anode

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