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Pre-treatment of olive oil mill wastewaters based on solar management techniques: an integrated rational approach

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Abstract

Olive oil production is considered one of the oldest agricultural industries in the Mediterranean countries. The treatment of liquid wastes produced from olive oil production is still a major challenge facing this industry. The main problem is attributed to its colour, high organic content and toxicity which is due to the presence of phenolic compounds. Compared to other advanced oxidation processes (AOPs), Fenton's reaction presents several advantages. H_2O_2 is environmentally friendly, since it slowly decomposes into oxygen and water. Besides, the abundance, lack of toxicity and ease of removal from water makes Fe^{2+} the most commonly used transition metal for Fenton's reaction applications. In order to facilitate the degradation of the pollutants, solar energy is used to enhance the Fenton's reaction to degrade the oil into simple, safe products. The full-scale experiments, which were conducted in Egypt, a solar collector to capture UV radiation from the sun was developed in conjunction with Fenton's reagent. Excellent removal rates of the contaminants were recorded. The experimental parameters were investigated and optimum operating parameters for the Fenton's reagent was achieved through the Response Surface Methodology (RSM) experimental design based on the Box-Behnken factorial design. The parameters studied are: iron ion, H_2O_2 and oxalic acid concentrations. The results revealed that the optimized values are 194; 677 and 63mg/l for Fe^{2+}; H_2O_2 and oxalic acid, respectively. The COD removal efficiency at those optimum conditions reached to 65%.

Biography

*Maha Tony is a Staff Associate Researcher in the Green ChemistryCentre, Universiy of York, United Kingdom. She was previously a lecturer of Chemical Engineering in the faculty of engineering, Minofya University, Egypt. Maha received her Ph.D. in 2009 through the channel scheme between University College Dublin, UCD in Ireland and Minia University in Egypt. Now she is dealing with the research area including wastewater treatment, waste management. sh*e has published more than 22 papers in reputed journals and *international conferences.*