### 8<sup>th</sup> International Conference on **Environmental Chemistry and Engineering**

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## Green Energy, Green Engineering and Technology

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# An advanced oxidation process based on Fenton reactions for reduction of environmental impact of leather tanning effluents as an efficient method for wastewater treatment

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Tn the last few decades, humankind is facing water pollution and its scarcity. In this regards, great attention is being given to the removal of organic pollutants from wastewater by advanced oxidation processes (AOPs) that are based on generation of highly reactive species, especially hydroxyl radicals. Fenton processes are attractive alternatives in effluent treatment, especially when applied to recalcitrant compounds. Leather tannery wastewater treatment represents a difficult technological problem. Unfortunately, it is one of the most serious industries which generates large amounts of hazardous wastes and is a source of severe environmental impacts as well as health risks. In particular, the dehairing stage generates an alkaline wastewater (high pH) with high concentrations of organic matter, sulphides, suspended solids, and salts, which shows significant toxicity. Also, chrome has well known adverse effects because it is highly toxic, highly persistent in the environment and not biodegradable. Conventional treatment methods of this effluent are inefficient to meet the required limits. The objective of this work was to evaluate the efficiency Fenton's reaction as an advanced oxidation for the treatment of lime/de-hair and chrome effluents, investigating the reduction of COD, ammoniac nitrogen and chromium concentrations as well as toxicity in treated wastewaters. The different operational conditions as variable doses of hydrogen peroxide  $(H_2O_2)$  and iron sulfate  $(Fe^{2+})$ , pH, time and different mass ratios of  $Fe^{2+}/H_2O_2$  were investigated to determine the optimum operating conditions for the elimination of chrome, chemical oxygen demand (COD), biological oxygen demand (BOD), sulfide, total kjeldahl nitrogen (TKN), total suspended solids (TSS) and oil & grease. The experimental results show that COD, sulphide and oil-grease was removed effectively and the treated effluent has a good quality. Residual concentrations of COD, BOD, TSS and chrome were 974, 533, 19 and 485 mg/l, respectively. The sulfides concentration was highly reduced from 3695 to 1.4 mg/l. The overall COD, sulphide, oil-grease and chrome removal efficiencies reached 82%, 90%, 96% and 95% respectively. The treated effluent could meet the national regulatory standard for discharge into the sewerage systems with respect to the studied parameters.

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Figure : Schematic diagram illustrate the inputs and outputs as well as environmental impact associated with tanning process

#### **Recent Publications**

- 1. M A El-Khateeb, El-Shahat H A Nashy, N A Abdel Ghany and Ahmed M Awad (2017) Environmental impact elimination of chrome tanning effluent using electrocoagulation process assisted by chemical oxidation. Desalination and Water Treatment 65:147–152.
- 2. El-Shahat H A Nashy and M A El-Khateeb (2015) Agro-substances and non-agro-substances as efficient and costeffective materials for wastewater treatment. Desalination and Water Treatment. 54(9):2357-2363.

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- 3. Morera J M, Bacardit A, Ollé L, Bartolí E and Borràs M D (2007) Minimization of the environmental impact of chrome tanning: a new process with high chrome exhaustion. Chemosphere 69(11):1728-33.
- 4. Swarna V K, Venba R, Madhan B, Chandrababu N K and Sadulla S (2009) Cleaner tanning practices for tannery pollution abatement: Role of enzymes in eco-friendly vegetable tanning. J. Cleaner Production 17(5):507-515.
- 5. Regina C C Costa, Flàva C C Moura, Patricia E F Oliveira, Fabiano Magalhães and Jose D Ardisson (2010) Controlled reduction of red mud waste to produce active systems for environmental applications: heterogeneous Fenton reaction and reduction of Cr(VI). Chemosphere 78:1116-1120.

#### Biography

El-Shahat H A Nashy is a Professor in the Chemical Industries Research Division, Department of Chemistry of Tanning Materials and Leather Technology. His general specialization is in natural sciences and he is specialized in chemical sciences. He has experience in the wastewater treatment and its evaluation according to environment required limits. Also, his other works are in interest of chemistry of tanning materials and leather applications.

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