Sibéria Caroline Gomes de Moraes et al., J Chromatogr Sep Tech 2015, 6:4
http://dx.doi.org/10.4172/2157-7064.S1.011

OMICS International
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International Conference and Expo on
Separation Techniques
August 10-12, 2015 San Francisco, USA

Wastewater treatment assessment of a process for oil refining unit oxidative advanced using artificial neural networks

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The exploration, production and transportation of oil and its derivatives can lead to generation of effluents that are usually treated by biological processes (aerated lagoons, activated sludge or biological reactors). In these processes, some of the contaminants are removed, and the final effluent presents a new physical-chemical characteristic that sometimes reaches the limits allowed by law for disposal into receiving bodies. However, these processes produce sludge with a high load of contamination and should be taken to landfill or co-processes, processes that are costly to the company. In this work we applied the method to advanced oxidation processes (AOP) for degradation of polycyclic aromatic hydrocarbons (PAH) in wastewater refinary an actual oil and data were processed by neural networks, statistical models based on behavior of a complex physical system capable of mapping a set of input-output without having any prior knowledge of the other process, relying only on historical data. The results were corroborated by measurements of degradation of PAH, and TOC were completed with toxicity studies using natural material microcrustacean. We used three oxidation processes: Photolysis, Fenton process and process photo-Fenton. There was a decline below 30% for treatment with photolysis, up to 60% for the Fenton treatment and over 90% for the treatment processes employed photo-Fenton when a concentration of H2O2 for 60, 95 and 130 mmol. In the toxicity test, we used the microcrustacean *Artemia salina*, which were subjected to exposure for 24 hours, obtaining a percentage of 80% of survivors' microcrustacean which proves the effectiveness of treatment. To employ the neural network, we used the experimental data and simulated in the test and validation, leading to evidence that the values were very close and that the neural network used was able to accurately track the trend of the data, hence the values of TOC, because the correlation coefficient for the first model was R2=0.994 and the second model was R2=0.996.

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