

February 28-March 01, 2019
London, UKInsights Anal Electrochem 2019, Volume 5
DOI: 10.21767/2470-9867-C1-009

Degradation of priority pollutants by ferrate(VI) oxidation: Analysis of the influence of initial oxidant concentration and pH value

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Pesticides and pharmaceuticals became of high environmental concern due to their high chemical, physical-chemical and biological stability. Standard approaches in water treatment are not designated to remove pollutants of such characteristics and thus advanced oxidation processes are usually applied. One of the oxidation processes is treatment by ferrate(VI) salt, which is considered to be ecologically acceptable. Namely, ferrate(VI) ion is a strong oxidation reagent and, at the same time, its reactions with pollutants often result with highly reactive radicals that significantly contribute the pollutants' degradation. In addition, reduction of ferrates leads to the formation of Fe(III) species that induce coagulation and improves removal of present organic pollutants. Seven pesticides and five pharmaceuticals

of high environmental concern (namely: alachlor, atrazine, cybutryne, diuron, isoproturon, chlorfenvinphos, simazine, azithromycin, erythromycin, carbamazepine, dexamethasone, and oxytetracycline) were subjected to ferrate(VI) treatment. The degradation of the pollutants was monitored by HPLC; a specific chromatographic method had to be developed for each analyzed pollutant in order to provide shortest analysis with adequate resolution of detected compounds (initial pollutant and the arising degradation products). The influence of initial pH and concentration of oxidant on degradation rate of the studied pollutants was monitored and the optimal conditions for ferrate treatment were determined.

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