DEGRADATION OF CEFTRIAXONE IN WATER BY HETEROGENEOUSLY ACTIVATED PERSULFATE

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Advanced oxidation processes are a group of new technologies that are based on a highly reactive hydroxyl radical, which reacts to almost all organic molecules [1]. Alternative to hydroxyl radicals are sulfate radicals that are more selective, persistent and stronger oxidants [2].

The aim of this research was to study the degradation of ceftriaxone (CTA) in ultrapure water and groundwater by heterogeneously activated persulfate (PS). Goethite (α-FeO(OH)) was used as a heterogeneous catalyst. The efficacy of the following processes were studied: UV-C, UV-C/PS and UV-C/PS/α-FeO(OH). The impacts of water matrix, pH, concentrations of persulfate and goethite to mineralization (TOC removal) and degradation of CTA were examined.

It was ascertained that the degradation of CTA follows pseudo-first order reaction kinetics. Ceftriaxone decomposes at least 99.5% in 15 min treatment time in all the processes. The CTA degradation efficiency was similar in all studied processes, although the removal of TOC was negligible using only UV-C radiation. Therefore, the effect of persulfate and goethite concentrations to the target compound degradation were investigated.

The results indicated that the increase of persulfate concentration improved TOC removal, while the increase of goethite dose did not notably increase TOC removal. In addition, excessive concentration of goethite inhibited CTA degradation. The pH value had insignificant effect to the UV-C/PS process. CTA degradation in groundwater was the most effective by the UV-C/PS process, while the observed processes in general were slower than in ultrapure water.

References:

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2. Boczkaj, G., Fernandes, A. Wastewater treatment by means of advanced oxidation processes at basic pH conditions: a review. – *Chemical Engineering Journal*, 2017, 320, 608-633.

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