Sonochemical degradation of twenty-three emerging contaminants in urban wastewater

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**ABSTRACT**

The occurrence and fate of pharmaceuticals in the environment, and in aquatic media in particular, have received considerable attention by the scientific community during the last two decades. Pharmaceuticals, which are designed to be biologically active substances, are usually lipophilic and resistant to biodegradation, thus having the potential for accumulation and persistence in the environment. Although they are usually present at relatively low concentrations, ranging between ng/L and µg/L levels, they may cause serious effects on the environment. In this study, the removal efficiency of sonolysis has been tested on a mixture of 23 pharmaceuticals. Diclofenac and carbamazepine degradations were tested at different power densities (100–400 W/L) using low frequency. These compounds were spiked separately in wastewater at high concentrations (mg/L). Subsequently, low-frequency ultrasound-induced degradation of a mixture of 23 emerging contaminants with low concentration (µg/L) in urban wastewater was investigated, working at 100 W/L. It was found that the pharmaceuticals conversion is enhanced at increased applied power densities. The reaction rate for different pharmaceuticals is almost the same in the mixtures and the kinetic regimes are mainly pseudo-first order.

**Keywords:** Advanced oxidation processes; Emerging compounds; Pharmaceuticals; Sonolysis; Wastewater