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Toxicity Reduction in Pharmaceutical Compound Mixtures Using Electron Beam Irradiation

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The presence of pharmaceutical compounds in surface waters has been widely documented, representing potential risks to environmental and human health (Adeleye et al., 2021; Souza et al., 2022). This study aims to evaluate electron beam irradiation, as a promising technology, to reduce the toxicity of pharmaceuticals in water. Acute toxicity tests were conducted with three different mixtures of pharmaceuticals: a) Sulfadiazine + Fluoxetine, b) Caffeine + Fluoxetine, and c) Metformin + Fluoxetine. Results indicated that the antibiotic SDZ + FLX mixture resulted in 23.1% and 16% toxicity reduction for *Daphnia similis* microcrustacean and for the marine bacterium *Vibrio fischeri*, after 2.5 kGy. The stimulant CFN + FLX mixture resulted in a toxicity reduction of 42.4% and 25.3% respectively, for both organisms, at 2.5 kGy. However, the antidiabetic MET + FLX mixture, only the bacterial assay resulted positive for the toxicity removal: 21.9% less toxic for *V. fischeri*. The mixture of MET + FLX was more toxic than mixture A and B for daphnidae. Electron Beam Irradiation is effective for the degradation of organic molecules and toxicity is an indispensable parameter for understanding the formation of irradiation by-products.

Reference

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