

## P264. Application of electron beam irradiation for remediation of pharmaceutical compounds in water

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A significant number of pharmaceutical active compounds have been released in the aquatic environment. These compounds are not fully removed from water and wastewater treatment plants. Furthermore, these contaminants are not commonly monitored, and they possess the potential to cause adverse ecological and human health effects. Electron Beam Irradiation (EBI) have been applied as an alternatively green method in water management, being efficient for removing organic recalcitrant pollutants at low doses. This work aims to assess the effect of EBI on toxicity of four pharmaceuticals from distinct class (anti-inflammatory, antidepressant, antibiotic, and antidiabetic) using organism from different trophic levels. Acetylsalicylic acid and fluoxetine hydrochloride were obtained from Labsynth (>99.5%) and Divis Pharmaceuticals Pvt. Ltd (98.8%), respectively. Metformin hydrochloride (97%) and ciprofloxacin (>98%) were purchased from Sigma-Aldrich. All aqueous solution were diluted using ultra-pure water. Acute toxicity assays with *Daphnia similis* and *Vibrio fischeri* were based on ABNT/NBR standard methods. The evaluated endpoint was immobility and bioluminescence inhibition, respectively. The yeast assays were carried by monitoring of changes in the specific conductivity of suspensions of *S. cerevisiae*. All the assays were performed in triplicate. The toxicity results of the microcrustacean and the bacteria were expressed in Toxicity Factor. For the yeast, data were analyzed by F-test and t-test using a significance level of 0.05. The UV-Vis spectrum showed changes in all pharmaceutical's spectrum after irradiation at 2.5 kGy. The toxicity results indicated that the effects varied depending on the organism and the studied pharmaceutical. For acetylsalicylic acid, increase of toxicity was observed for all three the organism. In contrast, for fluoxetine, a great toxicity removal was achieved for *D. similis* while and for the bacteria and the yeast no changes of toxicity were noted. Regarding metformin, the radiolytic byproducts were only toxic to the microcrustacean, possibly including residual hydrogen peroxide. Finally, for ciprofloxacin, toxicity increase was verified for *D. similis* and *V. fischeri*, while detoxification was observed for *S. cerevisiae*. In conclusion, the present work demonstrated EBI is effective for removing pharmaceuticals and showed the importance of using different organism for toxicity assessment.

**Palabras clave:** ecotoxicity, electron beam irradiation, pharmaceuticals, remediation.

**Área temática:** Mitigation and Remediation.