

Poster 39

Butylone enantioseparation and ecotoxicity evaluation on *Daphnia magna*

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Abstract

Background: The synthetic drug butylone (2-methylamino-1-(3,4-methylenedioxyphenyl)butan-1-one, BTL) is a chiral cathinone consumed in the form of racemate [1]. After consumption, BTL is metabolized and excreted along with its metabolites, and its residues are carried by sewerage systems to wastewater treatment plants (WWTPs) [2]. Both human metabolism and biodegradation in WWTPs may be enantioselective causing a change in its enantiomeric fraction (EF). However, enantiomers may exhibit different biological activities including toxicity on non-target aquatic organisms [3]. **Objective:** This study aimed to separate both enantiomers and assess the sub-chronic effects on *Daphnia magna* focusing on morphophysiological and reproductive parameters. **Methods:** The enantiomers were separated by liquid chromatography using a homemade semipreparative chiral column (APS-Nucleosil coated with a 3,5-dimethylphenylcarbamate of amylose). *Daphnia* (with less than 24 h) were exposed for 9 days to concentrations of 0.1, 1, or 10 µg/L, with a total of 5 replicates per concentration and a control. **Results:** Morphophysiological alterations were observed, except in the heart area. A tendency to the increase of body size, heart size and mortality were observed for the higher concentrations (1 and 10 µg/L). The daphniids with eggs tended to decrease. Analysis of other endpoints (ongoing) are required to draw accurate conclusions. **Conclusions:** The present study demonstrates that exposure to BTL may cause effects on mortality and morphology of *D. magna*. The ongoing studies will bring new knowledge on BTL adverse effects and the possible enantioselective toxicity effects on this non-target aquatic organism.

Keywords: ecotoxicity; psychoactive drugs; *Daphnia magna*; enantioseparation

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References

1. Roque Bravo, R.; Carmo, H.; Valente, M.J.; Silva, J.P.; Carvalho, F.; Bastos, M.L.; Dias da Silva, D. From street to lab: in vitro hepatotoxicity of buphedrone, butylone and 3,4-DMMC. *Arch Toxicol* **2021**, *95*, 1443-1462.
2. Wang, Z.; Tang, B.; Wang, K.; Hao, Y.; Yang, F. Accumulation and risk prioritization of psychoactive substances in the critically endangered Yangtze finless porpoise. *J. Hazard. Mater.* **2023**, *442*, 130002.
3. Langa, I.; Tiritan, M.E.; Silva, D.; Ribeiro, C. Gas Chromatography Multiresidue Method for Enantiomeric Fraction Determination of Psychoactive Substances in Effluents and River Surface Waters. *Chemosensors* **2021**, *9*, 224.



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