



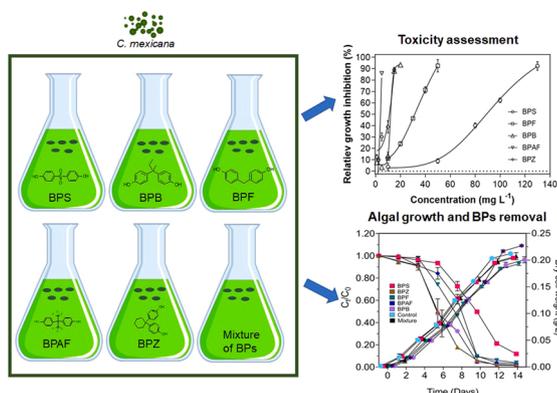
Research Article

Fate of five bisphenol derivatives in *Chlamydomonas mexicana*: Toxicity, removal, biotransformation and microalgal metabolismNikita Yadav^{a,1}, Hyun-Jo Ahn^{a,1}, Mayur B. Kurade^a, Yongtae Ahn^a, Young-Kwon Park^b, Moonis Ali Khan^c, El-Sayed Salama^d, Xiangkai Li^e, Byong-Hun Jeon^{a,*}^a Department of Earth Resources and Environmental Engineering, Hanyang University, Seoul 04763, Republic of Korea^b School of Environmental Engineering, University of Seoul, Seoul 02504, Republic of Korea^c Chemistry Department, College of Science, King Saud University, Riyadh 11451, Saudi Arabia^d Department of Occupational and Environmental Health, School of Public Health, Lanzhou University, Lanzhou, Gansu 730000, PR China^e Ministry of Education Key Laboratory of Cell Activities and Stress Adaptations, School of Life Science, Lanzhou University, Lanzhou, Gansu 730000, PR China

HIGHLIGHTS

- Bisphenol-AF exhibited the highest toxicity to *C. mexicana*.
- *C. mexicana* effectively removed 99–61% of 1 mg L⁻¹ bisphenols in 14 days.
- Biotransformed products of bisphenols in *C. mexicana* were analyzed.
- Palmitic acid in *C. mexicana* increased significantly after bisphenols exposure.

GRAPHICAL ABSTRACT



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ABSTRACT

Bisphenols (BPs) are recognized as emerging contaminants because of their estrogenic properties and frequent occurrence in environmental matrices. Here, we evaluated the toxic effects of five common BPs on freshwater microalga *Chlamydomonas mexicana* and removal of the BPs by the alga. Bisphenols -AF (BPAF), -B (BPB), and -Z (BPZ) (96 h, EC₅₀ 1.78–12.09 mg·L⁻¹) exhibited higher toxicity to *C. mexicana* compared to bisphenol -S (BPS) and -F (BPF) (96 h, EC₅₀ 30.53–85.48 mg·L⁻¹). In contrast, the mixture of BPs exhibited acute toxicity (96 h, EC₅₀ 8.07 mg·L⁻¹). After 14 days, *C. mexicana* had effectively removed 61%, 99%, 55%, 87%, and 89% of BPS, BPF,

Abbreviations: BPs, bisphenols; BPA, Bisphenol-A; BPS, Bisphenol-S; BPB, Bisphenol-B; BPF, Bisphenol-F; BPAF, Bisphenol-AF; BPZ, Bisphenol-Z; CW, constructed wetland; ECs, endocrine disruptors; WWTPs, wastewater treatment plants; HPLC, high-performance liquid chromatography; LC50/ EC50, acute toxicity value; ChV, chronic toxicity value; TP, transformed products; ECOSAR, Ecological Structure Activity Relationships program; NIST, National Institute of Standards and Technology.

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