ISSN 2815-0260
Proceedings of the Young Scientists' Conference on Multidisciplinary Research-2025
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
27th November 2025

Paper ID: CMT_205

The impact of sunlight exposure time on microplastic release from bottled water in tropical climates

D.W.M.D.S. Chandrawansha[1*], T.G.M. Mihidula[1], L. Jayarathne[1]

[1]*National Institute of Fundamental Studies, Kandy, Sri Lanka*

**dinukachandrawansha@gmail.com*

Microplastic (MP) contamination in bottled drinking water has become a significant environmental and public health concern; particularly in regions with a high plastic consumption, like Sri Lanka. While earlier studies have confirmed the presence of microplastics in bottled water, the effect of extended sunlight exposure on their release has not been thoroughly examined. This study investigates the effect of sunlight exposure time on the release of MP particles from 5 litre Polyethylenterepthalate (PET) water bottles in tropical climatic conditions. The experimental setup includes a total of thirty-two 5 litre water filled bottles. Direct sunlight exposure was applied to the bottles across varied time intervals of 1 day, 7 days, 14 days and 30 days respectively. The water samples were filtered using a 100 µm sieve pre and post exposure and the retained particles were quantified under an optical microscope. An initial concentration of 60 ± 8 MP particles per litre was observed, followed by an exponential increase of approximately 4.97% particles per litre per day, as described by the model $y = 57.181e^{0.045851x}$ ($R^2 = 0.099$), with respect to the duration of sunlight exposure. Subsequent Raman spectroscopy analysis identified the presence of photodegraded PET products (-COOH), Peak broadening and crystalline deformities. This confirmed the release of PET MPs from the bottles and the degradation of them into by-products. It is suggested that the photodegradation of PET MPs under sunlight is driven primarily by photo-oxidation, where UV irradiation generates reactive oxygen species that attack the PET polymer chains, causing chain scissions and resulting in new functional groups on the MP surfaces. These findings highlight potential health risks linked to prolonged storage of bottled drinking water under sunlight and emphasize the importance of raising public awareness.

Keywords: *Particle release, photodegradation, plastic count, polyethylene terephthalate*