An environmentally-friendly method for the identification of microplastics using density analysis

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Abstract

The main objective of this study is to identify the type of polymer of microplastics using density analysis, utilising an affordable and accessible methodology. Current methodologies for microplastic polymer identification are not practical in field work especially in remote areas. The methodology here proposed offers a cost-effective, time-efficient and field alternative, useful to separate and identify plastics using their density.

A considerable amount of literature has been published on the separation and identification of plastics using their density Morét-Ferguson et al., (2010) placed a piece of plastic in distilled water, if the plastic sank concentrated CaCl\textsubscript{2} or SrCl\textsubscript{2} was added until the plastic was neutrally buoyant. However, if the plastic floated, ethanol was added until the plastic was neutrally buoyant. Similarly, to identify unknown plastics, Kolb and Kolb (1991) created solutions with varying densities and then recorded which plastics floated or sank. Syakti (2017) extracted microplastics from environmental mediums based on the principle that different polymers have different densities.

This study differs from other research since the proposed methodology successfully distinguished eight types of microplastics using their densities, only using water, sucrose and ethanol and gave a precise protocol for the preparation of the solutions. Most importantly, this method is suitable for micoroplastics. In this method, solutions of 8 different known densities were prepared following precise protocols. Microplastic particles are disposed in different test tubes containing solutions of different densities. Since different types of plastics have different densities, they will sink or float depending on the solution they are in. The buoyancy of the microplastics in the solutions is noted and used to identify the microplastics’ polymer type.

Keywords: density analysis, microplastics, pollution, marine, identification, environmentally friendly

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