Increasing Microplastic Removal Efficiency With Ferrofluid

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Microplastics in waterways are becoming an ever-increasing problem for the natural world and for humans as well. It is important to find ways to remove microplastics effectively. Ferrofluids are a mixture consisting of a carrier liquid that suspends magnetic particles in itself, and are an inventive way of removing microplastics from waterways. To increase efficiency in microplastic removal with ferrofluids, three different oils were selected: grapeseed, canola, and sunflower. These were tested for their viscosity at temperatures of 7, 21.1, and 37.8 degrees Celsius. Later, a magnet's force was measured at these same three temperatures. Lastly, the three oils were used as ferrofluid liquid carriers to remove microplastics at the mentioned three temperatures. The oil-based ferrofluids removed microplastics twice at each temperature, once with a neodymium magnet at 21.1 degrees Celsius, and again with a neodymium magnet at 7 degrees Celsius. It was hypothesized that the grapeseed oil-based ferrofluid at 37.8 degrees Celsius and a neodymium magnet at 7 degrees Celsius would be the most efficient at removing microplastics. The hypothesis was right in the aspect that the neodymium magnet performed best on average at 7 degrees Celsius; it performed the best overall when paired with grapeseed oil-based ferrofluid at 7 degrees Celsius. This may be due to the magnet's strong force at lower temperatures overpowering the high viscosity of grapeseed oil at 7 degrees Celsius. Therefore, to increase the efficiency of microplastic removal using ferrofluids, grapeseed oil should be used as the liquid carrier in ferrofluids at 7 degrees Celsius, and the ferrofluid and microplastics should be removed with a magnet at 7 degrees Celsius.

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