Analyzing and Filtering Microplastics in Drinking Water

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Purpose: The EPA estimates that by 2050, 12,000 metric tons of plastic will be discarded into the ecosystem. Studies have shown that a liter of bottled water may contain thousands of microplastics and nanoplastics, and regular ingestion of these contaminants can lead to adverse health issues. -- The researcher would like to develop a sustainable and eco-friendly model to remove these contaminants from drinking water. -- Magnetic iron oxide nanoparticles (MIONs) are capable of attracting microplastics due to their superior magnetic properties and compatible molecular structure. The researcher hypothesizes that "If magnetic iron oxide nanoparticles are applied in drinking water abundant with microplastics, then they will demonstrate a significant ability to remove these contaminants." Procedure: Microplastics of various sizes and compositions were added to distilled water to create a testing medium. A custom filter was constructed using a series of MION-coated perforated metal plates at the front and a perforated magnetic plate at the rear of a transparent tube. Untreated water was then passed through the filter. Using a high resolution microscope microplastics in both the treated and untreated water were recorded for comparison. Results: The procedure removed over 77% of microplastics around 400 micrometers and nearly 72% around 20 micrometers. Data variation was within ±2SD, with a p-value of 1.2%, below the acceptable 5%. Conclusions: The study shows that MIONs effectively remove microplastics, leading to a sustainable and eco-friendly water filtration system. This removal can reduce the negative impact on human health and prevent diseases linked to plastic ingestion.

Awards Won: