

An Investigation into the Removal of Dyes and Plastic Microfibers from Wastewater

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The textile industry is one of the most polluting industries in the world, with a fifth of water pollution originating from just the dyeing and finishing steps of the textile manufacturing process alone. This study found a new method for dye and plastic microfiber removal by utilizing the adsorbent property of powdered activated carbon (AC), nonpolar property of oil, and magnetic property of magnetite. Currently, powdered AC is not used for industrial purposes because its small size severely complicates its removal from the water after use. However, it's more efficient than granular AC, which is being used industrially at present. To find a method to utilize powdered AC while also removing dye and plastic microfibers, the experiments were divided into 4 phases of pollutant removal from water to test individual and combined materials, isolating their effects on the pollutants: dye and microfibers (combined), dye, microfibers, and powdered AC. Pollutant removal percentages were converted using light intensity measurements and calibration curves. Results showed that AC was most efficient at dye removal (87%), while oil was best for microfiber (77%) and AC removal (96%). The addition of magnetite aids in oil removal. This method removes dye and microfibers from water while simultaneously separating the removal agents from water after use. This study may contribute to the development of a more cost efficient textile wastewater treatment system that targets both dyes and plastic microfibers.