

# Remediation of Bisphenol A Water Contaminants by Reusing Activated Charcoal Filters

May Wang and Jeffrey Field

**Background and Purpose:** Endocrine disruptors (EDCs) are chemicals that interfere with an organism's endocrine system. Bisphenol A (BPA), a common EDC found in plastic bottles and soda cans, is a synthetic estrogen that feminizes an organism. Efforts have been made to eliminate BPA from the water supply by using new filtration methods, but most are too expensive or ineffective. The purpose of this study was to test the consistency and kinetics of activated charcoal as a means of removing BPA.

**Materials and Methods:** Sand filters, which were tested as a control, are commonly used in water treatment facilities. Experiments were conducted using activated charcoal filters and varying concentrations of BPA in two methods: consecutive rounds of batch use and continuous use. The hypothesis was that activated charcoal would be a reliable method of filtration that would withstand repeated challenges of BPA, but would eventually become saturated after a certain point and lose its effectiveness. Concentrations of the BPA solutions were measured using UV absorption in a spectrophotometer, after establishing a standard curve to determine the linear range of the assay.

**Results:** The sand filters were largely ineffective, sometimes contaminating the water even further. The percent removal for both consecutive rounds of filtration and continuous use was consistently in the range of 85% to greater than 99% for all rounds and hours of use. No statistical difference in percent removal was observed between consecutive use and continuous use when paired t-tests were performed ( $p >> 0.05$ ,  $\alpha = 0.05$ ).

**Discussion:** This study concluded that activated charcoal as a filter is effective for removal and is active for a number of times after the initial use and for several hours of use. These results are promising for the future of activated charcoal as an effective, economical method to filter BPA from water, especially wastewater, where BPA is commonly found and left unfiltered. Activated charcoal filters could improve overall ecological health and significantly decrease risk of exposure to BPA.

May Wang, Teen Research and Education in Environmental Science at the Center for Excellence in Environmental Toxicology, University of Pennsylvania, Perelman School of Medicine; 28 Ponderosa Drive, Holland, PA 18966; Tel: 267-987-6583; Email: 1stviolin2016@gmail.com

Jeffrey Field, Ph.D., Center for Excellence in Environmental Toxicology, University of Pennsylvania, Perelman School of Medicine, Department of Pharmacology; 1313 BRB II/III Building, 421 Curie Blvd, Philadelphia, PA 19104; Tel: 215-898-1912; Email: jfield@mail.med.upenn.edu

Presenting Author: May Wang