

The Presence, Effects, and Removal of Pharmaceuticals and Personal Care Products in the Environment

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ABSTRACT

Pharmaceuticals and personal care products (PPCPs) have recently become water pollutants of investigation. With increased concern for possible adverse ecological and human effects, researchers have been faced with the challenge of learning more about this class of contaminants. The U.S. Environmental Protection Agency has made identification of risks of unrecognized pollutants one of its top five goals of Strategic Plan 2000 for the Office of Research and Development (Daughton and Ternes, 1999). As research becomes more intense, new methods of detection and removal of PPCPs in wastewater and surface water are being created. While the acute and chronic effects of pharmaceuticals and personal care products in humans remain widely unknown, endocrine disruption and other effects have been observed in aquatic life. As wastewater effluents continue to bear concentrations of unmetabolized pharmaceuticals and portions of personal care products, research on the effects, removal, and presence of them increases in importance.

KEY WORDS: pharmaceutical, personal care products, endocrine disruptor, maximum contaminant level

INTRODUCTION

Recently, a new class of pollutants has become the concern of many environmental researchers. Pharmaceuticals and personal care products (PPCPs) have been detected in many waterways across the United States and have the potential for adverse ecological and human effects. These pollutants are not well understood, making research and development pertaining to them a priority. First capturing the attention of European researchers, pharmaceuticals and personal care products have become the focus of researchers across the United States, from the Environmental Protection Agency to university research programs. Research and development throughout the past ten years has created a better understanding of the pollutants, but has not clearly identified many key elements necessary to fully understand the impact of pharmaceuticals and personal care products. Important methods of detection, methods of remediation, and knowledge of the effects of PPCPs have been the greatest accomplishments thus far in research.

As freshwater resources seem to become limited, interest in conserving the value of water supplies has become essential (Koplin et al, 2002). The strain on water supplies has forced many communities to investigate alternative sources for water, such as recycling treated wastewater. Currently, recycled wastewater is commonly used for such purposes as irrigation and landscaping. Recycling wastewater for potable use is becoming of greater interest for many communities. In order for this practice to become acceptable in the eyes of the public, it is necessary for all to understand the nature of microcontaminants found in recycled wastewater (Sedlak et al, 2000). In the process of understanding recycled water, the issue of pharmaceuticals and personal care products has emerged. Pharmaceuticals are of particular concern due to their ability to become endocrine disrupting chemicals in the environment.

SOURCE OF PHARMACEUTICALS AND PERSONAL CARE PRODUCTS

Pharmaceuticals and personal care products have many methods of entering water sources. Pharmaceutical producing companies and medical industries produce a large amount of wastewater contaminated with pharmaceuticals. The Environmental Protection Agency recognizes the issue of releasing pharmaceuticals into wastewater and has set forth effluent concentrations for pharmaceutical point source polluters such as hospitals and pharmaceutical industries.