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Disinfection By-Products in Drinking Water, Recycled Water and Wastewater: Formation, Detection, Toxicity and Health Effects: Preface

The disinfection of drinking water was an outstanding (and perhaps the most important) public health achievement of the 20th century. According to the United Nations World Health Organization, over 4 billion people have access to improved drinking water. Yet drinking water-mediated waterborne disease is a major cause of morbidity and mortality. The WHO predicts that by 2025, half of the world's population will be living in water-stressed areas. Water and wastewater recycling are global priorities. The development of novel methods and their implementation for the disinfection of drinking water are crucial. Water disinfection involves the need for pathogen inactivation to control acute waterborne disease, balanced with the reduction of toxic disinfection by-products (DBPs) associated with chronic adverse health effects. Disinfection by-products are the unintended consequence of reactions between disinfectants with organic and halide precursors in source waters. Exposure to DBPs is associated with unfavorable health effects, from cancer induction to adverse pregnancy outcomes. However, the forcing agents responsible for these adverse biological effects are largely unknown. While more than 700 DBPs have been identified, few (<20) are regulated by national governments. Identified DBPs represent less than half of the total organic halogen measured in drinking water, and of the thousands of possible DBPs, only approximately 100 have been evaluated by systematic quantitative toxicological analyses. Epidemiological studies are hampered by problems with exposure metrics and the suite of DBPs present in drinking water. Although the

last two decades experienced increased interdisciplinary collaborations amongst chemists, biologists, epidemiologists, engineers, and regulators, resolving the risks of DBPs follows a dated paradigm. A new integrated approach is required to determine the contaminants in source and drinking waters that increase health risks and to provide the foundation for novel disinfection practices for the 21st century. This Special Issue provides some illumination for a roadmap of future research toward these goals.

This issue of the Journal of Environmental Sciences entitled, "Disinfection By-Products in Drinking Water, Recycled Water and Wastewater: Formation, Detection, Toxicity and Health Effects" offers a glimpse into the manifold areas of water research. This collection of papers prepared by scientists throughout the world illustrates the breadth of high impact research on water issues with the goals of protecting public health and the environment. In addition, with this special issue, we celebrate the established status of the Gordon Research Conference on Disinfection By-Products.

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