

Executive summary

Introduction

Worldwide water utilities seek for processes for the treatment of water with pathogens and organic micro pollutants. Over the last decades UV technology has developed into a reliable and costeffective treatment process for surface water and groundwater. However, UV disinfection and UV oxidation may lead to the formation of undesirable by-products. Therefore, to ensure a safe application of UV technology, additional information on process conditions related to the water quality is required.

Importance

Increased regulations on water quality may strongly affect the choice of treatment process. By-product formation during UV-based processes is inevitable which enhances the need for qualitative and quantitative data about the formation of compounds with respect to human health.

Approach

This project covers a literature research aiming at giving an overview of by-product formation during UV-based treatment processes in different water qualities. By-products are defined as the compounds remaining in the water phase after reaction (UV light, hydroxyl radicals) with background matter, e.g. natural organics, nitrate. Products remaining after reaction with the target compounds are not within the scope of this research. This overview is completed with the gaps in knowledge about by-product formation during application of UV technology.

Result

Nitrite and AOC are frequently encountered in UV-treated water. Bromate formation does not occur. Algae growth may occur during UV disinfection. Generally, by-products are formed in higher concentrations using medium-pressure UV lamps than using low-pressure UV lamps. Also, the formation level of by-products is much higher during UV oxidation than during UV disinfection. An important gap in knowledge are quantitative data about the formation of toxic compounds, e.g. genotoxicity and carcinogenicity. It is concluded that much is known about by-product formation during application of UV technology, but additional data are required about toxicity.

More information

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