22 June 2021 (Tuesday)

4.00pm-5.30pm (SGT) (GMT +8)
Session 2.1 – Improving Water Treatment

Session Chair(s): Seungkwan Hong, Korea University (Republic of Korea), Sri Hernani Affandi, Binnies Singapore (Singapore)

Development And Application Of A Novel Integrated Drinking Water Treatment Plant Model For Better Operational Decision Making

W. Audenaert, U. Rehman, J. Plooij, I. Nopens, R. van der Neut, B. Martijn. AM-TEAM (Belgium)

An unprecedented integrated modelling study was conducted at PWNs drinking water and process water treatment facilities in Andijk (Netherlands). An integrated model predicting the interaction between water storage basins and treatment facilities was built and applied. The dynamic plant wide model was able to predict the impact of future operational decisions and as such, was used for optimal decision making. Some decisions were already implemented in practice. Further, the model can be used to assess the impact of climate change induced water changes of surface water quality.

UV-LED/Chlorine For Water Treatment: Do Tailored Wavelengths Make Things Better Or Worse From A DBP Perspective?

I. Carra, J. Fernandez, O. Autin, J. Bolton, P. Jarvis. Cranfield University (United Kingdom)

The UV/Chlorine process has gained attention in recent years due to the high quantum yield and absorbance of chlorine. However, there are still many unknowns around its application, such as the potential for the formation of DBPs. Some research has been published on the formation of DBPs after UV/Chlorine treatment with low and medium pressure lamps. However, there are no studies reporting on DBP formation at tailored wavelengths more specific to the UV/Chlorine process, which is possible thanks to LEDs. The aim of this research was to therefore determine the effectiveness of the UV/Chlorine process for the degradation of pesticides in real source waters whilst also considering the wider water quality impact of the process. The novelty of this work resides in the use of an innovative UV-LED reactor emitting at 285 nm for the removal of three pesticides, and the impact of the process on the formation of three THMs, HAAs and bromate. The impact of having GAC treatment after the UV/Chlorine process on DBP formation was also studied.

Solving Algae Based Taste And Odor Issues With Ozone AOP In South Carolina

T. Puehmeier, S. Dominguez, S. Besser, A. Ried, H. Stapel. Xylem Services GmbH (Germany)

In June 2013, Anderson Regional Joint Water System (ARJWS) began experiencing seasonal taste and odor problems due to algal blooms found in Lake Hartwell, naturally produced by the common taste and odor compounds, 2-methylisoborneol (MIB) and geosmin. These compounds create a strong earthy odor and noticeable at low concentrations (<10 ng/L). A CMAR team helped identifying the most efficient Advanced Oxidation Process (AOP) to remove the taste and odor causing compounds, reduce other compounds of emerging concern (CECs) and procure and install the new AOP system within two years. Since commissioning of the new ozone AOP system in early 2018, the plant is measuring non-detect MIB/Geosmin in their finished water. In addition, it enabled ARJWS to improve the operation of their clarification process with less chemicals and transform their dual media filtration system into a biological active filtration system. This paper will present measured performance and cost developments before and after implementation of the ozone based AOP system.

Removal of Disinfection By-product Precursors in Drinking Water Treatment Processes: Is Fluorescence Parallel Factor Analysis A Promising Indicator?

H. Dong, Y. Wang, Z. Qiang. Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences (China)

Disinfection by-product (DBP) precursors removal was regarded as the most important method for DBPs control in drinking water treatment plants. Removal efficiencies of DBP precursors by conventional and advanced treatment processes were investigated via fluorescence PARAFAC analysis and DBPs formation potential (DBPsFP) test. Conventional treatment processes exhibited overall higher performance than advanced treatment processes. Coagulation-sedimentation process performed best, and preferentially removed humic-like component. Efficiencies of O3 and BAC processes were much better than ultrafiltration. The highest reduction ratio was observed for tryptophan-like and tyrosine-like components across O3 process, but for protein-bound component across BAC process. Reductions of carbonaceous DBPs were generally best correlated with humic component removal, while reduction of dichloroacetonitrile exhibited the strongest correlation with protein-bound component. The results reflected that fluorescence PARAFAC analysis was a promising tool to indicate DBP precursors removal.