

## Ozonation for source treatment of pharmaceuticals in hospital wastewater - ozone lifetime and required ozone dose - DTU Orbit (08/11/2017)

### Ozonation for source treatment of pharmaceuticals in hospital wastewater - ozone lifetime and required ozone dose

Ozonation aimed at removing pharmaceuticals was studied in an effluent from an experimental pilot system using staged moving bed biofilm reactor (MBBR) tanks for the optimal biological treatment of wastewater from a medical care unit of Aarhus University Hospital. Dissolved organic carbon (DOC) and pH in samples varied considerably, and the effect of these two parameters on ozone lifetime and the efficiency of ozone in removing pharmaceuticals were determined. The pH in the effluent varied from 5.0 to 9.0 resulting in approximately a doubling of the required ozone dose at the highest pH for each pharmaceutical. DOC varied from 6 to 20 mg-DOC/L. The ozone required for removing each pharmaceutical, varied linearly with DOC and thus, ozone doses normalized to DOC (specific ozone dose) agreed between water samples (typically within 15%). At neutral pH the specific ozone dose required to remove the easiest degradable pharmaceutical, sulfadiazine, was  $0.50 \pm 0.04$  mg-O<sub>3</sub>/mg-DOC and the most recalcitrant, diatrizoic acid, required  $4.7 \pm 0.6$  mg-O<sub>3</sub>/mg-DOC. The lifetime of ozone increased drastically in the higher end of the indicated dosage. At the lowest observed pH of 5.0, its lifetime was quadrupled to 20 min which influences the design of the reaction tank. The addition of 0.1 mg-H<sub>2</sub>O<sub>2</sub> per 1 mg-O<sub>3</sub> mitigated the prolonged lifetime without a corresponding influence in the pharmaceutical removal efficiency of ozone.

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Authors: Hansen, K. M. S. (Intern), Spiliotopoulou, A. (Intern), Chhetri, R. K. (Intern), Casas, M. E. (Ekstern), Bester, K. (Ekstern), Andersen, H. R. (Intern)

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