PROJECT: SENSOR
SYSTEM: RAS
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CtrlAQUA

Does ozone impact the quality of DOM in RAS?

DURATION: 2017 – 2022

SALINITY TESTED: Brackish water and salt water

HIGHLIGHTS:

- First known characterization of dissolved organic matter in recirculating aquaculture systems (RAS) by Fourier Transform Ion Cyclotron Resonance Mass Spectrometry (FTICRMS).
- Dissolved organic matter were extracted from authentic water from RAS system to achieve knowledge on compositional sources and understanding of DOM transformations when exposed to ozone.
- Studies included samples from makeup water at 12 ng/L salinity, water after the water treatment processes of RAS (pump-sump), tank waters and the standard feed.
- Makeup water, pump-sump and tank water samples were rich in CHO and unsaturated compounds prior to ozonation.
- Humic-like and unsaturated CHO group of compounds, particularly the -CH2- homologs of CHO-dissolved organic matter were decomposed by ozone.
- Post ozonation of RAS waters, new fulvic-like and saturated compounds were formed.
- CHON and CHONS compounds were produced during ozonation at high abundance.

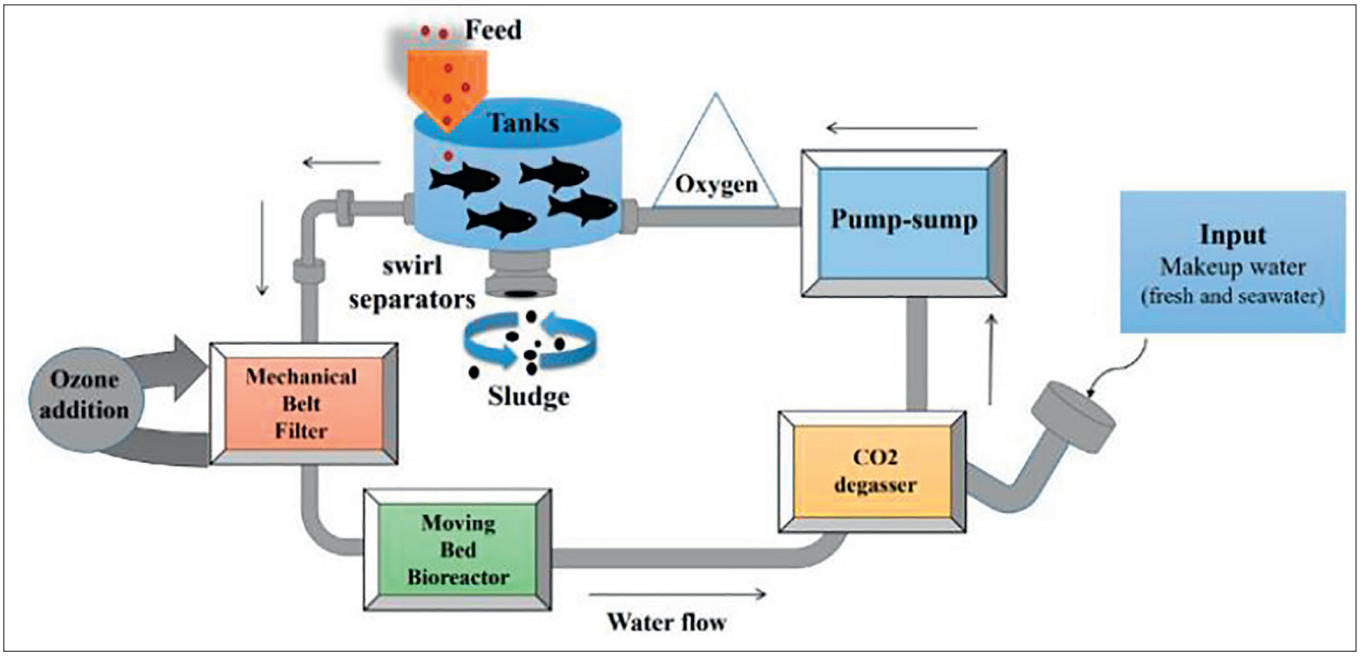
RECOMMENDATIONS:

Ozonation degrades dissolved organic matter under transformation into relatively saturated molecules, with accumulation of nitrogen-containing compounds associated to the make-up water and the fish diets rich in CHON and CHONS type of compounds. The levels of ammonia and nitrated should be carefully monitored during ozonation as observed increased levels were potentially caused by reactions of amines or amino-groups with ozone.

READ MORE:

Aguilar-Alarcón, P., Zherebker, A., Rubekina, A., Shirshin, E., Simonsen, M.A., Kolarevic, J., Lazado, C.C., Nikolaev, E.N., Asimakopoulos, A.G., Mikkelsen, Ø. (2022) Impact of ozone treatment on dissolved organic matter in land-based recirculating aquaculture systems studied by Fourier transform ion cyclotron resonance mass spectrometry. Science of The Total Environment. 843:157009. https://doi.org/10.1016/j.scitotenv.2022.157009

The factsheet is ready for implementation, but with the note that the testing has not been done for all industrial relevant conditions.



Experimental set-up of the recirculating aquaculture system (RAS) at the Nofima Centre for Recirculation in Aquaculture.