Title of Research:

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Comprehensive evaluation methods for chemicals registered in PRTR.

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Summary of Research:

Chemicals are widely used in chemical industries. Huge amount of the chemical usage and consequent discharge might result in their entering into the wastewater and even water treatment units such as the biological and/or physicochemical processes. This research is aimed at establishing the formation potential methods for toxic chemicals during those treatments above, and proposing new risk assessment methods.

In the first term, four analytical methods were established for each group including four trihalomethanes (THMs), four aldehydes, eight nitrosamines and six perfluorinated carboxylic acids (PFCAs), respectively. Moreover, four fluorotelomer alcohols (FTOHs) as the precursors of PFCAs were established. Besides, according to the reported mechanisms for forming the THMs, aldehydes and nitrosames, the predicted precursors were selected among the chemicals registered in PRTR. And their concentrations in wastewater were calculated based on the PPTR data and annual wastewater in Japan. Three assessment methods were established for formation potential tests, the ozonation treatment (two conditions: high and low dissolved ozone dose), chloramination treatment, and biological treatment (two conditions: aerobic and anaerobic), respectively. Samples covered the chemicals in PPTR and actual wastewater samples. Five chemicals were firstly selected as the potential precursors according to the high potential of exposure in wastewater (calculated concentration in wastewater) and reported precursors in literatures. The formation potential for the aldehydes and nitrosamines during the ozonation and chlorination treatments were investigated. The results showed during the ozonation treatment, the dimethylhydrazine formed significant formaldehyde and N-nitrosodimethylamine. Further, more chemicals will be tested and quantified for the formation potential. In the case of PFCAs formation potential during the biological treatment, the formation and degradation rates were studied under the anaerobic (10, 20 day, 1, 2, and 3 month) and the aerobic condition (10, 20 day, 1 month). The results found the PFCAs formation was correlated with the degradation of FTOHs predictor.

Timeline: November 1, 2012 –

Topics:
Poster presentation at 2nd Annual Conference of LRI