Evaluation of toxic compounds in water using bioassay combined with LC-QTOF analysis

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Introduction

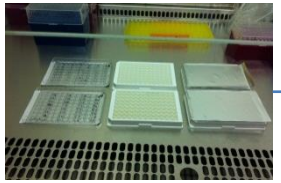
The risk of human exposed to different water sources brings higher requirement on modern water quality including treated wastewater and recycled water. Conventional chemical monitoring have been criticised on the basis that they cannot include the full range of chemical pollutants that could occur in water, and because they do not account for the combined effects of different chemicals or their transformation products. Bioanalytical tools are complementary to chemical analysis, while they can measure mixture effects and contribute to the assessment of the cumulative effects of chemicals that exhibit the same mode of toxic action and thus concentration additive effects. Bioassay screen combined with instrument identification has been the most efficient way to evaluate the water quality related to human health nowadays.

In this research, wastewater and recycled water samples were collected through HLB tandem Coconut Charcoal SPE cartridge, the resulting extracts were evaluated by different bioassay including cell promoter glucocorticoid reporter assay (GR), and AMESII mutagenicity assay. Fractionation and Quadrupole Time-of-Flight mass spectrometry (QTOF) were used for the chemical identification and the ions were distinguished from MPP software (Mass Profiling Professional).

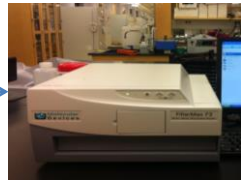
Sample Bioactivities

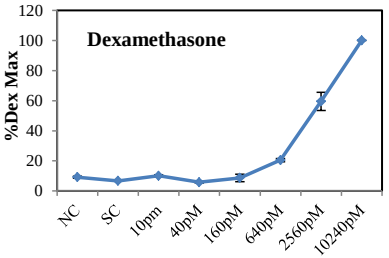
Glucocorticoid receptor activity

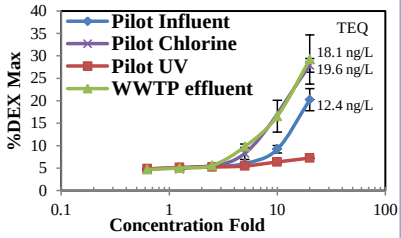
Sample exposure



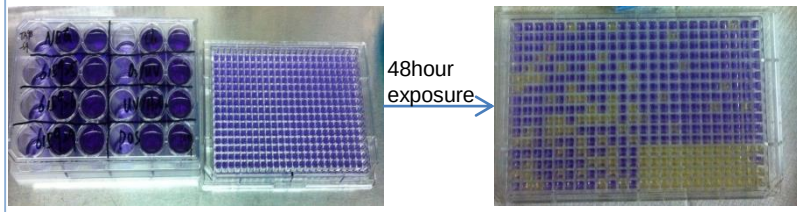
Luminescence detection

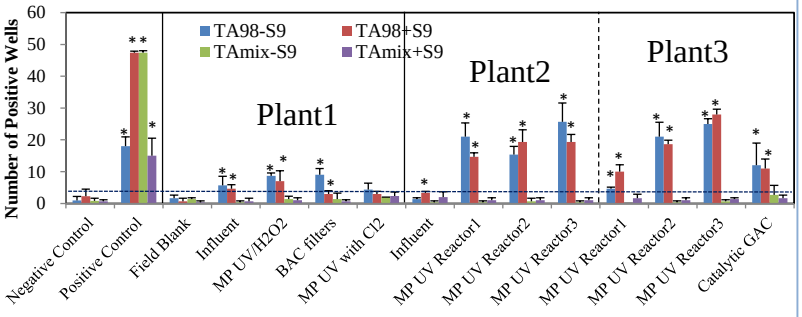






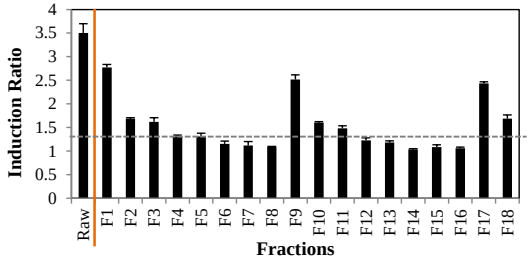
AMESII Mutagenicity Test





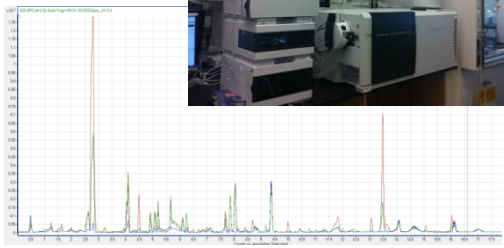
Samples are through HPLC fractionation for further separation.

ZORBAX Eclipse XDB-C18 (9.4 x 250mm, 5μm)
Injection volume: 1.5mL

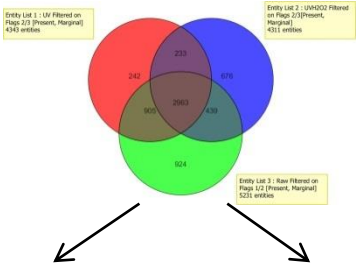


QTOF Identification

F1-Raw
F1-UV
F1-UV/H2O2



QTOF followed by MPP analysis is the possible way to accurately identify the possible causal toxic chemicals.



Formula Generation Database Searching

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