

Water for All Conserve, Value, Enjoy



Real-time detection of taste and odour compounds in water

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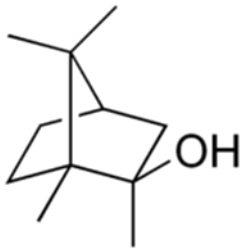
- **Background**
- **Opportunity Areas & Key Considerations**
- **Existing challenges**
- **Expected Project Outcomes**



Background

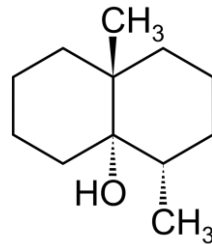
- ✓ Solvents and organic compounds such as **2-MIB** and **Geosmin**, **acetone** and **tetrahydrofuran** could exist in water infrequently at very low concentrations.

2-MIB



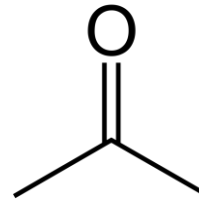
Earthy/musty odor
2-20 ppt

Geosmin



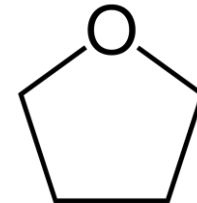
Earthy/musty odor
6-10 ppt

Acetone



fruity odor
13-20 ppm

Tetrahydrofuran



ethereal/sweet odor
4 ppm

Background

- ✓ Although these organic compounds do not pose a health hazard and are within permissible drinking water quality standards, they can cause **taste and odour issues** at the consumer end and give rise to **customer complaints**.
- ✓ Some of these compounds do not cause any taste and odour issues until they are **boiled**.

Background



Instruments such as purge and trap gas chromatography-mass spectrometer (**P&T GC-MS**) or a liquid chromatography-mass spectrometer (**LC-MS**) in the lab



Human nose by boiling the samples



How to identify taste & odour organic compounds?

Online TOC sensors used for real time monitoring
-- not able to pinpoint the specific species of compounds

Opportunity Areas & Key Considerations

Our Interest

Cost effective and **rapid** monitoring solutions needed:

- ✓ **Discriminate** between the various taste and odour-causing compounds
- ✓ Provide an indication of their **concentration** in both raw water and treated water sample matrix

Considerations

- ✓ **Extremely low concentrations** of the compounds (in the parts per billion or even parts per trillion levels) could cause the taste and odour issues
- ✓ Some of the compounds may remain **undetectable** at **ambient conditions**, but are only **detected** through the **human nose** when they are **heated**

Existing challenges

- ✓ **Extremely low concentrations** of organic compounds (such as 2-MIB, Geosmin, and others) at ppb or even ppt can cause taste and odour issues;
- ✓ Human nose and taste buds are able to detect some of these compounds at low levels, thus **solutions** that are able to **mimic these sensory systems or propose alternative ways** to pick up taste and odour issues will be considered;
- ✓ The solution must be feasible to be implemented either in a **laboratory environment**, or in an **outdoor environment** to monitor taste and odour (i.e. it must be able to operate in a **completely automated manner**);

Existing challenges

- ✓ Not all the odorous compounds present in drinking water have been fully characterized and their presence in drinking water is highly episodic with intervals of several years between episodes. Therefore the **solution** has to be **capable of learning and adapting its detection ability to accommodate new target compounds**;
- ✓ The cost of the solution must ideally be **less than SGD 90,000 per unit**;

Expected Project Outcomes

An integrated automated system:

Autosampler + Detector + Alert System

- able to **pick up** taste and odour issues
- able to **send an early alert** to the operator, once detect abnormalities in the water matrix samples

Thank You