

CASE STUDY - UTILIZING CHECKLIGHT'S AOC TEST TO MONITOR BIOFOULING POTENTIAL IN WATER PURIFICATION SYSTEMS

The Situation

One of the most difficult problems in water purification systems is microbiological contamination. Microbial growth in a water system not only reduces water quality, but if left unattended, it will eventually form biofilms that reduce system performance and life span. Proper monitoring of each section of the RO plant is of vital importance to detect any biofilm formation at its early stage.

The Problem

A crucial parameter in biofouling development is the availability of nutrients that can support microbial growth in the system. The most common method used to measure its level is the TOC test (Total Organic Carbon). However, to obtain an accurate estimate of bacterial regrowth potential one has to determine the assimilable fraction of the total organic carbon. Most of the standard or proposed AOC (Assimilable Organic Carbon) methodologies are hindered by their long duration, cost, labour requirement, and lack of robustness. They involve the inoculation of the studied water sample with a bacterial inoculum (intrinsic population or a standard culture); after a time period varying between 5 and 30 days, the increase in viable counts and/or the decrease in DOC are determined. Obviously, results obtained after such a long procedure have little practical value.

The Solution

CheckLight was able to demonstrate that its **AOC Test Kit** can provide vital real-time measurement of readily available organic carbon in water. Acquiring this information in real-time would enable water purification system operators to take timely preventative action to protect expensive filtration units from biofouling and biofilm formation.

CheckLight Ltd.

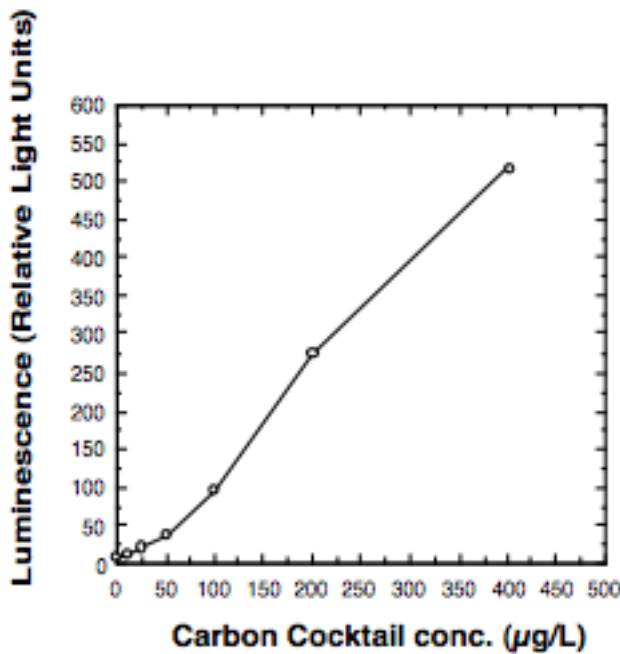
P.O. Box 72 Qiryat-Tiv'on 36000, Israel.
Tel: (972)-4-9930530, Fax: (972)-4-9533176
www.checklight.biz, info@checklight.biz

The Method

The kit reagent is exposed to serial dilutions of the pasteurized water sample and developed luminescence is recorded after two hours of incubation at ambient temperature. The level of luminescence accurately reflects the concentration of bio-available organic carbon.

Figure 1, shows the resultant measurements of the standard Carbon Cocktail used as reference and positive control in the test system.

Figure 1-



Data analysis is straightforward: **the higher the luminescence, the higher the concentration of AOC.**

CheckLight Ltd.

P.O. Box 72 Qiryat-Tiv'on 36000, Israel.
Tel: (972)-4-9930530, Fax: (972)-4-9533176
www.checklight.biz, info@checklight.biz

Results

The results obtained from the analysis of two plants (A,B) with similar water purification setups are shown below. The main objective of this sampling and analysis technique is to be able to localize or isolate the source of any bioactivity before it starts to spread and affect other parts of the system, especially the RO membranes. Sampling points were chosen as to adequately cover the entire RO plant system and were subjected to the **CheckLight's AOC Test Kit**.

Results are presented in µg Carbon Cocktail/L.

Sampling Point	Plant A	Plant B
Raw water intake	490	420
After sand filter	265	205
After carbon filters	390	77
After micron filters	375	69
RO product	<20	<20

As can be seen, the water purification cascade in Plant B operates well in terms of organic carbon removal. However, in Plant A, a problem was spotted in the granular activated carbon step. Not only did it fail to remove the AOC, but it also increased its level in the outflow, most probably due to microbial contamination inside or on the surface of the filter bed and the release of metabolism by-products and debris. Real-time detection of the failure point in the process, enabled the operators to undertake rapid corrective measures to protect the RO membranes from high AOC exposure that might have led to biofilm induction.

Conclusions

CheckLight's AOC Test Kit is a simple, reliable bioassay for real-time, low-cost determination of the presence of readily utilizable organic carbon in water. It can also be easily applied to monitor AOC in **brackish water and seawater desalination systems**.

CheckLight Ltd.

P.O. Box 72 Qiryat-Tiv'on 36000, Israel.
Tel: (972)-4-9930530, Fax: (972)-4-9533176
www.checklight.biz, info@checklight.biz

Benefits:

- **Time saving** - accurate and meaningful results of dozens of samples can be obtained within 2-3 hours. No need for sample transportation to external labs.
- **Reliable** - data highly correlative with standard tests.
- **Easy to use** - no special laboratory skills required for operation.
- **Cost effective**- enabling frequent monitoring to rapidly detect dangerous changes in water quality.

Applications:

The test enables QA/QC supervisors to:

- Monitor water at various pre- and post-filtration steps.
- Optimize timing of filter backwash.
- Provide early warning of membrane biofouling.
- Reduce operation & maintenance costs (i.e., lowest total cost of water production).

For more details visit our web site at - <http://www.checklight.biz>

CheckLight Ltd
P.O. Box 72
Qiryat Tivon 36000
Israel
info@checklight.biz
T-972 4 9930530
F-972 4 9533176

CheckLight Ltd.

P.O. Box 72 Qiryat-Tiv'on 36000, Israel.
Tel: (972)-4-9930530, Fax: (972)-4-9533176
www.checklight.biz, info@checklight.biz