

Microtox®

the proven
contaminant
detection
technology
for drinking water security!

Drinking water utilities across the country are installing Microtox Toxicity Test Systems because they have determined that Microtox is their best option for frequent and accurate screening for the increases in toxicity that would be characteristic of an intentional contamination of the water supply.





The Microtox Model 500 Analyzer is a laboratory-based, temperature-controlled, self-calibrating photometer that measures light production from a luminescent bacteria and easily interfaces with a PC - using MicrotoxOmni™ Software - to efficiently collect, analyze, and store test data.

Microtox Systems combine the advantages of whole organism toxicity testing with the speed and precision of analytical instruments to produce a reliable biological test system that produces results quickly - in time for the results to be used for effective decision making as part of a comprehensive drinking water security plan.

The use of living test organisms is the only way to reliably measure the toxicity of a water or soil sample. Traditional test methods - using species of fish or invertebrates - can be expensive, show great variability in results, and always take many days to get results. Microtox Systems combine the advantages of whole organism toxicity testing with the speed and precision of analytical instruments to produce a reliable biological test system that produces results quickly - in time for the results to be used for effective decision making.

Microtox Test Systems are based upon the use of luminescent bacteria known as *Vibrio fischeri*. *V. fischeri* produce light as a by-product of normal metabolism. Any inhibition of normal metabolism, such as that caused by toxicity, results in a decreased rate of luminescence. The higher the level of toxicity, the greater the inhibition of light production.

Microtox Acute Toxicity Testing System

Acute toxicity testing is designed to detect concentrations of contaminants that cause 50% lethality (LC_{50}) during a short-term exposure (48 to 96 hours). Microtox test results are available in 15 minutes. The Microtox Acute Toxicity Test has been successfully used for drinking water security, plus a variety of environmental, process monitoring and educational applications including wastewater treatment plant effluent testing, Toxicity Reduction Evaluations (TRE's) and Toxicity Identification Evaluations (TIE's), surface water monitoring, and monitoring of industrial process waters.

The Microtox Test methodology has been validated by the industrial, academic, and government testing communities. The current Microtox bibliography contains over 500 papers and reports, pertaining to the use, evaluation and application of the Microtox Acute Test System.

! *"Microtox Toxicity Testing has been widely used for water supply security testing. Microtox systems were relied upon for water supply security screening during the Olympics in Los Angeles and Atlanta, and in major cities during the 1991 Gulf War."*

Who's using Microtox?

"We purchased the Microtox 500® to augment the analytical capabilities of our laboratory as part of our water quality program to protect consumers of our water, including the U.S. Pentagon."

**Elizabeth Turner, Laboratory Manager
U.S. Army Corps of Engineers
Washington Aqueduct**

"Patapsco Labs, for the City of Baltimore, has been using the Microtox Analyzer for 22 years for toxicity screening. Following the events of September 11th, the facility immediately began using Microtox to protect drinking water."

**Pushpa Sokhey
Lab Technical Administrator
Patapsco Treatment Plant
City of Baltimore MD**

"We use Microtox at the Escondido Waste Treatment Facility as a key element in our Pretreatment Program of Microtox testing have taken the initiative to avoid discharging highly toxic wastewater to our facility."

**Fred Rowlen, Industrial Pretreatment
Coordinator, Hale Avenue Wastewater
Treatment Facility
City of Escondido, CA**

"The Microtox Toxicity Test System has been proven in seven years of service to be a valuable tool in screening the discharges from 91 significant industrial users in Chattanooga's Pretreatment Program. With the increased demands on our system to accept liquid discharges from the cleanup of hazardous wastes and Superfund sites, Microtox has assumed new importance in giving rapid, dependable information to be used as a basis for accepting these wastes treatment by the City."

**John Henderson, System Engineer
Moccasin Bend Wastewater Treatment
Plant, City of Chattanooga, TN**

FAQs about Microtox

1 What is the Microtox System?

The Microtox Acute Toxicity Test is a biosensor technology being used to monitor drinking water supplies in many countries and major U.S. cities where either accidental or deliberate contamination is a concern. The Test can be completed in as little as 15 minutes, allowing for a quick response to changes in water quality. The Microtox Test System quickly reveals any changes in the level of toxicity of drinking water. This provides for an effective means of water supply surveillance when supplies are monitored regularly at strategic points.

Microtox Toxicity Test Systems are uniquely suited for drinking water surveillance because they provide rapid screening and confirmatory results, which are cost-effective and easy to perform.

With more than 500 peer-reviewed scientific articles and more than 2000 instruments in place worldwide, the Microtox® Toxicity Test System is the standard for rapid toxicity screening and analysis.

2 Has the system been used before for drinking water surveillance during sensitive times?

Yes. The US Army Corps of Engineers and the Washington Aqueduct system is currently using Microtox systems to monitor the drinking water that is supplied to the Pentagon to protect the civilian and military personnel working there. Also, during key events such as the Olympic Games in 1984 and 1996, the Democratic National Convention in 2000, and many cities during the Gulf War, Microtox systems were used for continuous surveillance of drinking water treatment and distribution systems.

What Chemicals does Microtox test for?

Nearly 20 years of scientific studies has documented the sensitivity of Microtox to more than a thousand different simple and complex chemicals. Microtox responds to a very broad range of toxicants and classes of chemical agents including metals, pesticides, fungicides, rodenticides, chlorinated solvents, industrial chemicals, and similar materials.

Aren't these chemicals difficult for a terrorist to obtain?

- 2 No. Terrorists need not be sophisticated to use these agents. Many of these compounds are commonly used, inexpensive, and easy

to obtain over the counter in large quantities. Strychnine is available in the form of rat poison. Sodium cyanide is highly toxic in small doses and is easily obtainable from numerous suppliers to the mining and metals industries. It is not possible to prevent a terrorist from gaining access to these and other common compounds, but it is possible to detect if they have been introduced into a city's water system.

3 Why not just test for specific chemicals?

Practical experience with wastewater pretreatment studies has shown that chemical-specific measurements identify true toxicity in unknown samples only about 20% of the time. While chemical-specific tests can be sensitive and precise, they are also very narrow and will not detect toxicants unless the analyst knows specifically what compounds to look for.

Unanticipated toxicants usually go undetected, because time, cost, and incomplete knowledge prevent chemical-specific testing from being a practical screen for toxicity. In addition, even when the chemical constituency of a sample is known in detail, its effective toxicity cannot reliably be calculated; different chemicals in a complex sample often work synergistically or antagonistically to increase or decrease toxicity.

Chemical-specific tests are most useful for identifying particular chemicals after a sample is known to be toxic.

4 What about Botulinum toxins?

Investigations have shown that Microtox does respond to Botulinum toxin, but the effect has not been quantified.

5 Will Microtox detect the presence of organisms like salmonella in drinking water samples?

No. But drinking water treatment experts agree that drinking water treatment systems - due to chlorination and the other highly efficient disinfectant systems commonly used - are extremely good at removing microorganisms from drinking water systems and the threat of this type of tampering is very low.

Please turn to rear cover for additional FAQs about Microtox.

Partial list of toxic compounds detected by Microtox

Strychnine	Trinitrotoluene (TNT)	Ochratoxin
Arsenic	4-phenyl Toluene	Chloroform
Sodium Cyanide	Pentachlorophenol	Sodium Lauryl Sulfate
Potassium Cyanide	Paraquat	Lindane
PR-Toxin	Cyclohexamide	Cresol
Aflatoxin	Quinine	Malathion
Rubratoxin	Botulinum Toxin	Fluoroacetate
Benzoyl Cyanide	Lead	Parathion
DDT	Mercury	Carbofuran
Formaldehyde	Selenium	Patulin
Carbaryl	Chromium	Diazinon
	Copper	Cadmium