New Test To Detect Triclosan in Water

A new test that detects triclosan at a concentration of 20 parts per trillion (ppt)—the equivalent of 1 ounce in 31 million tons—could expedite environmental monitoring of this widely used antibacterial agent in rivers, wells, and other bodies of water.

Such is the hope of a team of Agricultural Research Service (ARS) and Abraxis, Inc., scientists who compared the new triclosan test, called "magnetic particle enzyme immunoassay," to the more traditional method—gas chromatography-mass spectrometry (GC-MS).

"This new technique is capable of measuring the triclosan content of a large number of water samples much faster than previous methods," says ARS chemist Weilin L. Shelver. "We plan on expanding the assay's use into the detection of triclosan in other environmental matrices and food."

Originally intended for hospital use 30-plus years ago, triclosan today can be found in many household products, including hand soap, toothpaste, cutting boards, socks, and even some veterinary items, such as teat sealant and pet shampoo. Researchers have found that due to its intensive use, triclosan or its metabolites are present in waterways, fish, human milk, serum, urine, and foods, notes Shelver. Triclosan's impact on antimicrobial resistance, the environment, wildlife, and human health is the subject of ongoing debate.

Shelver, who's in ARS's Animal Metabolism-Agricultural Chemicals Research Unit at Fargo, North Dakota, developed the new triclosan test in collaboration with Jennifer L. Church, Lisa M. Kamp, and Fernando M. Rubio—all of Abraxis, Warminster, Pennsylvania.

Shelver says the test complements existing methods, but it is faster, cheaper, and easier to use, especially for routine monitoring.

The team evaluated the test by using it to detect triclosan and its derivative, methyl-triclosan, in river water, tap water, and sewage samples from three municipal treatment plants in the Red River Basin area shared by North Dakota and Minnesota. Their river- and tap-water analysis showed total triclosan levels (which include methyl-triclosan) below 20 ppt (the assay's detection limit), indicating little contamination of the rivers that supplied the water.

Their wastewater analysis revealed pretreatment triclosan levels sometimes exceeded 3,000 ppt, but that posttreatment levels were below 500 ppt. The results confirmed other reports indicating that sewage plants' purification steps removed much, but not all, of the chemical from water before discharging it into the environment.

In the validation phase of their studies, the team compared the test results to those generated by GC-MS instrumentation, which is very sensitive but costly and requires dedicated lab space as well as specialized training to use. In addition to correlating well with GC-MS analysis, the new test proved to be sensitive enough to distinguish triclosan from chemically similar contaminants.—By **Jan Suszkiw,** ARS.

This research is part of Food Safety, an ARS national program (#108) described on the World Wide Web at www.nps.ars.usda.gov.

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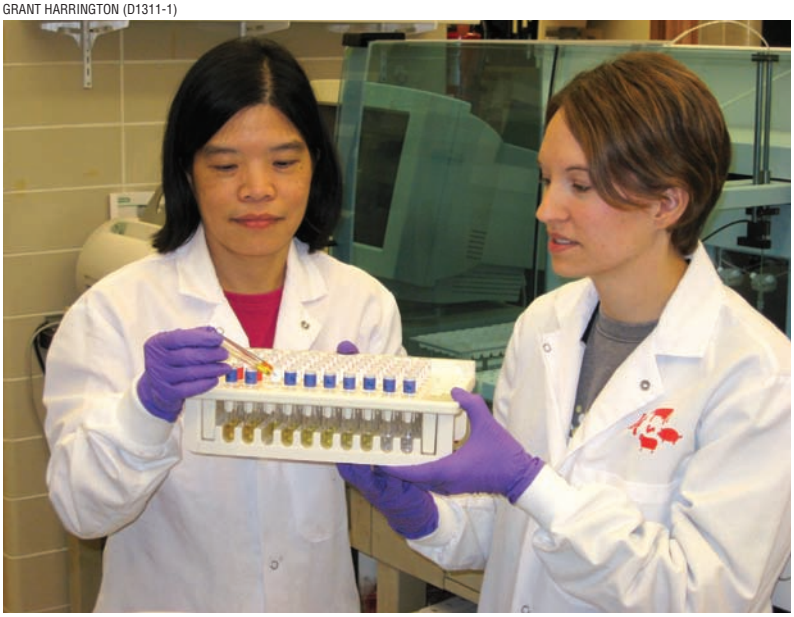

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Above: Chemist Weilin Shelver (left) and technician Amy McGarvey examine ELISA test results of river water, tap water, and sewage samples for content of the widely used antibacterial agent triclosan.

Left: Yellow color represents low or no triclosan, while the clear color represents high concentration of triclosan in the sample.