ORNL technology raises bar, lowers cost for groundwater contaminant sensors

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Long-term continuous monitoring of groundwater where contaminants are present or suspected could be streamlined with a technology developed at the Department of Energy's Oak Ridge National Laboratory.

While laboratory-based technologies for analysis of water contaminants are time-consuming, labor-intensive and expensive, the method introduced in a paper published in Analytical Chemistry is eloquent. The system combines a membrane tube and an ion mobility analysis system, or analyzer, creating a single procedure for in-situ monitoring of chlorinated hydrocarbons in water.

"Our technology represents a low-cost yet highly accurate way to monitor contaminants in water and air," said Chemical Sciences Division researcher Jun Xu, the lead researcher for the project.

The proprietary system, called membrane-extraction ion mobility spectrometry, is a single compact device able to detect aqueous tetrachloroethylene and tricholoroethylene concentrations as low as 75 micrograms per liter with a monitoring duty cycle of three minutes. Xu noted that this technology would reduce the cost of long-term monitoring of contaminants in groundwater by up to 80 percent.

"Based on this technology, a field-deployable sensor can be made and you would no longer need to have someone take a groundwater sample from a well and ship it to a laboratory for testing," Xu said. "The ORNL

sensor does all three of these tasks in one step and very quickly, saving money."

Groundwater monitoring, however, is just one example of the technology's capabilities. The sensor can also be configured to monitor well, tap or river water or other water suspected of having an undesirable or possibly illegal level of contamination. Also, additional membranes with different properties can be installed to enable collection of a wider variety of contaminants.

More information: "Membrane-extraction ion mobility spectrometry for in situ detection of chlorinated hydrocarbons in water," *Analytical Chemistry*.

Provided by Oak Ridge National Laboratory