

Major class of fracking chemicals no more toxic than common household substances, analysis finds

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The "surfactant" chemicals found in samples of fracking fluid collected in five states were no more toxic than substances commonly found in homes, according to a first-of-its-kind analysis by researchers at the University of Colorado Boulder.

Fracking fluid is largely composed of water and sand, but oil and gas companies also add a variety of other chemicals, including anti-bacterial agents, corrosion inhibitors and surfactants. Surfactants reduce the surface tension between water and oil, allowing for more oil to be extracted from porous rock underground.

In a new study published in the journal *Analytical Chemistry*, the research team identified the surfactants found in fracking fluid samples from Colorado, Louisiana, Nevada, Pennsylvania and Texas. The results showed that the chemicals found in the fluid samples were also commonly found in everyday products, from toothpaste to laxatives to detergent to ice cream.

"This is the first published paper that identifies some of the organic fracking chemicals going down the well that companies use," said Michael Thurman, lead author of the paper and a co-founder of the Laboratory for Environmental Mass Spectrometry in CU-Boulder's College of Engineering and Applied Science. "We found chemicals in the samples we were running that most of us are putting down our drains at home."

Imma Ferrer, chief scientist at the mass spectrometry laboratory and co-author of the paper said, "Our unique instrumentation with accurate mass and intimate knowledge of ion chemistry was used to identify these chemicals." The mass spectrometry laboratory is sponsored by Agilent Technologies, Inc., which provides state-of-the-art instrumentation and support.

The fluid samples analyzed for the study were provided through partnerships with Colorado State University and colleagues at CU-Boulder.

Hydraulic fracturing, or "fracking," is a technique used to increase the amount of oil and gas that can be extracted from the ground by forcing fluid down the well. Fracking has allowed for an explosion of oil and gas operations across the country. In the U.S. the number of natural gas wells has increased by 200,000 in the last two decades, according to the U.S. Energy Information Administration.

Among the concerns raised by the fracking boom is that the chemicals used in the fracking fluid might contaminate ground and surface water supplies. But determining the risk of contamination—or proving that any contamination has occurred in the past—has been difficult because oil and gas companies have been reluctant to share exactly what's in their proprietary fluid mixtures, citing stiff competition within the industry.

Recent state and federal regulations require companies to disclose what is being used in their fracking fluids, but the resulting lists typically use broad chemical categories to describe the actual ingredients.

The results of the new study are important not only because they give a picture of the possible toxicity of the fluid but because a detailed list of the ingredients can be used as a "fingerprint" to trace whether suspected contamination of water supplies actually originated from a fracking operation.

The authors caution that their results may not be applicable to all wells. Individual well operators use unique fracking fluid mixtures that may be modified depending on the underlying geology. Ferrer and Thurman are now working to analyze more water samples collected from other wells as part of a larger study at CU-Boulder exploring the impacts of natural gas development.

Thurman notes that there are other concerns about fracking—including air pollution, the antimicrobial biocides used in fracking fluids, wastewater disposal triggering earthquakes and the large amount of water used—that are important to investigate and ameliorate. But water pollution from surfactants in fracking fluid may not be as big a concern as

previously thought.

"What we have learned in this piece of work is that the really toxic surfactants aren't being used in the wells we have tested," he said.

Story Source:

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Journal Reference:

1. E. Michael Thurman, Imma Ferrer, Jens Blotevogel, Thomas Borch. **Analysis of Hydraulic Fracturing Flowback and Produced Waters Using Accurate Mass: Identification of Ethoxylated Surfactants.** *Analytical Chemistry*, 2014; 86 (19): 9653 DOI: [10.1021/ac502163k](#)
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