

'Peeling the onion' to get rid of odors near wastewater treatment plants

April 2 2017



Credit: George Hodan/public domain

Powerful nuisance odors from sewage and wastewater treatment facilities are a worldwide problem, but finding and eliminating the sources of such unpleasant aromas can be difficult. Scientists have

compared the search to peeling an onion—one layer is found and removed, but then a second and third emerge, ready to make their odoriferous presence known. Scientists have now developed a system to sample, measure, categorize and control these smells and are applying it from Seattle to Sydney.

The researchers will present their results today at the 253rd National Meeting & Exposition of the American Chemical Society (ACS). ACS, the world's largest scientific society, is holding the meeting here through Thursday.

"Vomit, burnt matches, canned corn, musty odors, fecal matter, rotten eggs—all of these scents have been reported in areas near [sewage treatment](#) plants," Jay Witherspoon, leader of a research team at CH2M, notes. Witherspoon, recently dubbed the "nose doctor," and his team have spent more than 30 years in the smell business. "Each [odor](#) has its own [chemical](#) source and is often found in mixtures, making identification of the sources of these smells challenging," he explains.

"People have become more sensitive to odors, and they are living closer to treatment facilities," Witherspoon notes. In the past, plants were built far from where people lived, but today homes are built ever closer to such facilities as cities have expanded. "Smells have become a quality of life issue," he says.

For field testing, Irwin Suffet, Ph.D., a collaborator from the University of California, Los Angeles (UCLA), developed an "odor wheel." It displays public-friendly general descriptions of a range of smells on the outside and the chemical composition of the smelly agents on the inside. The team uses this wheel to ask the public about a bothersome stench. To capture and measure odors, the researchers use plastic bags, metal containers, sorbent tubes, hand held devices and electronic noses. The samples are then analyzed in laboratories using both sensitive detection

devices and human panels. One of the detection devices is typically a mass spectrometer, which can help identify the compounds that make up the offensive scent. The human odor panels determine how strong and offensive the smell is to people, based on their experience.

Once identified, the chemical and its aroma can be eliminated with scrubbers, biofilters or the introduction of other chemicals that can mask the offensive one.

Over the years, the most common stink—the odor of rotten eggs from hydrogen sulfide—has been mostly eliminated by extensive chemical and biological odor control equipment. However, Witherspoon notes, other smells can cause concern, such as the odor of rotten vegetables that can come from methyl mercaptan and dimethyl disulfide; the canned corn smell emitted by dimethyl sulfide; the musty smells from 2-methyl isoborneol and 2-isopropyl-3-methoxypyrazine; the fecal odor of skatole and indole; and the pungent smell of ammonia.

The cheapest way to control these chemicals is at their source but that is not always possible, Witherspoon says. For instance, an odor from a chemical emitted by an industrial facility was not apparent until the compound reached a Philadelphia sewage treatment plant. The strong odor of dimethyl sulfide was only released when the chemical was exposed to oxygen and bacteria in the sewage treatment facility's aeration tank.

Right now, Witherspoon and other researchers are working to refine and standardize the technology to measure and control odors. Currently, Witherspoon has to take most of the samples to his collaborator at UCLA for analysis, but he says this technique is being expanded to other laboratories and is spreading throughout the industry as a whole as a viable alternative to traditional methods.

More information: From Philly to smell A - tracking, measuring, and controlling non-H₂S odor nuisances, 253rd National Meeting & Exposition of the American Chemical Society (ACS), 2017.

Provided by American Chemical Society

Citation: 'Peeling the onion' to get rid of odors near wastewater treatment plants (2017, April 2)
retrieved 27 April 2024 from

<https://phys.org/news/2017-04-onion-odors-wastewater-treatment.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.