

Hydrogen Sulfide Sensing

[h2s-sensor-arduino.jpg](#)



Purpose

This tool is being developed to detect hydrogen sulfide in an affordable, quantifiable manner. In September of 2011, Public Laboratory members, met with residents of Garfield County, Colorado to discuss the growing hydrogen sulfide problem in their small, rural community. Recently, the community organized to take a gaseous grab sample from one resident's kitchen sink. Analysis of the grab sample showed hydrogen sulfide levels of more than 185 times above the long-term exposure level recommended by the EPA. The family, in which the son developed painful skin lesions and other symptoms coincident with this exposure, was forced to abandon the house. They are seeking legal assistance, but so far, neighboring gas development companies have denied association with the families water contamination. In this extreme case, the regulatory authorities were not able to act to support exposed individuals. The grab sample, while able to capture one record of exposure, was costly (over \$500) and had to be shipped to a lab in California within 24 hours in order to ensure the samples viability. The family did not hear results of the test for weeks, all the while continuing their exposure.

There are large gaps in our public health system, particularly around environmental health issues associated with large scale industries like oil and gas. This instance is just one of many. Public Lab researchers are attempting to innovate novel community based approaches to environmental health problems like hydrogen sulfide, so that communities and workers may begin not only developing systems to track their exposure, but also generating data and evidence in order to scientifically validate their experiences.

(Setting strips up in the film canisters)

Applications and example uses

We currently have two approaches to sensing hydrogen sulfide in Development.

Our first prototype used a digital sensor for hydrogen sulfide. Advantages of this system is that data from the sensor could be logged over time and that tool is reusable and portable. However the [Figaro TGS 825 sensor](#) itself is expensive approximately \$60 for an individual sensor and \$40 in bulk. (does anyone have a link to buy one online?)

Our second prototype uses photographic paper. The silver in photographic paper tarnishes with exposure to hydrogen sulfide.

We are working on make a test for hydrogen sulfide using strips of photographic paper. We believe this test could be far more affordable than the digital version and accessible to non-programmers.

This project is based on these two papers:

Horwell, C.J., Allen, A.G., Mather, T.A., Patterson, J.E., 2004. Evaluation of a simple passive sampling technique for monitoring volcanogenic hydrogen sulphide. *J. Environ. Monitor.* 6, 630 - 635.

Horwell, C.J., Patterson, J.E., Gamble, J.A., Allen, A.G., 2005. Monitoring and mapping of hydrogen sulphide emissions across an



active geothermal field: Rotorua, New Zealand. J. Volcanol. Geotherm. Res. 139, 259-269.

How to make your own

Both of these tools are currently in the early stages of development, research notes can be found at the links below. There are two different tracks, one utilizing an industrial sensor with an arduino board and the other utilizing photographic paper with silver halide based on research done on H₂S at volcanoes.

[Framing the Problem](#)

Basic Information on Hydrogen Sulfide

[Hydrogen Sulfide Monitoring in Gas Patch: Background](#)

[Hydrogen Sulfide: Information on the Gas](#)

[Conversion from \$\mu\text{g}/\text{m}^3\$ to ppm hydrogen sulfide](#)

Arduino and Industrial H₂S Sensor

[Prototype H₂S Sensor](#)

[Temperature and Humidity Sensors to Correct H₂S](#)

[Arduino + Figaro Hydrogen Sulfide Sensor](#)

[Arduino Patch for Detecting Hydrogen Sulfide](#)

[Hydrogen Sulfide Detection for Fart Detector](#)

Photographic Paper for H₂S Sensing

[Hydrogen Sulfide Testing with Black and White Film](#)

[Hydrogen Sulfide Dosimeter](#)

[Hydrogen Sulfide Tarnishing Silver](#)

[Controlled Testing with B&W Film Hydrogen Sulfide Detectors](#)

[MSDS sheet for Kodak Photo Flo](#)

Get involved!

If you are interested in helping develop hydrogen sulfide sensing, please contribute thoughts, comments and research notes on this page as well as join us on the Public Lab mailing list.

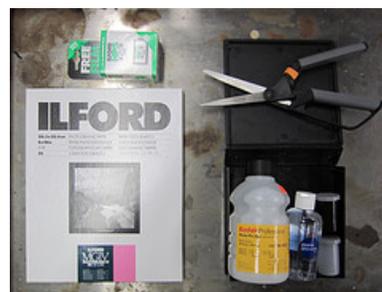
- Currently active work on the film assay is being done in Providence by James Schaffroth and Sara Wylie. Jeff Warren is working on the digital sensor. Other collaborators include Shannon Dosemagen, Battlement Mesa Citizen's Alliance, and LUMCON.

Short-term goals:

1. to successfully sense hydrogen sulfide with photographic paper
2. to standardize the photopaper test within laboratory conditions in Louisiana.
3. to develop step by step guides to making the tools.
4. to develop open source tools for analyzing the photopaper

Places to start contributing:

If you're interested in getting involved you could try following the prototype documentation to make your own film testing strips. We can always use help in researching and documenting hydrogen sulfide health issues. Also perhaps you know of site to test or use this tool?



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Attachment	Size
PhotoPaperHydrogenSulfideHowtoGuide.pdf	2.25 MB



Source URL (retrieved on 05/24/2013 - 22:58): <http://publiclaboratory.org/tool/hydrogen-sulfide-sensing>