

VOCs SOURCE SPOT TESTS (VOCs)

The aim of this activity is to investigate and compare common sources of chemicals called volatile organic compounds (VOCs) that are found in everyday environments. During this test, the goal is not to measure the pollutant levels that might be typically found in rooms. Instead, the monitor is placed a fixed distance from the sources so you can compare the peak concentrations between sources.

Safety Notice

Indoor air pollutants are associated with a range of health effects in people of all ages. Some of these effects are acute, which means they are triggered by a short-term increase in concentrations. Other effects are chronic, from exposure to slightly higher concentrations over extended time periods, perhaps years or decades. For this reason, it is important that you take steps to make sure you do not make the air quality inside worse because of these activities. To do this, you should:

1. Only pick activities or sources from the list that you would normally use in your home.
2. Pick a space where you can easily increase the ventilation rate after the activity to remove any pollutants in the air.
3. Do not decrease the ventilation below normal background levels during the activities. This means leaving windows or vents open if they are normally open, and leaving any mechanical ventilation running if it would normally be on.

You will need:

- Air quality monitor, set up and connected to device
- Ruler
- Indoor sources, choose from the list
- Pen and paper to record results
- Stopwatch (optional)

Indoor activities to test
Toasting bread
Frying pancakes
Spraying perfume
Spraying deodorant
Spraying hairspray
Spraying air freshener
Spraying cleaner
Using nail varnish

Method:

1. Pick 3–5 possible sources from the table above.
2. Set up the air quality monitor 50 cm away from where you are going to be testing the possible sources. Follow the set-up instructions for your monitor and check that you can view the concentrations.
3. Note down the fine particle concentration at the start of your test. This is the background concentration, and for you to make a fair comparison between sources it is important the background level is the same before you test each source.
4. Use the first potential source from your list. For some sources it may be helpful to time how long it lasts or decide how long you think it should last. For example, if you are burning candles or incense, you may want to pick how long you should burn them for before starting.
5. Write down the highest particle concentration during the source activity.
6. Increase the ventilation rate until the particle concentration drops down to background levels.
7. Repeat steps 4–6 for the remaining sources.

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Results table

Background concentration: _____

Activity	Peak concentration (ppb)	Length of activity (seconds)

Questions to think about

1. Which source reached the highest concentration?
2. How could you present the findings?

Measuring VOCs

Volatile Organic Compounds (VOCs) are a group of chemicals found in the indoor environment. Most consumer sensors give a measure of total VOCs (TVOCs), which is an indication of the combined concentration of VOCs. There are very wide range of VOCs, with and without known health effects. The exact VOCs being measured by your monitor will depend on the type of sensor fitted in the monitor, so any concentrations you measure will only be an indication of what is emitted.

Indoor activities to investigate were identified using the following papers:

Dacunto et al. Real-time particle monitor calibration factors and PM_{2.5} emission factors for multiple indoor sources. *Environmental Science: Processes & Impacts*. 2013; 15, 1511–1519. DOI: 10.1039/c3em00209h

Singer BC, Delp WW. Response of consumer and research grade indoor air quality monitors to residential sources of fine particles. *Indoor Air*. 2018;28:624–639. DOI: 10.1111/ina.12463

Farmer, D. K. et al. Overview of HOMEChem: House Observations of Microbial and Environmental Chemistry. *Environmental Science: Processes & Impacts*. 2019; ISSN: 2050-7887. doi:10.1039/C9EM00228F