

VENTILATION SPOT TESTS (PM_{2.5}) (VOCs)

The aim of this activity is to investigate how ventilation methods in the home can be used to reduce the concentrations of fine particles or VOCs in a space. You have the freedom to choose any activity from the particle or VOCs spot test activities, depending on what you have in your home and what your air quality monitor measures.

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)

Ventilation conditions to test
Normal
Open a window
Open an external door
Extractor fan on
Cooker hood on low
Cooker hood on low
Cooker hood on high

Method:

1. Investigate the ventilation options available in your kitchen. Select some different ventilation conditions from the table above that are available in your kitchen to investigate.
2. Select a single source from either the list of VOC or particle sources in the activities. Preferably it should be a source that you have already investigated and know increases the concentrations.
3. Set up the air quality monitor away from where you are going to be doing the activity, so you are measuring the general room air.
4. Note down the fine particle and/or VOC 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.
5. Set the ventilation to how you normally use it.
6. Carry out your chosen source activity. If appropriate, standardise the length of the activity, for example spray deodorant for 3 seconds.
7. Write down the highest particle and/or VOC concentration during the source activity.
8. Increase the ventilation rate until the particle concentration drops down to background levels.
9. Repeat steps 5–8 for the remaining ventilation conditions.

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Results table

Background particle concentration: _____

Background VOC concentration: _____

Ventilation conditions	Peak particle concentration (µg/m ³)	Peak VOC concentration (ppb)

Questions to think about

1. Did the peak concentration change between ventilation conditions?
2. Look at the overall shape of concentrations over time for each test, can you see any differences between each ventilation condition?
3. How could you present the findings?

Conditions 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