Measure how well a room is ventilated

Starter · 1–3 hours · Low-cost kit · Step-by-step guide

Online version: https://ai-safety-sandbox.vercel.app/projects/co2-ventilation-check/

Summary

Use a CO2 monitor to estimate how often the air in a classroom, office or bedroom is replaced, then test what opening a window or running a fan actually does.

Why it matters

Many airborne diseases spread more in stuffy rooms. People rarely know how well their own spaces are ventilated, and cheap measurements can change behaviour fast.

What you will have at the end

A one-page result: air changes per hour before and after one change.

Steps (tick each box as you go)

- [ ] **1. Get a CO2 monitor (15 min)**
  Borrow one if you can (labs, libraries and societies often have them). Note the model, because part of the project is checking how reliable cheap monitors are.

- [ ] **2. Take an outdoor baseline (10 min)**
  Measure CO2 outside for a few minutes. Outdoor air is usually around 400–450 ppm; write down your reading.

- [ ] **3. Measure the room in use (30 min)**
  Record CO2 every few minutes while people are in the room. Note the number of people, room size, and whether windows or doors are open.

- [ ] **4. Measure the decay (30 min)**
  When everyone leaves, keep recording as CO2 falls back towards the outdoor level. The speed of that fall tells you the air change rate: ACH ~ ln((C0 - C_out) ÷ (C_t - C_out)) ÷ hours elapsed.

- [ ] **5. Change one thing and compare (30 min)**
  Repeat with a window open or a fan or purifier running. Write up both numbers, your method, and what you would tell the people who use the room.

What you need

- A CO2 monitor (borrowed or low-cost)
- A room you can measure twice
- A spreadsheet

What you will learn

- How ventilation is measured
- The tracer-gas decay method
- Why cheap sensors need sanity checks

Key terms

Air changes per hour (ACH)
How many times per hour a room’s air is replaced with fresh or cleaned air. Higher ACH means airborne germs build up less.

Source and links

Hatta & Bazarragchaa — A hundred project ideas in biosecurity (2025)
https://casualphysicsenjoyer.com/Essays+in+progress/Biosecurity/A+hundred+project+ideas+in+Biosecurity

When you have finished

Write a few paragraphs on what you did, what you found and what you would try next, and share it with a friend, your society or online.

Try next: Ventilation & air filtration project ideas
https://ai-safety-sandbox.vercel.app/projects/ventilation-and-filtration-ideas/

Try next: Write the “far-UVC in ten minutes” explainer
https://ai-safety-sandbox.vercel.app/projects/far-uvc-explainer/

Courses, mentors, small grants and communities:
https://ai-safety-sandbox.vercel.app/next-steps/

Questions? Ask in AI Safety Cardiff University (AISCU): https://aiscu.org/

Notes