



Cucumber cylinder analysis protocols**



1. Immediately email your “Responsible Scientist” to notify receipt of shipment (Responsible Scientists are listed at the end of this document). You now have **4 weeks** to complete all analyses and to ship the cylinders to the next participant.
2. Position the cylinders in your laboratory, ensuring that there are no significant heat sources near the cylinders (for example, cryo-chillers, air conditioners, heaters).
3. Remove cap nuts from the cylinders (with 27 mm wrench). Note: these caps have been installed both to prevent and test for leaks. A leak could be present if you have severe difficulty removing the cap. In such a case, please inform your Responsible Scientist immediately.
4. Check the white plastic gasket (PCTFE) on the regulator DIN14 connectors for scratches or damage. If it is necessary, replace the gasket using a new gasket which you can find underneath the foam cube (below the regulator) in the high concentration cucumber box. Please also inform your Responsible Scientist, if you replace any of the gaskets. If there are no gaskets left, contact Armin Jordan.
5. Install the 3 regulators supplied, and open the cylinders to the high pressure side of the regulators.
6. Record the pressure in each cylinder, noting it in the Cucumber Logsheets Excel file.
7. Make a leak check of the DIN14 regulator connections to the cylinders. This should be done with the regulators at high pressure, with the main cylinder valves closed, and the regulator outlets closed (turn black knobs fully anti-clockwise, with nothing connected to the female Quick Connect on the outlets). Leave this for **at least half a day**, then check for any pressure drop on the high pressure side of the regulators. If the pressure has dropped, then all pressure should be released from the regulator (use the male Quick Connect which was supplied to your lab), and the connection carefully re-tightened (overwinding of the connection will destroy the PCTFE gasket). Then repeat the at-least-half-a-day leak check.
8. If you continue to have difficulty making a leak-tight seal, please do not over tighten. The PCTFE gasket should be examined, and replaced if necessary, for example, if it has become too ‘flat’ (see 4. above). If problems continue, please contact your Responsible Scientist.
9. Now do a pressure flush of the regulators 4 times. This means filling the regulators to the cylinder pressure, closing the cylinders, emptying all air from the regulators (use the male Quick Connect which was supplied to your lab), and then repeating, for a total of 4 times for each cylinder.
10. After installing regulators, leak checking, and pressure flushing, **wait a minimum of 2 days with the cylinders in the same lab where the analyses will take place, and with the high pressure side of the regulator at cylinder pressure, but with the main cylinder valve closed**, before the first analysis from the cylinders. After 2 days, check again for leaks by looking for any pressure drop on the high pressure side of the regulators. (If your measurements are at a remote field site and do not allow a 2-day wait, please discuss with your Responsible Scientist).
11. Each laboratory should then follow their normal procedures for analysis from unknown high pressure cylinders. Our recommendations are:
 - a) Flush between 5 and 10 Litres of air out of each cylinder and regulator (at low flow rate, that is, less than 500 mL/min) before you start your proper analyses.
 - b) Perform as high level on-site calibration as possible immediately before or after you analyse the Cucumbers.
12. Each laboratory may conduct more than one analysis from the cylinders, but we ask that no laboratory remove more than a total of 40 Litres of air from each cylinder.
13. If a laboratory conducts more than one analysis, we encourage, if possible, to do them on different days, but ensuring to keep the 4 week deadline.
14. After final analysis, remove the regulators, first noting again the cylinder pressures and writing them on the Logsheets, reinstall the cylinder DIN14 cap nuts, and place cylinders back in their boxes.
15. Ship the cylinders to the next participant in the round robin (if you are not sure who this is, ask your Responsible Scientist – usually it will be as indicated in the schematic below).
16. Email your Responsible Scientist when the cylinders are shipped out to the next participant.

** Please note, for O₂/N₂ analysis, there are a few additional requirements. Contact Andrew Manning if you are not sure about these.

** Inter-2 loop is still with the old CGA-type cylinders, and so protocols should be slightly different where DIN14 specifications are given above.

Cucumber cylinder data reporting protocols

1. After analysing a set of cucumber cylinders, you should report your results to both your Responsible Scientist and to Andrew Manning. There is a **4 week reporting deadline** for these results. We understand that some labs require 6 months or more before they can report final concentration numbers, however, at least provisional numbers are required 4 weeks after analysis.
2. Please use the Excel template provided for reporting your results.
3. Any change or update in concentration data for these analyses should be reported in a new copy of the same Excel template, and sent to your Responsible Scientist and Andrew Manning.
4. CO₂ results are required to be reported in the programme. Reporting (and analysis) of other species is optional.
5. Your analysis results, combined with results from other participants, may be presented at international meetings and workshops. If you have any concerns about this, you should contact Andrew Manning and Philippe Ciais (Philippe.Ciais@cea.fr) directly.

Responsible scientists

Euro-1 = Ingeborg Levin (Ingeborg.Levin@iup.uni-heidelberg.de)
 Euro-2 = Martina Schmidt (Martina.Schmidt@cea.fr)
 Euro-3 = Rolf Neubert (R.E.M.Neubert@rug.nl)
 Euro-4 = Armin Jordan (ajordan@bgc-jena.mpg.de)
 Euro-5 = Armin Jordan (ajordan@bgc-jena.mpg.de)
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Circulation of CarboEurope ICP Cucumbers

