Centre for Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

CEH ALPHA® Sampler

User Instructions

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1 Introduction

The CEH ALPHA® sampler (Figure 1) is a passive sampler for measuring NH_3 in air. The sampler uses a citric acid coated filter, which serves to capture the ammonia for later analysis. A white PTFE (Teflon) membrane protects the filter whilst allowing gaseous ammonia to diffuse through for capture. The membrane is positioned facing downwards during exposure. The membrane end of the sampler is sealed with a protective cap whilst not being exposed.

The passive sampling system consists of replicate CEH ALPHA® samplers attached to a shelter on a pole or post at about 1.5 m height above ground (Figure 2).

Replicate samplers are used in order to give a more reliable estimation of the air concentration of ammonia. All samplers are supplied in a plastic container for protection.

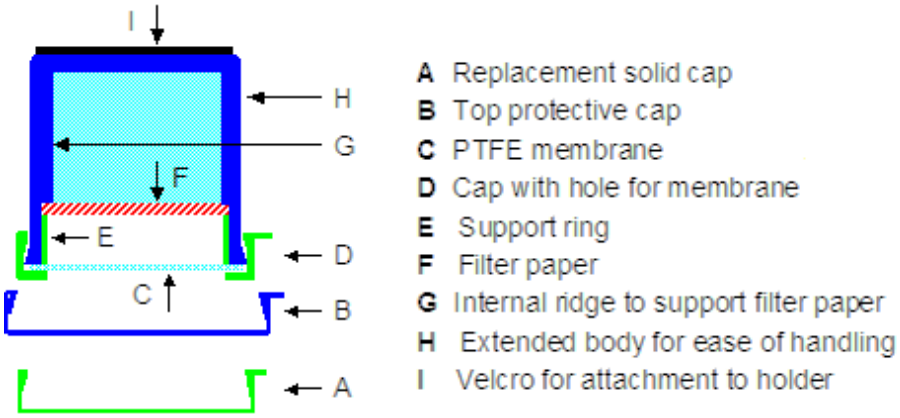


Figure 1: Outline diagram of a single CEH ALPHA® Sampler

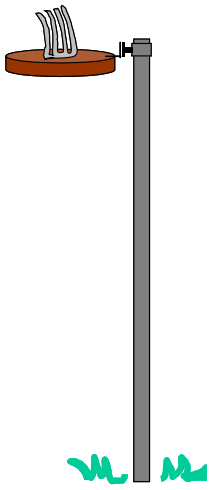


Figure 2: CEH ALPHA® sampler support on a metal post.

2 Preparation of CEH ALPHA® sampler filters for sampling ammonia

- Citric acid is suitable as an absorbent for temperate climates.
- Phosphorous acid should be used for hot, dry climates (avoid using in high humidity conditions).
- Oxalic acid is not recommended.

2.1 Preparation of coating solution: 12 % (m/v) citric acid in methanol

- Should be prepared fresh on the day of use.
- For 50ml coating solution, dissolve 6.0 g citric acid into 50 ml methanol.

2.2 Preparation of coating solution: 2 % (m/v) phosphorous acid in methanol

- Should be prepared fresh on the day of use.
- For 50ml coating solution, dissolve 1 g phosphorous acid into 2.5 ml deionised water then make up to 50 ml with methanol.

2.3 Preparation of coated filter papers

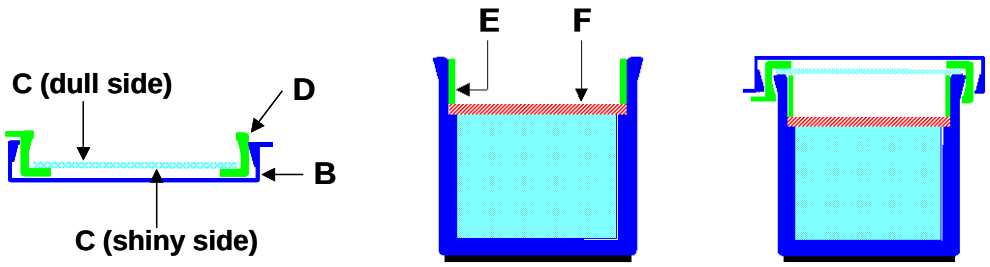
1. Transfer the coating solution to a small capped bottle.
2. Arrange a number of filters on clean petri dishes, no more than 10 at a time.
3. Working as quickly as possible, accurately dispense 55 µl aliquots of the coating solution onto the centre of each filter.
4. Place the petri dishes inside a desiccator.
5. Evacuate the desiccator by connecting it to a vacuum pump.
6. The impregnated filters should appear visibly dry after about 3 minutes.
7. The coated filters are now ready to be used, or they can be stored until required.
8. For storage, stack together inside a small petri dish sealed with either Parafilm and then placed inside grip-seal bags. This should in turn be stored in an airtight container.

3 Assembling CEH ALPHA® samplers

Components will be shipped and labelled accordingly.

1. Place cap D inside cap B (tabs on caps in opposite direction, to avoid cap D being taken off when cap B is removed).
2. Place 27 mm PTFE membrane (C) inside the cap assembly, polypropylene backing (shiny side) facing outside and PTFE side (dull side) facing inside.
3. Place coated filter paper (F) inside the CEH ALPHA® sampler body, on top of the internal ridge. Ensure this is lying flat.
4. Place support ring (E) on top of coated filter paper.
5. Put the double cap + membrane assembly onto the sampler. Ensure that PTFE membrane is sitting flat.
6. As a further precaution against contamination, the prepared samplers should also be wrapped up with Parafilm.

Note: The use of the top protective cap B over the membrane cap ensures that sampling does not start until cap B is removed.



3.1.1 Laboratory blanks

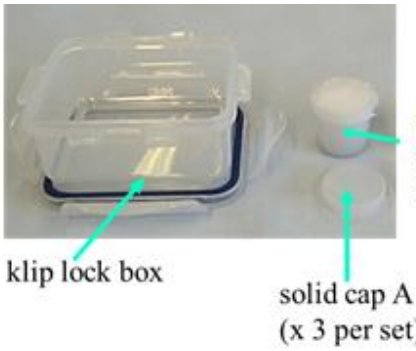
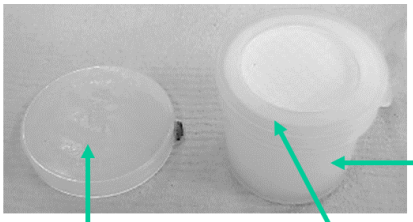
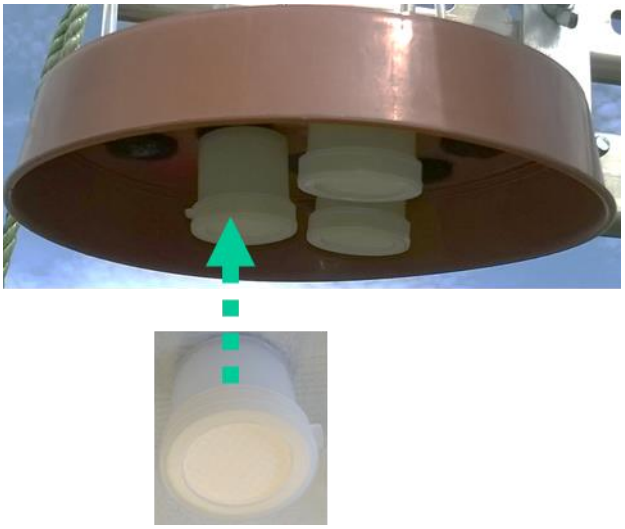
For every batch of CEH ALPHA® samplers that you make, you will need to prepare laboratory blanks, which should be about 10% of the total number of samplers (minimum of 2). Laboratory blanks should be capped with solid cap A and covered with Parafilm. They should be prepared at the beginning and end for each complete batch of CEH ALPHA® samplers, and at regular intervals throughout. Place the blank samplers inside a plastic container and then place the containers in a labelled grip-seal bag. Store the blanks in an airtight plastic box in a cool clean environment away from direct sunlight, preferably in a fridge / coldroom at 4°C.

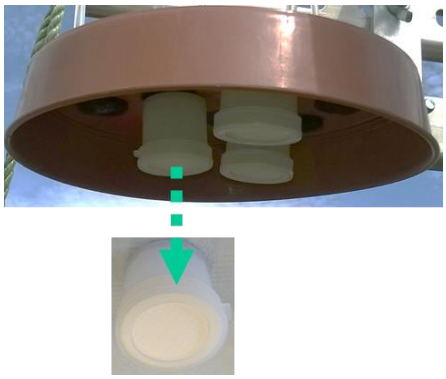
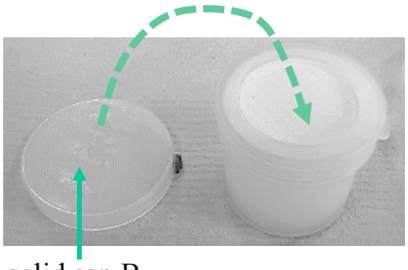
3.1.2 Transport blanks

Transport blanks are prepared in exactly the same way as samples and should be provided at regular intervals (and clearly marked), but these are left sealed and should be left in the carriage box.

4 CEH ALPHA® samplers for monitoring NH_3

Wear gloves at all times and avoid breathing directly on the samples

SETTING OUT	
	Contents of kit in klip lock box: • Three **CEH ALPHA® samplers with solid cap B on** • Three replacement **solid cap A**
 	Remove top **protective cap B** (embossed writing on cap). Press down lightly on the rim of the **membrane cap D** to ensure that it is on securely and has not loosened during removal of protective cap B.
	Attach the samplers firmly to the Velcro of the shelter provided. * Note the date and time on the recording card, plus any relevant observations.  *shelter with additional clips to keep samplers secure in high winds.

COLLECTING IN	
	At the end of exposure period, remove CEH ALPHA® samplers.
 solid cap B	Put **top protective cap (B)** (with embossed writing) back **on the membrane cap (D)**. Place sampler in klip lock box. Record sampling information on record card provided.
 Remove cap B and membrane cap D with PTFE membrane  Cap the samplers immediately with the **solid cap A**	Find **somewhere dry** for next step as rain water will contaminate the filter. **Remove both cap B and membrane cap D with PTFE membrane**. **Do not touch the filter paper.** Cap the samplers immediately with the **solid cap A**. Ensure that the cap is secure. The PTFE membranes are cleaned for reuse, so please take care when handling them.
	Put **EVERYTHING** back inside the container

5 Cleaning procedures for components

Plastic components and PTFE membranes

1. Remove all labels and disassemble all components before washing.
2. Soak in approx. 1 % Decon (or equivalent lab. detergent) solution for at least an hour or overnight (up to 24 hours).
3. Rinse several times with tap water.
4. Rinse 3 times with deionised water.
5. Spread components onto plastic trays (rinse trays with deionised water first) and dry in oven at 30-40°C.
6. Remove all components as soon as they are dry. Never leave them in the ovens longer than necessary, to minimise contamination.
7. Wear gloves at all times when handling clean components.

6 Contacts at CEH

In the case of any queries, please do not hesitate to contact:

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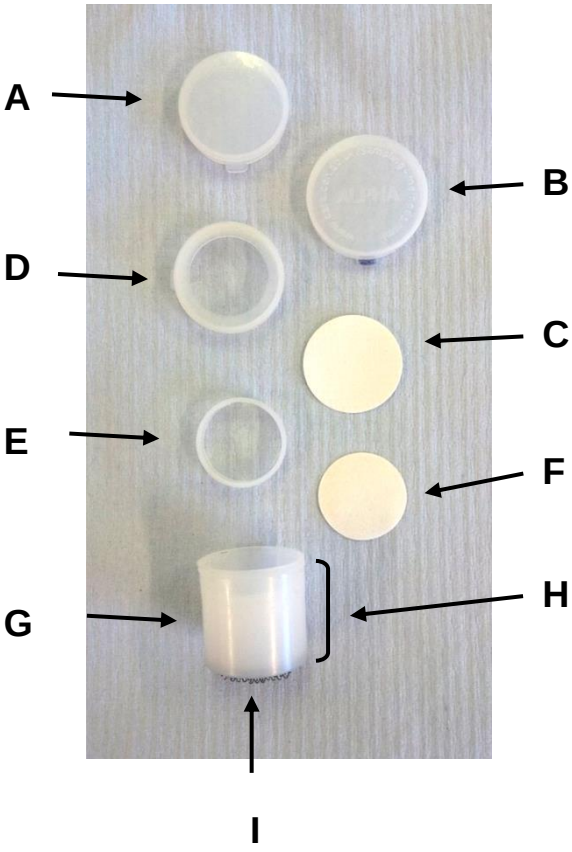
7 Appendix – CEH ALPHA® components



A **Replacement solid cap**
B **Top protective cap**
C **5µm PTFE membrane (27 mm diameter)**
D **Cap with hole for membrane**
E **Support ring (6 mm height)**
F **Filter paper**
G **Internal ridge to support filter paper**

Figure 1: Components of a single CEH ALPHA® sampler.

Figure 2: Assembled CEH ALPHA® sampler.

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Athena SWAN Bronze Award

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