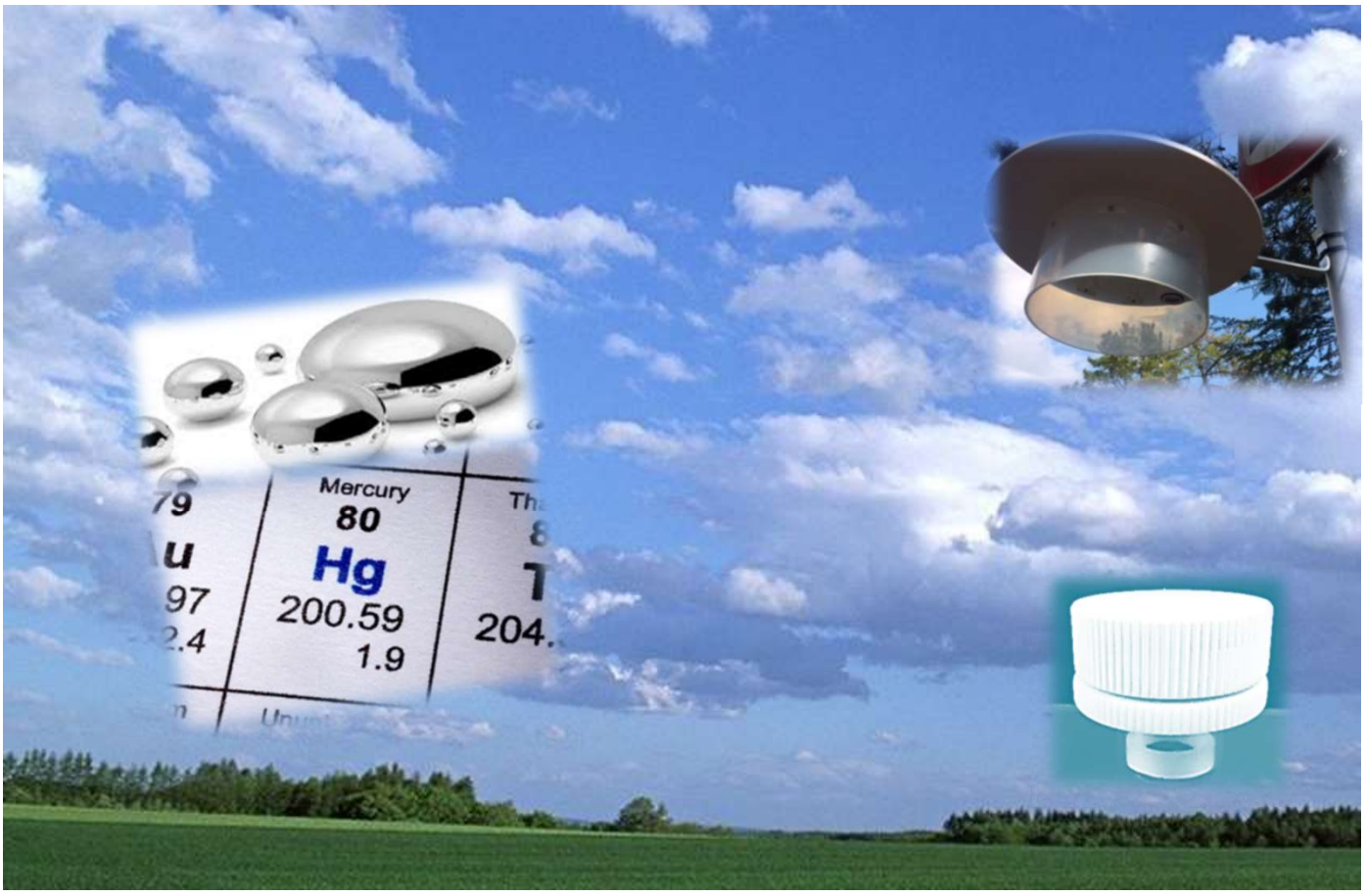
CNR - Consiglio Nazionale delle Ricerche
Istituto sull'Inquinamento Atmosferico

UN environment

Practical instructions to use CNR-IIA Passive Air Samplers (PASs) for Total Gaseous Mercury (TGM) monitoring



http://www.iia.cnr.it/

Contents

Instructions

CNR-IIA PASs description

Each Passive Sampler is a **compact device** capable of binding and keeps Total Gaseous Mercury (TGM) by a simple exposure to air (indoor and outdoor).

After each environmental exposure, PAS offers indication of **average pollution values over time periods** of a few hours to weeks/months.

It works exploiting the unassisted axial diffusion process of the mercury vapour through the diffusive membrane, along the glass vessel (diffusion path) up to the adsorbing film placed on the vessel bottom. Generally, planar or axial PASs are affected by lower sampling rates and limited sampling capacity, therefore they can be both useless in short-term analysis (due to low sampling rates) as long-term sampling (analyte back-diffusion due to low capacity).

The **uniqueness** of the CNR-IIA PAS adsorbing nanostructured film and composition overcomes these issues, allowing the PAS to work properly in short- as long-term analyses.

Further the new patented **double cap system** minimizes the operator handling, thus decreasing the chance to contaminate or ruin the sample, affecting the final results.

After thermal desorption, each PAS can be **re-used** for further exposure to air, obviously only when the adsorbing layer doesn't look evidently damaged (cracked, discoloured, detached parts).

INTRODUCTION

Each PAS adsorbing film is currently **produced by hand** in the CNR-IIA laboratory (Monterotondo, Rome, Italy), and it is the result of an advanced research within UNEP-GEF Project, focussed on designing robust and effective, as well as low cost and user friendly monitoring systems.

Each PAS is housed inside a **heat- and zip-sealed** aluminum sachet **together with a home-made cartridge that has to be always kept inside the sachet (closed) before, during and after the PAS exposure**. Basically, the white cartridge must never be kept out of the sachet and must return to the analysis laboratory together with the associated PAS.

For the environmental exposure, a suitable shelter housing up to 8 seats has been also designed and developed by CNR-IIA laboratories. The circular top structure protects the samples from solar irradiation as well as the bell around the samples protects them from wind and rain, favouring their proper functioning.

Designed and Produced by:
Institute for Atmospheric Pollution Research National Research Council
Research Area of Rome 1
Via Salaria km 29.3
Monterotondo (Rome)
00016

E-mails Contacts: antonella.macagnano@iia.cnr.it
francesca.sprovieri@iia.cnr.it
alessandra.fino@iia.cnr.it
nicola.pirrone@iia.cnr.it

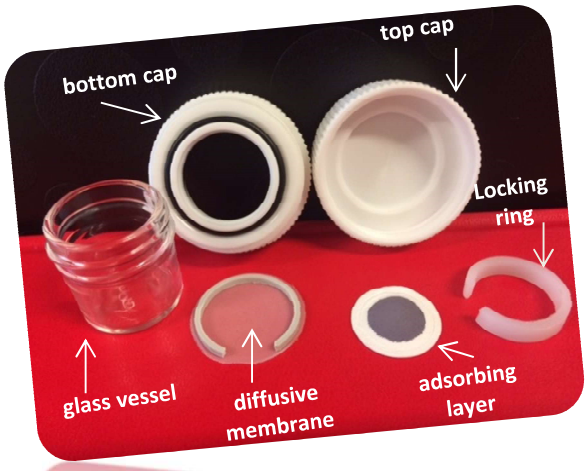
CNR-IIA PAS

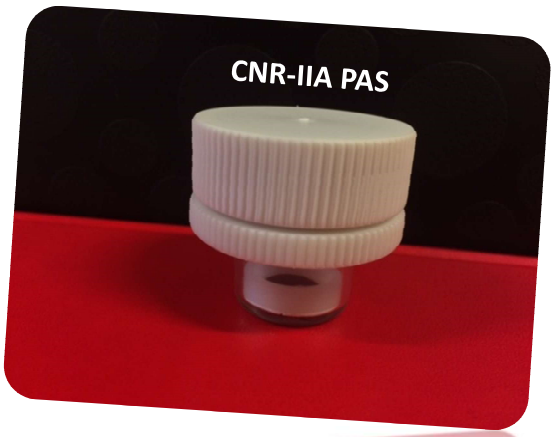
CNR-IIA Passive sampler comprises:

- ✓ a see-through borosilicate vessel (2.7 cm x 2.4 cm, height x diameter);

a white double cap with double screwing (upper cap: 4.1 cm x 1.4 cm; bottom cap : 4.1 cm x 1.7 cm);

- ✓ a nylon membrane for gas diffusion;
- ✓ two black O-rings (I.D.: 2.2 cm);
- ✓ a grey locking ring to keep the diffusion membrane to the cap;
- ✓ a white or black locking ring to keep the adsorbing membrane to the vessel bottom;
- ✓ the adsorbing membrane (violet);
- ✓ handmade perforated and hollowed cartridge (*scrubber-like*) to reduce the sachet pollution (*to be left inside the aluminum sachet*);
- ✓ a heat- and zip-sealed aluminum sachet
- ✓ a customized IIA-shelter hosting up to N.8 CNR-IIA PAS

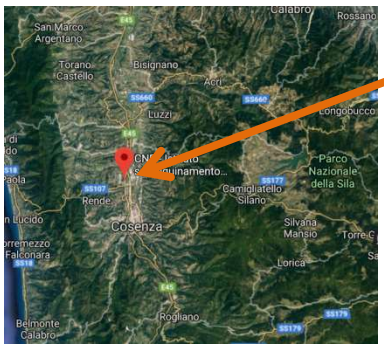




PRELIMINARY PROCEDURES TO THE PAS EXPOSURE

Key operating procedures

1) Select the monitoring site station and plan your monitoring program



The monitoring site should be selected and latitude and longitude indicated (e.g. CNR-IIA, Rende Italy : Lat. 39°.33'; Lon. 16°.18')

Each site should be examined and possibly photographed as well as the climatic factors that characterize it over the monitoring period (temperature, humidity percentage, rainfall, wind, etc.) should be reported

2) Use two hose clamps to fix the CNR-IIA-shelter to a tree or a pole about 1.80 and 2 meters high (parallel to the ground) (*the breathing zone*)