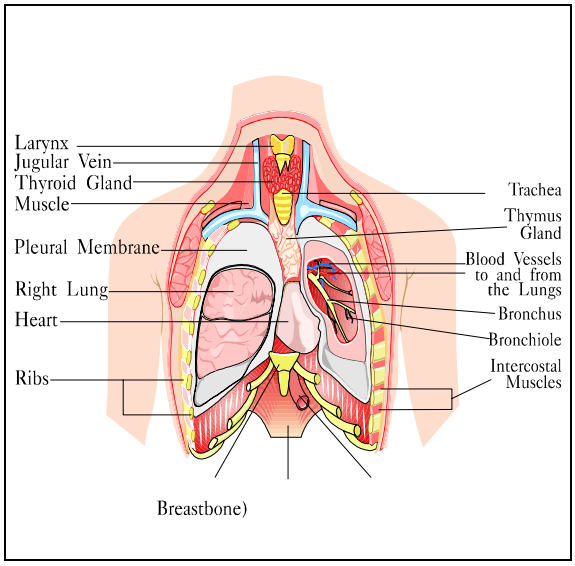
Breath Sampler Guidance Sheet

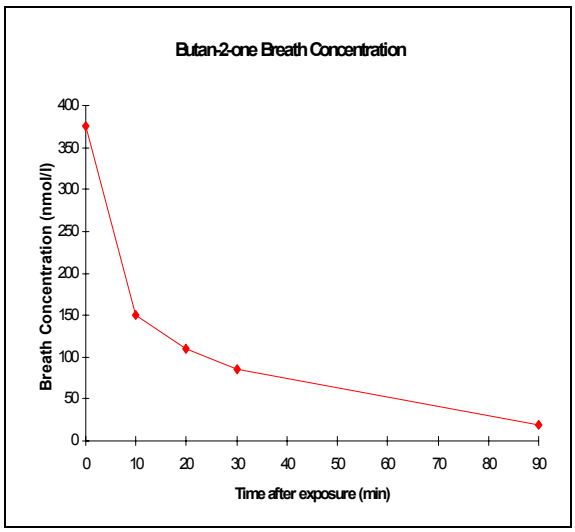
Why breath sampling?

Organic solvents are widely used in industry, and exposure to them results in entry into the body through the skin as well as by inhalation. Biological monitoring (BM) is a way of assessing total exposure by all routes. Many BM methods currently detect the compound of interest or its metabolites in blood or urine. However, blood sampling is invasive, and requires specially trained staff Since there is a rapid exchange between volatiles and gases in blood and air in the lungs, breath sampling has been proposed as a non-invasive alternative to blood sampling.



Sampling Strategy

The sampler operation is such that it captures the final portion of an exhalation, the end-tidal or alveolar air. This portion of the exhaled air is in equilibrium with the blood passing through the lungs. The captured portion of air is then transferred onto a stainless steel tube packed with adsorbent material.



Sampling Time

The solvent levels in the breath fall rapidly immediately after exposure, followed by a relatively slower change in excretion. The sample is best taken in a 'clean' area (e.g. office, medical room) about 10 minutes after the end of exposure.

Two, duplicate, samples should be provided per worker per time point. Also, two tubes should be returned unused, labelled as 'blanks'.

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This shows the sampler with piston rod in place, stainless steel tube, cardboard mouthpiece and Cap-Lok. Make sure piston inside the sampler is pulled right up to the green cap (mouthpiece) end of the sampler.

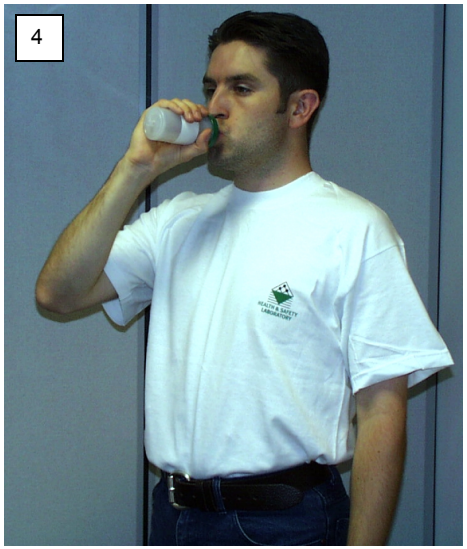
1

With the pushrod pulled right to the green cap (mouthpiece) end of the sampler unscrew the rod and remove it.

2

Place the cardboard mouthpiece over the end cap nozzle, and give the sampler to the worker.

3



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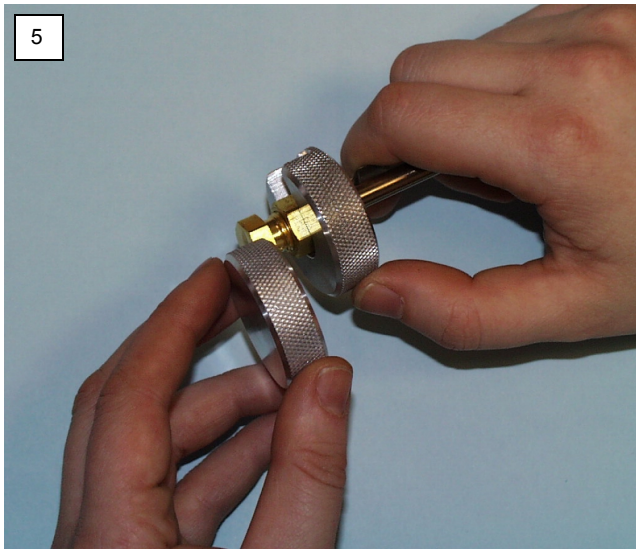
Ask the worker to breathe out through the sampler and encourage the worker to keep exhaling until the lungs are emptied. It is not necessary to breathe in deeply before giving the sample or to breathe in through the sampler.



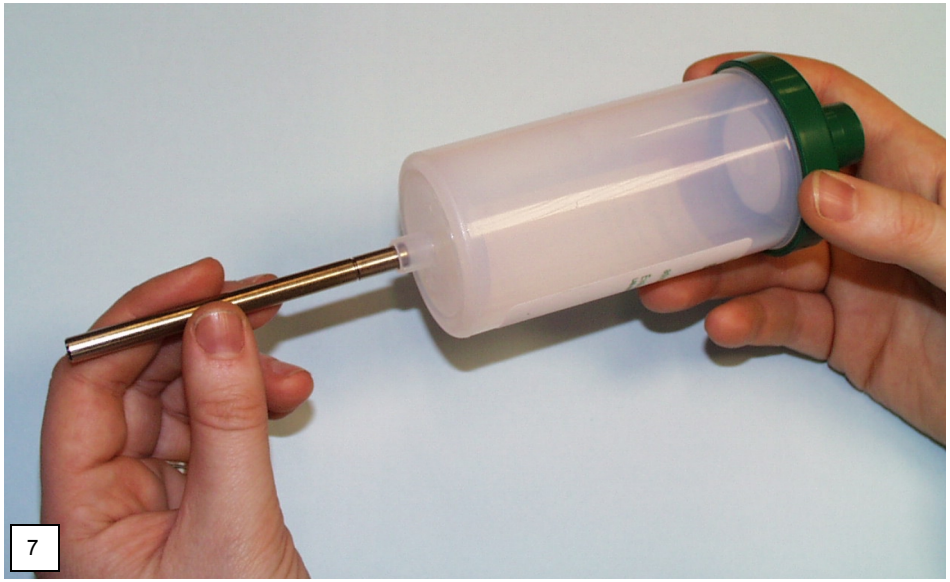
5

While the worker is giving a sample the stainless steel tube needs to be uncapped. Remove the label clip, if attached. Loosen the gold coloured caps using the Cap-Lok as shown above (by twisting the two discs in opposing directions), then pull the nuts from the ends of the tube.

6

Remove the nuts from the ends of the tube.

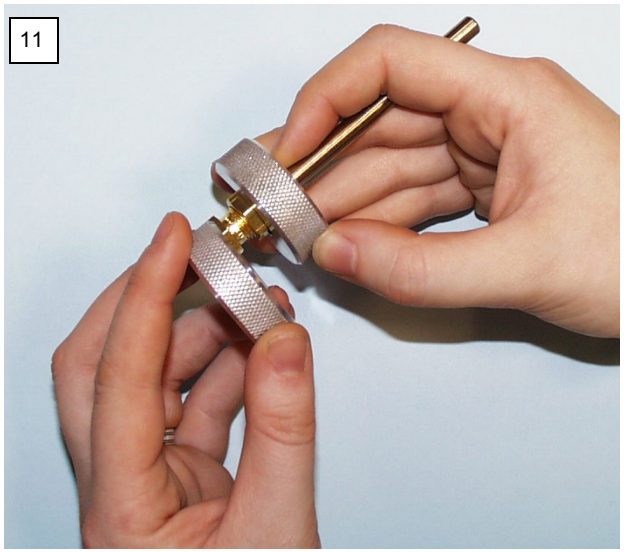
Once the worker has finished giving the sample, remove the cardboard mouthpiece and discard. Take the sampler and the stainless steel tube and push the grooved end of the tube into the narrow end of the sampler.



Screw the push rod into place in the end cap.

Transfer the trapped breath sample onto the tube by using the push rod to push the piston through the whole length of the sampler over about 10 seconds.

Count to 5 and then remove the tube.



Replace the gold nuts onto the ends of the tube and tighten until finger tight. Use the Cap-Lok to tighten the nut a further quarter turn. Gently pull the caps at each end to ensure they are secure. Attach the label clip and label the tube appropriately.

Flush the sampler by pulling and pushing the rod in and out three times. Return the piston to the end cap (mouthpiece) end and detach the rod. The sampler is now ready to be re-used. Repeat the entire process to provide a second, duplicate, sample for the worker.

Applications

Breath sampling, like all biological monitoring, can be especially useful when substances are potentially absorbed through the skin (as many solvents are) and/or when control of exposure relies upon personal protective equipment. By taking breath samples, you can determine whether the control measures in place are working or the PPE used is effective. It is also suitable for following the effects of changing work practices or control measures.

Many organic solvents are amenable to breath sampling. Some applications that we have studied and the solvents involved are listed below. These are just examples and many more can probably be monitored. Please ring the laboratory for further information.

Application	Solvents monitored
Degreasing	Trichloroethene
Dry-cleaning	Tetrachloroethene
Shoe industry	Acetone, Butanone (MEK)
White spirit	Toluene, Xylene, Decane, Nonane
Other solvent mixtures	Acetone, Butanone, Toluene, Xylene, Ethyl Acetate, Hexane, Tetrahydrofuran,

Interpretation of results can be by a number of means: some solvents (e.g. tetrachloroethene) have been set American or German guidance values. Others can be interpreted from volunteer studies or literature reviews. Many solvents will currently have to be interpreted on an 'in-house' basis, by comparison to 'baseline' values for particular processes.

For any further information about the breath sampler (including how to get hold of one) or any other of our exposure assessment services please don't hesitate to contact us:

Health and Safety Laboratory,
Harpur Hill,
Buxton.
SK17 9JN

Tel: Dr. John Cocker 01298 218429
Ms. Kate Jones 01298 218435
Fax: 01298 218470