

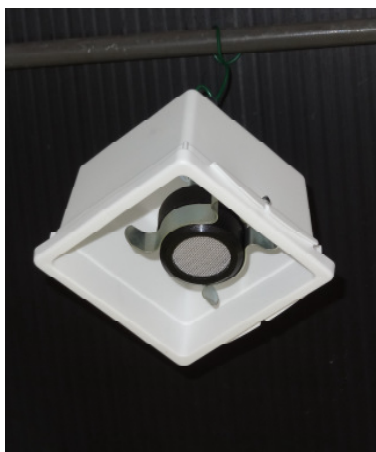
Diffusive Sampler for Carbon monoxide

Global background concentrations of carbon monoxide range between 0.06 mg/m³ and 0.14 mg/m³. In urban traffic environments of large European cities, the 8-hour average carbon monoxide concentrations are generally lower than 20 mg/m³ with short-lasting peaks below 60 mg/m³. Carbon monoxide concentrations inside vehicles are generally higher than those measured in ambient outdoor air.

The main sources of CO to the atmosphere:

- incomplete incineration processes
- car emissions
- space heaters

CO readily reacts with haemoglobin in the human blood and as a result the oxygen-carrying capacity of the blood is reduced. In order to protect non-smoking, middle-aged, and elderly population groups with documented or latent coronary artery disease from acute ischemic heart attacks, and to protect fetuses of non-smoking pregnant mothers



Protective shelter for CO sampler to protect the sampler from weather influences, as well as minimising wind disturbance

from untoward hypoxic effects, the World Health Organisation (WHO) recommends that a carboxy-haemoglobin level of 2.5% should not be exceeded.

The following recommendations or limit values exist:

- WHO as 8 hours mean	10 mg/m ³
- Switzerland as 24-hour mean	8 mg/m ³
- European Union as 8 hour mean :	10 mg/m ³
- Brazil 8h mean (≤ 1 a year)	10 mg/m ³

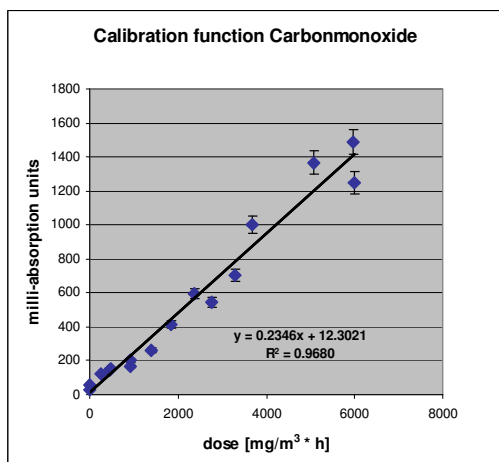
It makes sense to use passive samplers for longer exposure times, not least in order to save on labour costs. There is however a relation from one-week or two-week means to 8-hour means, as the figure on the reverse shows. If the mean values are below 4 mg/m³, it is highly likely that any excess of the 8-hour value can be ruled out.



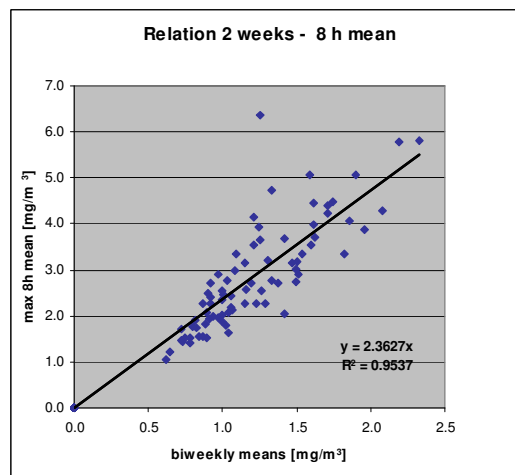
Diffusive sampler of carbon monoxide

The passive sampler for Carbon monoxide is based on the principle of the diffusion of CO molecules onto an absorbing medium, in this case Palladiumchloride. Metallic Palladium is formed, which can be determined by the Focaltin Reaction [1]. The passive samplers are composed of a polypropylene housing with an opening of 20 mm diameter. To reduce wind disturbance a glass fibre membrane is attached, supported by a wire net.

Specifications



The analytical function is linear up to 15 mg/m³ for a two week exposure



The relation one week value to maximal 8 hour mean is approximately 2.1 and 2.4 for two week exposures.
(111 datapairs highly trafficked places in Zurich 1985 –89)

Calibration function	$\text{conc [mg/m}^3\text{]} = (\text{mAbs} - 12.3) \cdot 4.26 / \text{hours}$	
Working range	0.5 – 20 mg/m³	
Sampling time	1 – 2 weeks	
Detection limit	0.5 mg/m³ for sampling periods of one week	
External influences:	wind speed	influence of wind speed < 10% up to 10 m/sec
	temperature	< 0.2 m/sec starvation
	humidity	no influence between 10 to 30°C
		no influence between 20 to 80%
Storage	before use:	12 months
	after exposure:	4 months
Cross sensitivity	Specific method	
Expanded uncertainty*	22.6 % at levels of 10 mg/m³	

*according to GUM; subject to change without notice

revised 6.6.2013

References

[1] G. Ciuhandu, V. Rusu: Photometrische Mikrobess-
timmung von Kohlenmonoxid in Luft und Blut in:
Clinical chemistry and laboratory medicine, Band
6, Heft 3: 1968

[2] WHO Regional Office for Europe,
Copenhagen, Denmark, 2000

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KP23e_2012.doc 6.6.2013