

Short-term diffusive sampler for nitrogen dioxide

Health effects

Nitrogen dioxide can irritate the lungs and lower resistance to respiratory infections such as influenza. The effects of short-term exposure are still unclear, but continued or frequent exposure to concentrations that are typically much higher than those normally found in the ambient air may cause increased incidence of acute respiratory illness in children.

Nitrogen oxides contribute to ozone formation and can have adverse effects on both terrestrial and aquatic ecosystems.



Measurement of nitrogen dioxide

Nitrogen dioxide is normally measured continuously by chemiluminescence monitors. This type of measurement permits the assessment of time series, but is restricted to a few selected sites. Diffusive samplers allow the spatial distribution of air pollutants in a wide area to be assessed.

Diffusive sampler

The sampler collects NO₂ by molecular diffusion along an inert tube to an absorbent, in this case triethanolamine.

In use, the samplers are mounted with the aid of a clip; the plastic cap is removed at the onset of sampling, thus allowing NO₂ to be transported by molecular diffusion up the tube to the TEA, where it is retained. The cap is replaced at the end of sampling and the collected NO₂ is determined spectrophotometrically by the well-established Saltzman method.

Sampling periods for this sampler usually range from 8 hours to 48 hours.

Air quality standards

Air quality standards vary from country to country:

| | |
|-------------|--|
| Switzerland | 80 µg/m ³ (24 hours) |
| China | 120 µg/m ³ (24 hours) |
| WHO | 150 µg/m ³ (24 hours) discontinued |

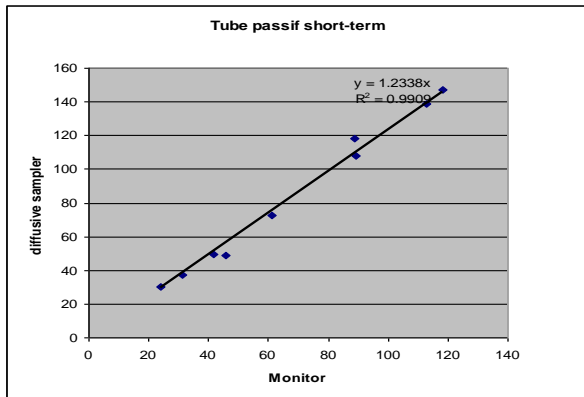
The diffusive sampler is suitable for checking compliance with short-term limits for 24 hours. The uncertainty of measurement was estimated as 10% at 120 µg/m³ according to the test results. This means that the limit value of 120 is not exceeded if the measured value is below 108 µg/m³. The pollution level is said to be in the region of the air quality standard if the value is between 108 and 132 µg/m³ but fails to comply with the standard if it exceeds 132 µg/m³.

Applications

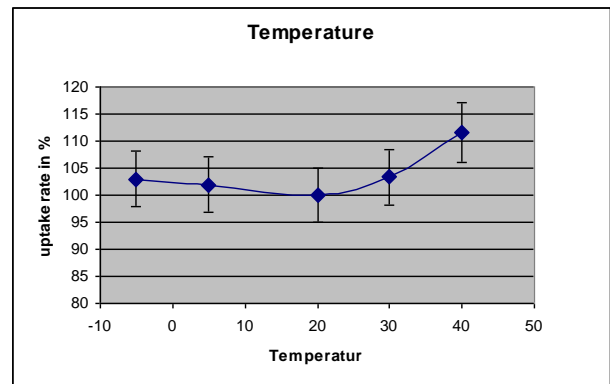
- Indicative measurement of daily means for monitoring air quality standards
- Assessment of personal exposure for epidemiological studies



Specifications



Field comparison at 2 sites in France. [1].



The influence of temperature is less than 10% in the range 5 to 30°C.

| | | |
|-----------------------|----------------------------|--|
| Sampling rate | 15.5 ml per minute at 20°C | |
| Working range | 5 – 240 µg/m ³ | |
| Exposure time | 8 to 48 hours | |
| Detection limit | for a 8-hours exposure | 5 µg/m ³ |
| | for a 24 -hours exposure | 2 µg/m ³ |
| External influences: | wind speed | influence of wind speed < 10% up to 10 m/sec |
| | temperature | no influence between 10 to 30°C |
| | humidity | no influence between 20 to 80% |
| Storage | before use: | 6 months |
| | after use: | 6 months |
| | Travelblank recommended | |
| Interferences | oxydants | |
| Extended uncertainty* | 20.1 % | at a level of 40 µg/m ³ |

*according to GUM; subject to change without notice

revised 20.02.2023

References

- [1] Caractérisation de l'exposition personnelle d'un échantillon de Franciliens, Février 2008.
AIRPARIF Surveillance de la Qualité de l'Air en Ile-de-France – Pôle Etudes ISBN 978-2-11-097823-3
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