Product Sheet

passam ag

air quality monitoring

Passive Sampler for BTEX

Product Number SP16

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Working Principle

The passive sampler enables the measurement of BTEX concentrations (benzene, toluene, ethylbenzene, and xylenes) in the air in two steps. First, the pollutants are collected autonomously and without an energy source. Then, the collected pollutant amount is analysed in our laboratory.

The sampler operates based on the principle of passive diffusion of pollutant molecules and their adsorption onto activated carbon made from coconut shells. Sampling takes place autonomously over a period of 1 to 4 weeks. A double-sided protective filter reduces environmental influences and ensures precise BTEX measurement.

We analyse using gas chromatography according to EN 14662-5[1] in our ISO 17025-accredited Swiss laboratory. The average BTEX concentration is then calculated based on the pollutant amount, exposure time, and sampling rate.

Only a protective container, which also serves as a holder, is required for the measurement site. The simple installation allows for use even in remote locations. Each sampler is uniquely identifiable by its lot number, ID, and expiration date.

Applications

The main sources of BTEX emissions include combustion processes from traffic, products from chemical production processes (refineries, paints and coatings, plastics), as well as the storage and processing of fuels. Passive sampler measurements are essential for understanding and controlling BTEX pollution in the air. Thanks to its cost efficiency, ease of use, and high flexibility, the passive sampler is widely used in air quality monitoring:

- **Regulatory monitoring:** The BTEX passive sampling method is used to monitor benzene concentrations in accordance with the EU directive. The annual average benzene limit will be reduced from the current 5.0 µg/m³ to 3.4 µg/m³ by 2030 [2]
- **Air quality studies and source identification:** Determining the spatial distribution of BTEX allows for the identification of sources such as traffic [3,4] or gas stations [4] as dominant emission sources
- **Epidemiological studies:** Investigating the effects of pollutants on human health and the environment
- **Indoor air quality monitoring**: Assessing air quality in indoor environments such as laboratories, warehouses, or production facilities
- **Industrial process monitoring**: Surveillance of industrial processes, e.g., in the petrochemical industry

Specifications

sampler type & dimension	glass-type (≈ Ø 10 mm, length 30 mm)
sampling time	1 – 4 weeks
sampling rate [ml/min] 20°C	6.44 Benzene, 5.72 Toluene, 5.20 Ethylbenzene, 5.04 / 5.03 / 5.45 p-/m-/o-Xylene
upper working range	170 µg/m^3
detection limit	0.3 – 0.5 µg/m^3 at 4 weeks or 0.6 – 1.0 µg/m^3 at 2 weeks exposure
expanded uncertainty	28.4 % at 5 ug/m^3 Benzene
analysis time	approx. 10 – 20 days
shelf life and storage conditions	24 months prior exposure; 6 months after exposure; store in sealed plastic bag at room temperature, protected from sun slight
transport conditions	shatterproof in a sealed plastic bag
environmental factors < 10%	wind: < 1.5 m/s temperature: in the range of -1 – 22 °C relative humidity: 20 - 60%
cross sensitivities	none known
validation	within the accredited scope of ISO/IEC 17025 according 14662-5/ EN 13528

References

[1] DIN EN 14662-5: Ambient air quality - Standard method for measurement of benzene concentrations - Part 5: Diffusive sampling followed by solvent desorption and gas chromatography; German version EN 14662-5:2005

[2] Directive (EU) 2024/2881 of the European Parliament and of the council of 23. Oct. 2024 on ambient airt quality and cleaner air for Europe; https://eur-lex.europa.eu/eli/dir/2024/2881/oj

[3] Marčiulaitienė et al. 2017: The characteristics of BTEX concentration in various types of environments in the Baltic Sea Region, Lithuania, Environ Sci Pollut Res (2017) 24:4162–4173.

[4] H. Amini et al., Spatiotemporal description of BTEX volatile organic compounds in a Middle Eastern megacity: Tehran Study of Exposure Prediction for Environmental Health Research (Tehran SEPEHR), Environmental Pollution, Volume 226, 2017, Pages 219-229, https://doi.org/10.1016/j.envpol.2017.04.027