



Detection of Organic Compounds in Outdoor Urban Air in Kosova and Macedonia Using a Passive Sampling Technique and Gas Chromatography Coupled with Mass Spectrometry

V. Mula,^{a,b,*} J. Bogdanov,^b J. Petreska Stanoeva^b, Z. Zdravkovski^b

^a Faculty of Education, University "Fehmi Agani" Gjakovë, Kosova

^b Institute of Chemistry, Faculty of Natural Sciences and Mathematics, Ss. Cyril and Methodius University, Skopje, N. Macedonia

[*vllaznim.mula@uni-gjk.org](mailto:vllaznim.mula@uni-gjk.org)

Urban organic pollutants have a significant direct and indirect impact on air quality, human health, and climate.^{1,2} Herein organic emissions in outdoor urban air were monitored in selected cities in the Republic of N. Macedonia and Kosova in 2022. For that purpose, Radiello® passive/diffusive samplers were used.³ After appropriate desorption the samples were subjected to analysis using gas chromatography coupled with mass spectrometry (GC/MS). The most abundant detected in the urban air were BTEX (benzene, toluene, ethylbenzene, and xylenes), C₉-C₁₁ alkyl aromatics (1,2,4-trimethylbenzene, 1-ethyl-3-methylbenzene, 1,3,5-trimethylbenzene, 1-methyl-4-propylbenzene), linear alkanes (*n*-undecane, *n*-dodecane, *n*-tridecane and *n*-tetradecane) and monoterpenes (α -pinene and limonene). Furthermore, BTEX compound ratios and correlations have been employed as a marker for finding VOC emission sources in the atmosphere.⁴ Long-term objectives include developing quantitative assessments of volatile organic compounds in outdoor air and regularly monitoring their amounts throughout the year. The above-mentioned method is simple and in the future, comparative studies can be carried out with active sampling.

Keywords: VOC, air pollution, gas chromatography, Radiello® passive sampling.

References

1. McDonald, B. C. Volatile Chemical Products Emerging as Largest Petrochemical Source of Urban Organic Emissions. *Science* **2018**, 359 (6377), 760–764. DOI: 10.1126/science.aaq0524.
2. Mohamed, M. F. Volatile Organic Compounds in Some Urban Locations in United States. *Chemosphere* **2002**, 47 (8), 863–882. DOI: 10.1016/S0045-6535(02)00107-8.
3. Marć, M. Application of Passive Sampling Technique in Monitoring Research on Quality of Atmospheric Air in the Area of Tczew, Poland. *Int. J. Environ. Anal. Chem.* **2014**, 94 (2), 151–167. DOI: 10.1080/03067319.2013.791979.
4. Abtahi, M. The Concentration of BTEX in the Air of Tehran: A Systematic Review-Meta Analysis and Risk Assessment. *Int. J. Environ. Res. Public Health* **2018**, 15 (9), 1837. DOI: 10.3390/ijerph15091837.