

RE-ANALYSIS OF VOLATILE ORGANIC COMPOUNDS IN AIR SAMPLES USING THERMAL DESORPTION UNITS



Tajana Horvat¹, Ivana Jakovljević¹, Iva Smoljo¹, Gordana Pehneć¹, Goran Gajski²

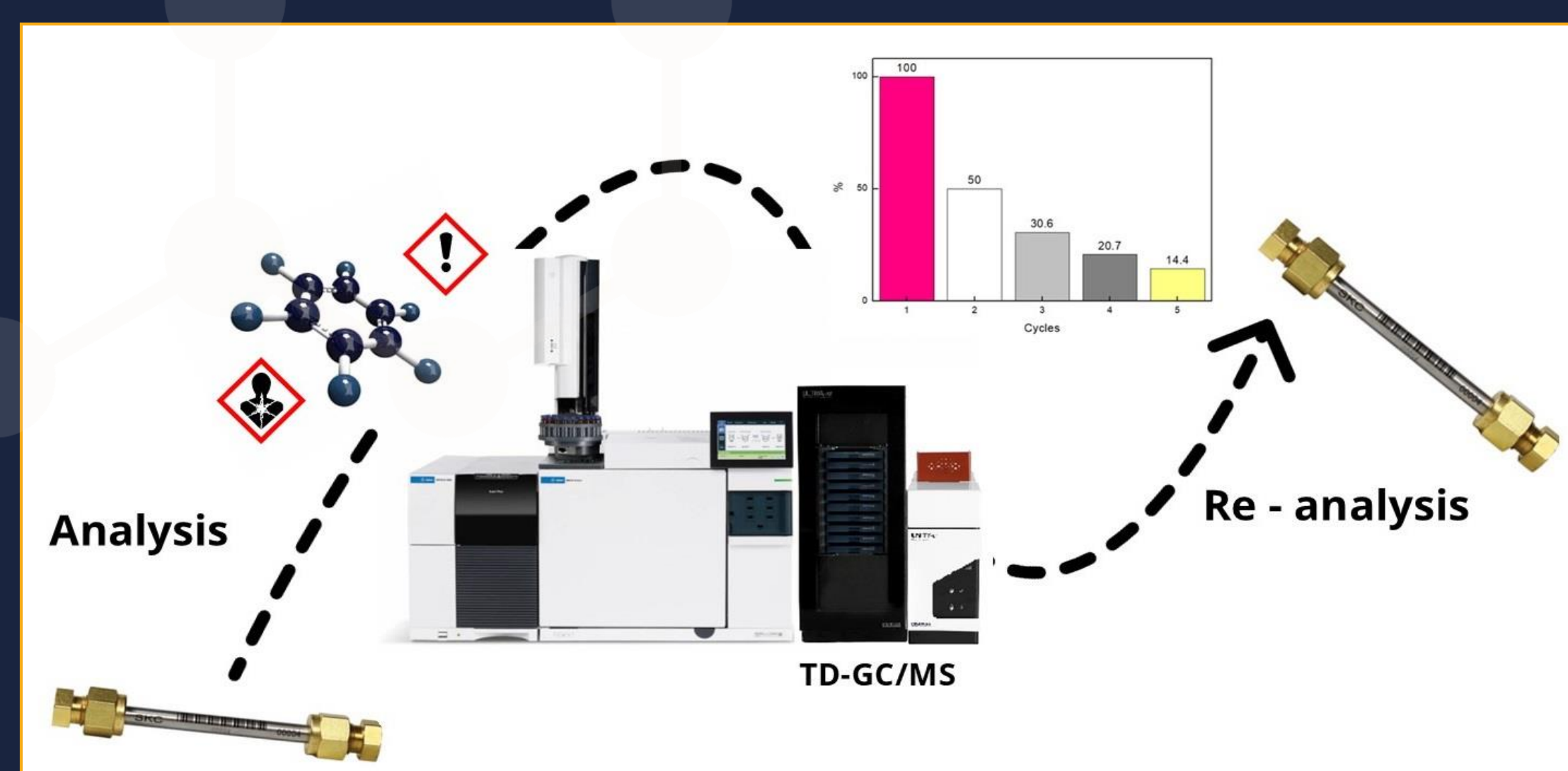
¹Environmental Hygiene Unit, Ksaverska cesta 2, 10000 Zagreb, Croatia

²Mutagenesis Unit, Ksaverska cesta 2, 10000 Zagreb, Croatia

Introduction

- Volatile organic compounds (VOCs) are known as environmental pollutants due to their carcinogenicity and mutagenicity consequently leading to adverse health effects as well as their influence on atmospheric chemistry.
- Due to their volatile nature, it is necessary to apply a suitable sample preparation method for their analysis.
- Thermal desorption (TD) is a method that replaces classic extraction methods, without the use of solvents, making the preparation more environmentally friendly.

Determining the **achievability and efficiencies** of air sample re-analysis in recollection mode, for **five consecutive cycles** in the same tubes.



Motivation

TD units have come into widespread use because of their many advantages.



On the other hand, the classical TD units destroy samples and basically only one analysis can be performed from each sampling case.

To eliminate this drawback, it is necessary to collect simultaneously additional samples.

However, modern TD units allow to split the desorbed samples flow, re-collect it on the same or a new sorbent tube, and perform repeat determinations from the same sample.

Method

Thirty real air samples were collected at multi-bed tubes.

TD-GC/MS instrument enables the return of the analyte to the tubes after the GC/MS analysis is performed, and thus the sample can be re-analysed.



Tubes packed with a combination of porous polymer, carbon black, and carbonised molecular sieved.

Results

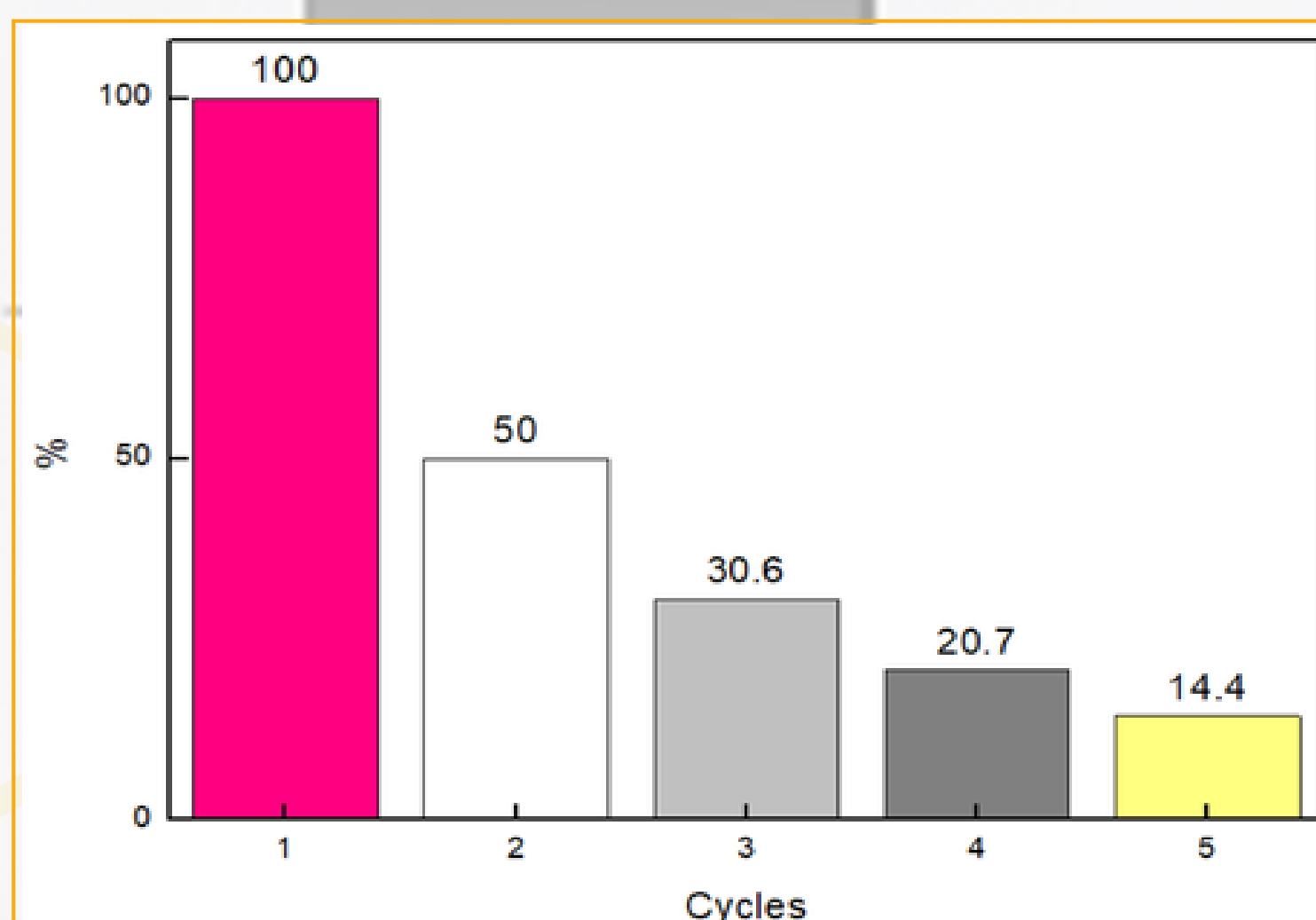


Fig 1. Average efficiencies for five consecutive desorption cycles are expressed in percentages.

It was taken that the first cycle of analysis represents 100 % of the total amount of the sample, while for the other four cycles, sample reductions were calculated in percentages.

For the second cycle, the efficiency of the re-analysis was 50.0 ± 5.6 % of the total amount, for the third cycle 30.6 ± 8.2 %, for the fourth cycle 20.7 ± 10.5 %, and for the fifth cycle was 14.4 ± 13.1 %.

Conclusion

Considering the calculated percentage reduction with analysis cycles, and the fact that they were very similar values for all individual analytes, it can be concluded that it is possible to re-collect air samples on the same sorbent tube and perform repeated determinations from the same sample if necessary.

Acknowledgements

This study was supported by the affiliated institution, European Regional Development Found project KK.01.1.1.02.0007 (Rec-IMI), the Horizon Europe (EDIAQI project #101057497), and the European Union – Next Generation 533-03-23-0006 (EnvironPollutHealth).



✉ thorvat@imi.hr

Scan the QR code for more about the EDIAQI project