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Water analysis always require a lot of space to preserve 2 bottles of sample for up 21 days at 4°C and requires a lot of operator time, that can lead to errors.

In order to reduce time and space required and to minimize human error new automated methods are needed.

Automated solid phase microextraction allowed to reduce the amount of sample needed for analysis. To increase extraction recovery an automated tool for fiber exchange (MFX) have been employed, coupled to GC/MS/MS's selectivity, sensitivity and reproducibility allowed to obtain required detection limits for national and international legislations.

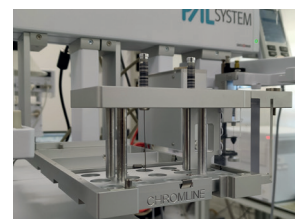
More than 100 analytes actually implemented, all included in EU Water Framework watchlist and Italian ground water and drinking water regulations: Dlg 152/2006 and Dlg 18/2023

- POLYCYCLIC AROMATIC HYDROCARBONS (PAH)
- POLYCHLORINATED BIPHENYLS (PCB)
- PRIMARY AROMATIC AMINES
- ORGANOCHLORINE PESTICIDES (OCP)
- PHENOLS
- NITROBENZENES
- POLYBROMINATED BIPHENYLETHERS (PBDE)

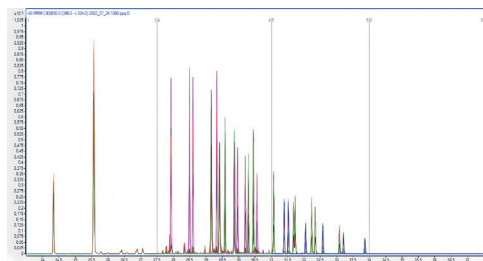


(Figure 1)

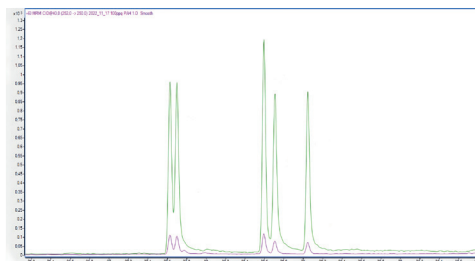
CTC RTC3 equipped with multiple syringe tool used to prepare standards, add derivatization agents and MFX tool for SPME extraction prior to GC/MS/MS analysis using Agilent 7890B GC coupled to Agilent 7010 triple quadrupole equipped with High Efficiency Source (figure 1) and detail of fast fit assembly fiber ready to be used with Multi Fiber eXchange tool (figure 2)



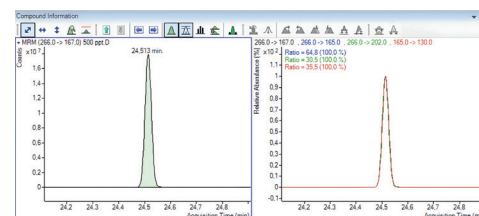
(Figure 2)



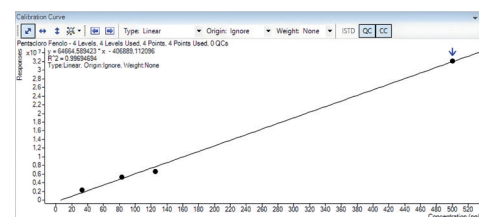
Overlaid chromatograms of interday PCB calibration check at 1 ng/L concentration in between a sequence containing heavy matrix samples (waste waters) working in headspace-SPME.



Overlaid chromatograms of 1 ng/L (green) and 0.1 ng/L (purple) calibration levels of benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[e]pyrene, benzo[a]pyrene and perylene, with a signal to noise ratio of almost 50 for benzo[a]pyrene at 0.1 ng/L extracted by direct immersion-SPME.



Pentachlorophenol standard at 30 n/L derivatized at instrument and extracted by headspace-SPME. And it's calibration curve in the range between 33 and 500 ng/L.



CONCLUSIONS

Preliminary results showed an encouraging path to follow in order to obtain a fully automated and fully modular tool for waters analysis and it will be further implemented and optimized increasing the number of compounds analyzed, and analytical throughput.