Challenges and Achievements of Tandem and Hybrid LC-MS in Environmental Analytical Chemistry

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The rapid developments in the field of LC-MS/MS have transformed this technique into a key technique for the analysis of environmental contaminants. Increased sensitivity, as a result of more efficient ionisation techniques and better detectors, has allowed detection of virtually any new and potentially harmful contaminant at very low level. Consequently, a number of new or previously ignored or unrecognized contaminants have been brought under scrutiny.

Today, the need for increased capabilities in environmental analysis is driving new strategies and instrument advances. LC-MS/MS techniques such as triple quadrupoles (QqQ) and ion traps (IT) are in common use for many years, while more recent approaches include linear traps (LIT), new generation triple quadrupoles, and hybrid instruments, such as quadrupole-time of flight (QqTOF) and Q-linear traps (QqLIT). These instruments are gaining widespread acceptance in several application areas (trace target analysis, screening, identification of degradation products, etc.) due to their advantages such as high scanning speeds, accurate mass measurement (QqTOF), and increased sensitivity (LIT, new generation triple quadrupoles). At the same time, recently introduced improvements in the LC side, like the use of ultra performance liquid chromatography (UPLC) or rapid resolution liquid chromatography (RRLC) makes this technology more attractive and powerful when combined with tandem or hybrid MS.

This paper will give several practical examples on the application of LC-QqTOF and LC-QqLIT for the determination of multi class pharmaceuticals in river and wastewater. Specific issues such as matrix effect, selectivity and sensitivity related with the number of compounds monitored, as well as the criteria for positive identification in terms of identification points (IP) will be discussed in details.

Acknowledgment
This work was financially supported by the Unity Through Knowledge Fond (UKF) project: Reduction of environmental risks posed by pharmaceuticals and their degradation products in process wastewaters, through RO/NF membrane treatment (REPHAD).