Time Saving Sample Preparation for Pain Killers in Wastewater

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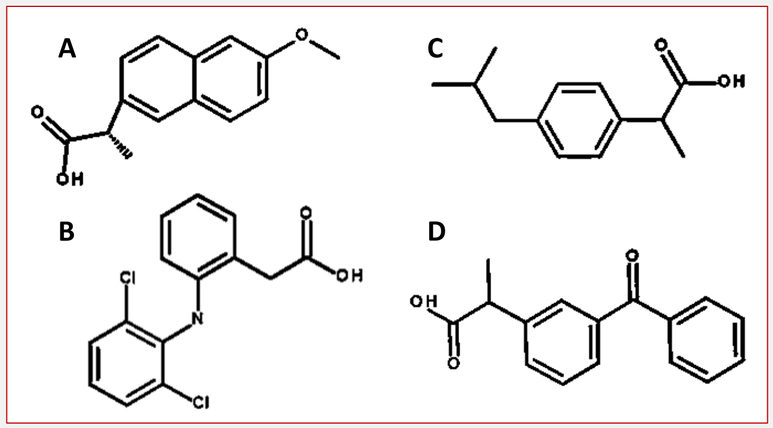
Conclusion

- Naproxen, diclofenac, ibuprofen, and ketoprofen were analyzed in wastewater samples.
- Rotary evaporation allowed preconcentration of the analytes prior to SPE extraction.
- Recoveries were between 76 and 105 % for artificial samples. For the influent C, recovery of naproxen and ibuprofen were 22 and 63 %, respectively.

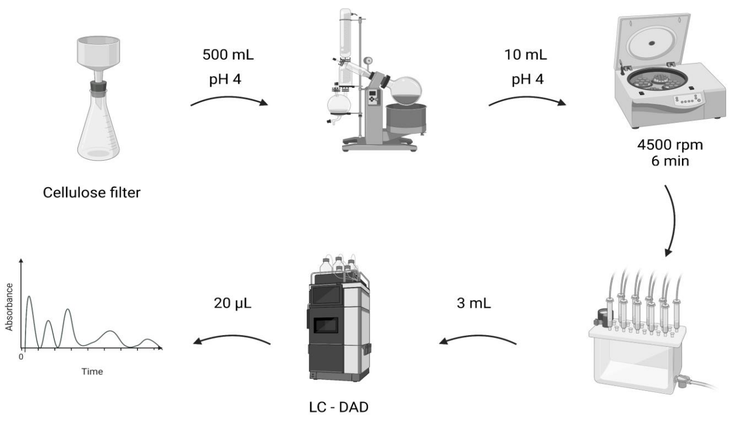
Introduction

Pain killers have been found in the aquatic environment at low concentrations. The main pollutant sources are wastewater treatment plants where removal of pain killers can be inadequate [1].

Solid-phase extraction (SPE) is commonly used as sample preparation [2]. However, it requires large volumes. Thus, the investigation to include rotary evaporation has been made here for the pain killers naproxen (**A**), diclofenac (**B**), ibuprofen (**C**), and ketoprofen (**D**) in wastewater (influent and effluent).



Methodology



Sample preparation included filtration, rotary evaporation, centrifugation, and SPE. The SPE was eluted with 3 mL 75% organic phase.
The mobile phase in the LC was 25:25:50 (v/v/v) Methanol : Acetonitrile : Buffer [3].

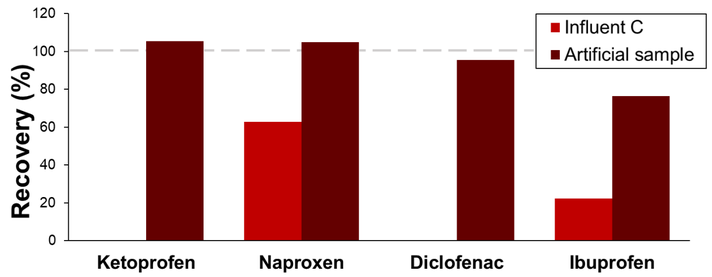


Figure 1. Recoveries in influent C and artificial sample (spiked with standards blank).

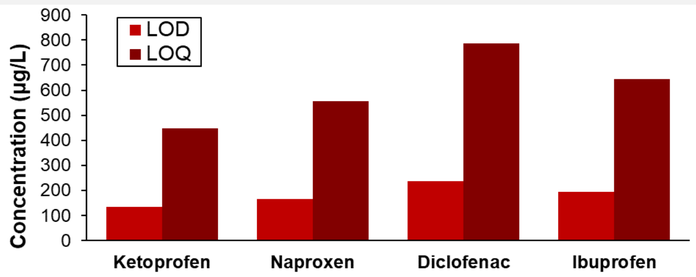


Figure 2. LOD and LOQ based on the calibration solutions of the compounds.

Results

- Naproxen and ibuprofen were detected in both influent AB and C. Ibuprofen detected below LOQ. No compounds were detected above LOD for the effluent.
- Recoveries on influent C and artificial sample indicates matrix effects.
- Rotary evaporation 35 min + SPE 20 min, compared to only SPE (>100 min).

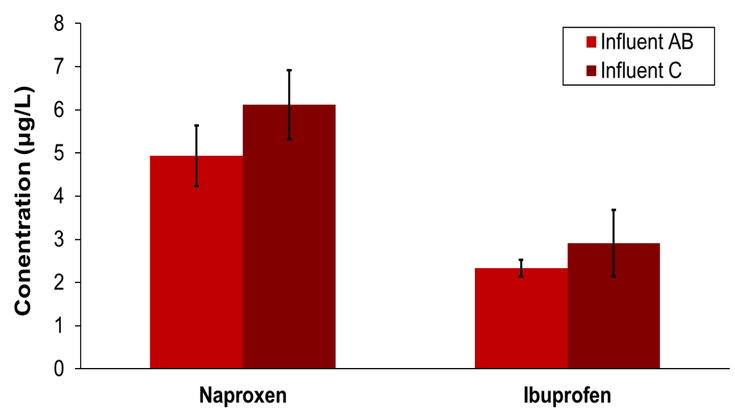


Figure 3. Concentration of detected compounds in influent wastewater samples. Detected compounds in effluent <LOD. Error bars are shown as standard deviation (n=3).

Acknowledgment

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References

[1] S. R. Hughes, P. Kay, L. R. Brown, Environ. Sci.Technol. 2013, 47, 661–677.
[2] Ternes TA (2001) Trends Anal Chem.20:419–434.
[3] Figure created in BioRender.com

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