



7TH PORTUGUESE YOUNG CHEMISTS MEETING

BOOK OF ABSTRACTS

19th - 21st May 2021

Bragança - Portugal

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MONITORING OF 17 β -ESTRADIOL IN RAW AND TREATED WATERS OF WASTEWATER TREATMENT PLANTS

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Nowadays, there has been a growing concern regarding the possible consequences of exposure to estrogens through its direct or indirect consumption. The increasing utilization of estrogenic compounds, such as natural or synthetic estrogens and pharmaceuticals, results in their continual occurrence and accumulation in the aquatic environment. Monitoring the levels of estrogens is, currently, highly needed due to its frequent detection in treated wastewaters of Wastewater Treatment Plants (WWTP's) [1]. The present work is divided in two main experimental stages. First, an SPE/HPLC-UV experimental methodology is optimized to detect and quantify 17 β -Estradiol (E2) present into aqueous samples. The HPLC-UV operating conditions were selected by performing a screening of the mobile phase composition (11 different compositions). A pure methanol composition was selected based in the lower retention time and the highest UV detector signal. In **Figure 1**, is presented the chromatographic curves used to obtain a HPLC-UV calibration curve for estradiol (analysis without SPE extraction). The solid phase extraction optimization involves a three-level Box-Behnken experimental design [2] with four factors (sample volume, sample pH, adsorbent drying time and solvent composition in the washing step), as presented in **Table 1**, combined with a response surface methodology. The validation of the optimized experimental methodology is done by the monitoring of estradiol in wastewater influent and effluent samples from Bragança Wastewater Treatment Plant in Portugal.

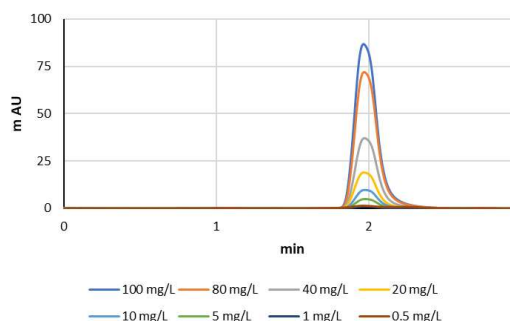


Figure 1: Chromatographic curves used to obtain a calibration curve for E2 obtained by HPLC-UV (without SPE) with a range of 0.5-100 mg/L.

Table 1: Three-level Box-Behnken experimental design and levels.

Factors	Levels
Sample Volume	500, 1000 and 1500 (mL)
Sample pH	2, 5 and 8
Adsorbent drying time	10, 35 and 60 (min)
Solvent composition in washing (% methanol in water)	0, 5 and 10 (%)

References

- [1] A.P. Fonseca, M. Cardoso, V. Esteves, *J Environ Anal Toxicol*, 4 (2013) 203.
 [2] S. Teixeira, C. Delerue-Matos, L. Santos, *Sci Total Environ*, 646 (2019) 168.