

Sensitive Preconcentration Coupled to Simple Chromatographic Method for Local Anesthetics Monitoring in Environmental Waste Water Samples [†]

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Abstract: Local anesthetics (LA) are a group of compounds used in medical practice to treat or relieve painful conditions. Our purpose was to achieve the simultaneous and sensitive determination of five LAs: Benzocaine (BNZ), Bupivacaine (BPV), Carticaine (CAR), Prilocaine (PRI), and Procaine (PRO) in wastewater. An off-line separation and preconcentration method, using a XAD-4 resin column followed by HPLC/UV quantification at $\lambda = 232$ nm, was developed to analyze LAs in environmental samples. The experimental design, data analysis, and desirability function calculations for the quantification were performed by using Stat-Ease Design-Expert Trial Version 8.0 software. From the initial 100 ml sample, 5 ml eluates were obtained, with no less than 95% of the mass recovery for each analyte, improving 19 times the methodology sensitivity. The observed HPLC retention times of BPV, CAR, PRI, PRO, and BNZ were 0.88, 1.99, 6.17, 6.92, and 12.27 min, respectively. The limits of detection (LOD) and limits of quantification (LOQ) of the studied LAs were between $2.47 \cdot 10^{-7}$ - $7.46 \cdot 10^{-7}$ ($\mu\text{g ml}^{-1}$) and between $8.06 \cdot 10^{-7}$ - $2.49 \cdot 10^{-6}$ ($\mu\text{g ml}^{-1}$), respectively. In all cases, the standard deviation was lower than 0.05 for intraday and interday precision. In conclusion, the sensitivity and selectivity of the proposed method offer a tool for the simultaneous screening and quantification of all the local anesthetics studied.

Keywords: local anesthetics; Benzocaine; Bupivacaine; Carticaine; Prilocaine; Procaine; HPLC/UV.

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Conflicts of Interest

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.