proceedings

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Abstract

Voltammetric Electronic Tongue for the Resolution of Ternary Nitrophenol Mixtures †

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† Presented at the 5th International Symposium on Sensor Science (I3S 2017), Barcelona, Spain, 27–29 September 2017.

Published: 13 December 2017

Nitrophenols have been widely employed in different applications from explosives to weight loss drugs but the main environmental problem is their generation as degradation products of common herbicides [1,2]. This work reports a quantification method for picric acid, 2,4-dinitrophenol and 4-nitrophenol using electrochemical sensing coupled with advanced mathematical processing; this approach is known as electronic tongue.

The array was formed by an epoxy graphite composite, gold, platinum and silver. The electrochemical technique employed was cyclic voltammetry in a phosphate buffer pH = 6.5. An electrochemical cleaning step was performed between samples to guarantee a steady and reliable response and to prevent any fouling of the electrode surfaces.

Artificial neural networks (ANNs) were the chemometric tool used for modeling as they allow a superior capability for non-linear information. In this particular case, the electrochemical data was compressed using Discrete Wavelet Transform and the resulting coefficients were fed to the ANN, the architecture of which was sequentially optimized. The resolution of the mixtures was achieved with a total normalized root mean square error (NRMSE) of 0.076 for the test subset, allowing a fast and acceptable detection of these nitroaromatic compounds.

Conflicts of Interest: The authors declare no conflict of interest.

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