Comparative Studies of Two Electronic Tongues for the Detection of Ethylphenols by MIP-Based and a Chemically Modified Sensor Arrays †

A. Herrera-Chacon, A. González-Calabuis and M. del Valle

This work reports the comparison of two different Electronic Tongues (ETs) approaches for the detection and quantification of the main chemical responsible of Brett character in wines, 4-Ethylphenol (4-EP), 4-Ethylguaiacol (4-EG) and 4-Ethylcatechol (4-EC).

On the one hand, a sensor array based on Molecularly Imprinted Polymers (MIPs) was designed to be individually selective for each of the analytes was used. These polymers were designed and synthesised using each of the analytes, respectively, as template molecules. Once they were obtained these materials were characterised and integrated onto the Graphite Epoxy Composites sensors (GECs). Then, the readout was done by Differential Pulse Voltammetry (DPV), optimizing previously the conditions.

The other sensor array was constructed by 5 modified-GECs and 1 GECs, as bare electrode. The different sensors were modified with Cu nanoparticles, WO_3 nanoparticles, Co phtalocyanine, Bi_2O_3 nanoparticles and polypyrrole. This choice was intended as to maximize the differences in the obtained voltammograms for the different sensors using cyclic voltammetry (CV) as electrochemical technique.

Once the sensor arrays were developed Principal Component Analysis (PCAs) were done in order to discriminate the phenols among other interferent species. Finally, Artificial Neural Networks (ANNs) were used for the quantification of these analytes in water samples in the case of MIPs-based sensor array and in wine on the other case.

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.