

Potentiometric sensor containing set of ion selective electrodes with lipid modified membranes for quality assessment of tested non-alcoholic beverages

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ABSTRACT

Potentiometric sensors may be a good tool for fast quality control of commercial drinks. In this work, such a sensor, containing a set of ion-selective electrodes with lipid-modified membranes (benzyl-hexadecyldimethylammonium chloride monohydrate, hexadecylamine, 1-dodecanol, elaidic acid, cholesterol) was used for discrimination and quality control of non-alcoholic beverages, mainly composed of sugar and citric acid. It was found that the electrodes stability, membrane reproducibility and sensitivity to acetic, hydrochloric and citric acid concentration were very good. On the contrary, ion selective electrodes were not sensitive to sweet substances (glucose, fructose, sucrose) concentration changes. The potentiometric sensor consisting of ion-selective electrodes was applied to commercially available non-alcoholic beverages, a reference drink and to di-component mixtures of sucrose and citric acid. A database of its responses to those mixtures was created. The possibility of using a “fingerprint” method for recognition and quality control of unknown beverages was discussed. The sensor responses to non-alcoholic beverages were transformed by principal component analysis and agglomerative hierarchical clustering analysis and compared to the results obtained with sensory analysis. The tested drinks can be divided into two groups of similar sour taste intensity (lemonades and orangeades). The beverage of low sour taste intensity and the non-carbonated drink were outside these groups. The obtained results show that the potentiometric sensor with lipid-modified ion-selective electrodes may be a useful tool for quality control of unknown drinks on the last step of a production line.

Keywords: Quality assessment; Potentiometric sensor; Ion selective electrodes; Lipophilic compound-polymer membrane; Non-alcoholic beverages; Principal component analysis; Agglomerative hierarchical clustering

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