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VII International Food Chemistry Symposium

The theoretical description for CoO(OH)-assisted electrochemical determination of sucralose and perillartine in beverages over hydroquinonic conducting polymer

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Perillartine (Fig.1) (perillaldehyde *anti*-aldoxime) is a natural sugar, extracted from Japanese perilla (shiso) leaves. Being considered twice as sweet as sucralose, mentioned below, four times as sweet as saccharine and 2000 times as sweet as sucrose, it may serve as a viable alternative to synthetic sweeteners. It may be used alongside with its ether adduct (Fig. 1):

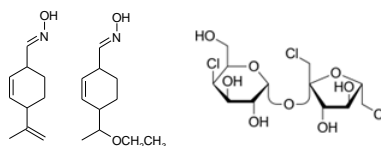


Figure 1. Perillartine, its ether derivative and sucralose

Nevertheless, it may be allergic for people allergic to shiso herb. Also, some toxic nitrogen derivatives like hydroxylamine may form during its metabolism in some people. Thus, the development of an efficient, exact and rapid method for perillartine determination is really actual task, and the electroanalytical methods would give it a good service.

As for sucralose (Fig. 1 to the right) is an extremely stable artificial sweetener up to 1000 times as sweet as common sugar. Its effects on human and animal organisms hasn't been completely studied yet. Moreover, being hardly metabolized, it is accumulated in the environment. A recent 2023-dated study has shown that the use of sucralose by pregnant women can influence the neonates' gut microbiota. Also, the organisms capable to metabolize it transform the sucralose transform it into toxic chloroorganic derivatives like dioxines and tetrachlorodibenzofurans.

Moreover, sucralose may be added in the double dose to mimic perillartine presence in the products, pretending to be Japanese. For this reason, the sucralose and perillartine determination is also actual, and the development of an electrochemical sensor, modified by conducting polymers is very suitable for this purpose.

In this work, the possibility for sucralose and perillartine electrochemical determination over poly(5-amino-1,4-naphthoquinone) is given. It is shown that the neutral medium is the most convenient for perillartine electrochemical determination on this conducting polymer, due to the less expressed ionization of both of the analytes. Nevertheless, the behavior is expected to be more dynamic than on CoO(OH). The analysis of the correspondent mathematical model confirms the efficiency of the electroanalytical process in the detection of both of the sweeteners in beverages. This process may be used in either food quality tests or in food falsification investigation.

1st to 3rd of November 2023

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