

ADVANCES IN THE DETERMINATION OF BIOGENIC AMINES

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Biogenic amines (BAs) are low molecular mass nitrogenous compounds with aliphatic (e.g., spermine, spermidine, putrescine, cadaverine), heterocyclic (e.g., tryptamine, histamine) or aromatic (e.g., phenylethylamine, tyramine) structures. Small amounts of BAs are synthesised in plant and animal cells, while larger quantities are found as a consequence of microbial metabolism in a wide range of fermented foods such as fermented sausage and fish products, cheeses, fermented vegetables, and beverages. Meanwhile, their contents in food samples varies to a great extent, and are strongly dependent on the composition, microbial flora and fermentation conditions. Therefore, the analysis of BAs is important as indicator of degree of food freshness or spoilage as well as to evaluate their toxicological risks. The analytical determination of BAs is challenging, mainly due to the fact that BAs are relatively polar compounds, making them extraordinary difficult to be extracted using the traditional organic solvents. Many of the BAs also lack the intrinsic structures for substantial absorption for the normal UV or fluorescence detection.

Over the years, our group had been developing analytical methods to meet the afore mentioned challenges. The main advances are in the area of sample pretreatment as this is the bottleneck in the entire analytical step. Strategies to achieve this include the use of specialised sorbents coated with crown ethers and hydrazones. These sorbents offer unique selectivity for certain types of BAs. Another interesting approach was the *in-situ* derivatization and extraction based on hollow-fibres liquid phase microextraction. This technique deserves special mentioning as it provides a new paradigm shift in measurements as it not only uses minute amounts of extracting solvents (~ 5 μ L) but the extraction and derivatization are feasible in a single step!

From the environment point of view, there is also much concern on the role of BAs as potential precursors for the formation of highly carcinogenic N-nitroso compounds. Towards this end, we have developed a capillary electrophoresis method using capacitively coupled contactless conductivity detection for the simultaneous determination of BAs in environmental water,

including seawater. This method enables the simultaneous determination of BAs without the need for derivatization. Results on the analysis of BAs on selected Malaysian products such as fermented fish, sauce, etc will be shared.

Keywords: biogenic amines, sample pretreatment, food and environment analysis

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