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Stability of dithiocarbamates during the preparation and extraction of food samples

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Dithiocarbamates are preferred fungicides for fruits and vegetables due to their strong efficiency and their relatively low human toxicity while being produced quite cheap. However, their concentration in food has to be controlled by law, because several degradation products show gene toxicity and carcinogenicity. This is currently carried out by the concentration of CS_2 after acid hydrolysis. Because of the poor solubility and great instability of the dithiocarbamates, there is presently no simple digestion method available. When determining the CS_2-concentration, dithiocarbamates are recorded as total parameter [1]; this does not respect the varying toxicities of the individual dithiocarbamate classes. The last published EU regulation 2007/57/EG also underlines the need for a specific analytical method. Till now specific methods are available for only a few dithiocarbamates [2-3]. Therefore, a method of selective and sensitive detection was searched. In this regard, experiments with plant matrix were made to find reliable information about the degradation of dithiocarbamates during the clean-up procedure.
The experimental parameters of this study are based on the analytical approaches using high performance Ion Pair Chromatography with UV detection [4]. Within this study several experiences were made: Standard solutions should be set up every day anew. Filters retaining (earth) alkali components have to be avoided for the sample preparation. When processing the assays both cysteine and an alkaline pH-value of at least ten avert too fast degradation of the dithiocarbamates. Freezing the assays causes a very fast degradation of the ingredients. Dehumidified assays partially offer a longer stability than fresh ones. Applying dithiocarbamates onto assays in order to educe them via surface extraction leads to a continuous decomposition of the ingredients. These experiences and derived rules are quantitatively described by calibration functions and particular degradation curves for the particular compounds.
In summary we did not succeed in establishing a new method for the specific determination of the dithiocarbamates but we can supply additional information and experiences that might be usefull on this way.

References

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