SUMMARY

Lipoic acid is necessary to obtain a full human connection. Unfortunately, the amount produced by man is not always sufficient, which is why lipoic acid should be supplied to the mechanism from the outside. Food is the second, in addition to de novo synthesis, source of this compound. The information included in the content of the compound in question in consumed products is extremely important. No data on the research of Polish food products were found in the available literature.

The literature part presents the characteristics of the tested compound, its physical and chemical properties. A separate chapter is devoted to discussing biological functions, metabolism and the use of lipoic acid, including in medicine and cosmetology. Natural synthesis processes are discussed and laboratory methods for obtaining the analyte and its occurrence in food products. Particular attention was paid to the methods of secretion and techniques for determining lipoic acid in biological samples, foodstuffs, as well as in dietary supplements. The process of modifying the lipoic acid molecule to make the form of the substance to be tested compatible with the detector was also described.

Based on the review of the literature, it was found that there is no one perfect method for determining lipoic acid, therefore in this PhD thesis an attempt was made to develop a simple method for determining this compound in samples of food products and dietary supplements. The developed procedure consists from the following stages: homogenization, extraction, derivatization and final assay. Due to the absence of an acid molecule in the fluorophore and chromophore moieties, the lipoic acid required modification through the derivatization process. The analytical suitability of derivatizing reagents such as 2-chloro-1-methylquinolinium tetrafluoroborate (CMQT), 2-chloro-1-methylpyridinium iodide (CMPI), 2,4′-dibromoacetophenone (DBAF) and 4-methoxybenzyl alcohol (4-MBA) not yet used in lipoic acid (LA) analytics. Sodium borohydride ($NaBH_4$) was used to obtain the reduced form of lipoic acid. ^1H NMR, IR, MS and absorption spectra of the analyzed compounds were recorded. The parameters of individual stages of the determination methods have been optimized. The best conditions for creating a derivatization reaction product were selected, i.e. environment reaction, time and temperature of the process, amount of derivatizing reagent added. The obtained derivatives were used to develop new spectrophotometric and chromatographic methods for determining lipoic acid.

The range of linearity, determination coefficients, repeatability, limit of quantification and detectability of individual methods were determined. The practical usability of the developed methods were checked by determining the content of lipoic acid in food samples and dietary supplements based on spectrophotometric and chromatographic techniques with UV detection (HPLC-UV) and GC-MS.

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