

INTEGRATED METHODS FOR ANALYSIS OF BIO-ACTIVE COMPOUNDS BY THIN-LAYER CHROMATOGRAPHY AND DIFFERENT SPECTRAL TECHNIQUES

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ABSTRACT

This thesis presents a survey of selective scientific activity developed over the last 16 years, containing exclusively the results obtained after the PhD thesis (1999) and a brief description of perspectives and directions of future research. All the aspects represent an overview of references listed at the end of thesis, including the ISI articles in which I am the author/co-author (36).

The thesis is structured on two parts:

Part A: Scientific achievements

Part B: Perspectives and future research directions

Part A: Scientific achievements

This part contains the main research results and is structured on three chapters.

Chapter 1. Analysis of bio-active compounds from drugs. This chapter begins with the presentation of a developed method for separation of *N*-alkyl phenothiazine sulfones by high performance thin-layer chromatography (HPTLC) using an optimum mobile phase. This was a challenge because these compounds have very similar structures and they differed only by one carbon atom. Then, it continues with the study of the influence of three descriptors set - dipole moment, polarizability, and surface area - in solute retention of three series of phthalazines derivatives, which are different in terms of their radicals. As a continuation of the researches carried out during the development of PhD thesis, the optimization and the modeling of the separation of five androstane isomers is presented. In this chapter, a special attention is dedicated to the separation of vitamins. First, the HPTLC coupled with Raman spectrometry were used for obtaining a suitable method for identification of hydrophilic vitamins from different samples. The second achievement was to develop a TLC with stationary phase gradient method useful for the separation of water-soluble vitamins. Also, the development of TLC method for quantification of tocopherols content from vegetable oils produced in Romania was performed.

Chapter 2. Analysis of natural antioxidant compounds from various samples. This chapter presents the separation and identification of some nitroxidic derivatives of nicotinic and *iso*-nicotinic acid by HPTLC coupled with electronic paramagnetic resonance (EPR), the assessment of antioxidant activity by TLC/HPTLC investigations and the influence of various factors (intermittent heating during the maceration, variety of same type of samples, processing methods) on antioxidant activity. These obtained results provides premise that TLC could be used to determine the antioxidant activity of various sample, this being the goal of our researches.

Chapter 3. Fingerprinting and authentication of some food These results are a natural continuation of those presented in chapter 2. Integrated methods were used for the following: fingerprinting and authentication of teas, including teas from *Camelia sinensis (L.)* and red fruits teas; authentication of honey in terms of floral origin and content of sugars; analysis, classification and fingerprinting of some Romanian red or white wines. The obtained results proved the potential of TLC/HPTLC, alone or together with other techniques, to be used for authentication of food and, also, for detection of counterfeit products.

Part B: Perspectives and future research directions

This part includes the perspectives and further research directions. Considering that in recent years a tremendous growth in the use of plants in the pharmaceutical and food industries have occurred and the demand for analytical methods to ensure quality and safety of products is rapidly increasing because new products enter in the market almost daily, I intend to extend the following directions: development of integrated methods for the analysis of phyto-pharmaceutical products, development of integrated analysis methods useful for authentication and for detection the adulteration of different food products and testing the influence of technological processes on bioactive compounds in various products. Also, in this part the expected results and the added value of research results are presented.