

Doctoral thesis abstract

„Industrial research on the synthesis of selected micronutrient chelates for their application in agriculture”

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The fertilizer industry is extremely important for the entire economy, because providing proper nutrition of plants is a key for obtaining crops with high quantity and their quality. Not every cultivated areas have soils rich in the necessary micro- and macroelements, therefore, deficiencies should be fixed with appropriate fertilizers. Regulations and greater society awareness cause that micro-nutrients must not only provide properly available forms of micronutrients, but also remain neutral to the environment.

As part of the doctoral dissertation, a literature review was carried out in terms of testing the compounds used in agriculture biodegradability methods, and the current knowledge on the biodegradability of commonly used products in agriculture was collected and systematized. In addition described methods of synthesis of the currently used ligands in fertilizers were analyzed and discussed, in particular those covered by patent law. Moreover, the processes taking place in plants with the participation of Cu, Mn, Zn and Fe microelements were investigated.

The aim of this research was to find alternative ways of synthesizing the ligand belonging to the polyaminocarboxylic group. As part of the research, expected products were obtained, initially at the laboratory stage, and then the synthesis was scaled up. Another element of the work was the synthesis of complexes with the abovementioned microelements. For obtaining the chelates both synthesized ligands and a commercially available ligand were used. Selected coordination compounds were characterized, and iron chelates were tested for the stability in high pH of the soil and then tested on peppers grown in alkaline soil. The work was carried out under the "Doktorat Wdrożeniowy" program, hence the economic aspects of the proposed methods were also discussed and its potential for implementation in Intermag Sp. z o. o. company.