

# Doctoral Thesis

## CONTRIBUTION TO THE STUDY OF THE BIOMATERIALS DRYING BY ATOMIZATION PROCESS

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### Abstract

The present doctoral thesis approaches a large interest theme, that of the spray drying of biomaterials and also the thermo and xero stability of these materials.

This subject is very important because the issue of biomaterials spray drying is a complicated one, due to the maintaining of the biologically active properties in products during the drying process.

The experimental research consists in:

- the characterization in terms of active principle (vitamin C) thermodegradation contained in wild rose fruits during the drying process by obtaining experimental data used to develop polynomial empirical equation for calculating the constant degradation of vitamin C;
- the determination of the necessary parameters for the elaboration of the mathematical model of spray drying, that enables the maintaining essential characteristics of the biomaterials.

The objectives of this doctoral thesis are:

- ✎ *literature study on biomaterials classification, biomaterials drying processes and spray dryers types used in industry;*
- ✎ *identification of process factors involved in biomaterials drying by intensive processes;*
- ✎ *classification of mathematical modeling methods applied to the case of biomaterials spray drying with the reviewing the types of modeling methods;*
- ✎ *active principle thermodegradation (vitamin C) during the drying process and obtaining experimental data and an empirical equation for calculating the constant degradation of vitamin C, using two different state of biomaterials;*
- ✎ *developing a mathematical model for the spray drying of biomaterials, applied for wild-rose extract;*
- ✎ *calculation of heat and mass transfer coefficients for aqueous solution of wild-rose extract;*
- ✎ *solving the system of equations expressing the heat and mass transfer for droplet using Excel program;*
- ✎ *developing the mathematical model for spray drying using ECANSE software and utilization of this program in the case of bovine serum albumin.*

The modeling of the drying process is used to know the obtained biomaterials characteristic according to the characteristics of wet material, the type of equipment and drying process parameters. Using the model can be obtaining an expert system; this allows the selection of the most suitable technology and technological parameters to obtain a dried product, with required characteristic.