

# ABSTRACT

Charles University, Faculty of Pharmacy in Hradec Králové

Department of: Pharmaceutical technology

Consultant: PharmDr. Petra Svačinová, Ph.D.

Student: Nikola Pavelková

Title of Thesis: Effect of temperature and solution concentration  
on the properties of spray-prepared lactose using  
the nozzle with diameter of 2 mm

Spray drying is a method used in various industry fields. The principle is the conversion of a substance in the liquid state into solid dry particles. By spray drying it is possible to obtain a suitable product with the desired properties, which depends on the various process parameters. The aim of the work is to determine the influence of temperature and concentration of the solution on the properties of spray-prepared lactose using a nozzle with a diameter of 2 mm. Solutions of 15 % and 20 % lactose were prepared and dried at inlet temperatures of 150 - 210 °C. The shape and size of obtained particles were examined by optical microscopy. Thermal properties were evaluated using differential scanning calorimetry.

At 15 % concentration, most of the spray-dried lactose particles occurred in the size range 2,5 - 5 µm and 5 - 7,5 µm. At a concentration of 20 % it was between 2,5 - 5 µm. For both concentrations the minimum numbers of particles were smaller than 2,5 µm and larger than 15 µm. Comparing the particle sizes between the concentrations at individual temperatures, in most cases, larger average sizes were obtained for the 15 % solution. During spray drying, the inlet temperature had no significant effect on the particle size. All particles were spherical with a smooth surface. The thermal characteristics showed that after the first month of evaluation, the particles contained an amorphous component, which was reflected on the thermograms by a glass transition. No glass transition was observed after the sixth month, as crystallization of the amorphous portion occurred during storage. The melting point of prepared samples ranged from 215,7 to 219,7 °C after six months, which corresponds to the melting point of alpha-lactose.