

ABSTRACT

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Title of Doctoral Thesis **Evaluation of the influence of filler sort and lubricant type and concentration on the parameters of the compaction equation**

This thesis is dealing with an evaluation of the compaction process of pharmaceutical excipients and their mixtures. The effect of the filler type, lubricant type and its concentration on the parameters of the compaction equation developed by Assoc. Prof. RNDr. Milan Řehula, CSc. is studied.

Microcrystalline cellulose Avicel PH-200, lactose Lactochem Fine Crystals and calcium hydrogen phosphate dihydrate Emcompress were used as model fillers. These fillers of similar particle size were selected because of different bonding mechanism and varying course of the compaction process. Fillers were evaluated individually and then in their blends with lubricants magnesium stearate, sodium stearyl fumarate and Syloid, i.e. modified colloidal silica in concentration 0,5 and 1 %. Moisture content and flow properties were determined in individual fillers. Particle size distribution, scanning electron microscope pictures and specific surface area measurements were performed for all used excipients.

Flowability of the prepared mixtures of fillers and lubricants was also measured. Tablets were prepared from individual fillers and their mixtures with lubricants, the course of compaction process was studied using the compaction equation and tablet hardness was determined. Diffractograms of individual fillers were compared with diffractograms of the tablets prepared from these fillers using two compaction forces and with the crushes of these tablets.

The conclusions confirmed that this compaction equation is capable of distinguishing the effects of the different filler types, and the type and concentration of added lubricant. The influence of the individual lubricants on the flow properties, the parameter values of the compaction equation and the properties of prepared tablets were described. Magnesium stearate appears to be the most active one from used lubricants, because it affected most significantly the flowability of the prepared mixtures, the course of compaction process and the tablet hardness. It was found that Syloid had similar or even greater effect than magnesium stearate on some parameters of the compaction equation (e.g. a_2 , a_3 , $1/t_1$ and $1/t_3$). However this similar effect is often achieved only at higher concentrations of Syloid in the comparison with the magnesium stearate. The increase of hardness of tablets prepared from mixtures with microcrystalline cellulose was another positive effect of Syloid.