

# Abstract

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Title of Doctoral Thesis        Influence of lubricants on viscoelastic parameters of  
compaction process

This thesis deals with an evaluation of lubricant's influence on viscoelastic parameters of compaction process. The force-displacement record and stress relaxation test were used for this evaluation. This study evaluates the viscoelastic parameters on three fillers intended for direct compression, i.e. microcrystalline cellulose Avicel PH-200, lactose Lactochem Fine Crystals and calcium hydrogen phosphate dihydrate Emcompress. Magnesium stearate and modified colloidal silica Syloid were used as lubricants at concentrations of 0.5 % and 1 %. Particle size and shape and specific surface area were determined for all used excipients. Flow properties were studied for individual fillers and also for their mixtures with lubricants. Subsequently, tablets were compressed from fillers and mixtures using force-displacement record and stress relaxation test, and viscoelastic parameters were evaluated. The applied compression forces for both methods were 5 kN, 10 kN and 15 kN. The hardness of tablets was measured.

The results show that both of used lubricants influence the parameters of force-displacement record and stress relaxation test. Both lubricants also affect the flow properties and the properties of compressed tablets. Magnesium stearate primarily improves the flow properties of powders, but has a negative effect on the plasticity and hardness of tablets. Syloid has better effect on the energy usable for the formation of bonds and also on the elastic energy released after compression. Compression pressure affects the ratio of individual energies. The most significant difference in stress relaxation test is between polymeric microcrystalline cellulose on one hand and brittle lactose on the other hand. Magnesium

stearate mostly increases the action of elastically deformed particles and also the final plasticity of microcrystalline cellulose. The influence of Syloid on elastic parameters is dependent on the compression pressure and the concentration, however plasticity is mostly increased. In the case of lactose, both lubricants decrease the elastic and plastic parameters. Calcium hydrogen phosphate is the least affected filler by presence of lubricants, although different effect of magnesium stearate and Syloid especially on plasticity parameters could be observed. It was also found that Syloid has less negative effect on the hardness of tablets.