

ABSTRACT

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Title of Thesis: The influence of the tableting speed on the parameters of the stress relaxation test

This diploma thesis evaluates the influence of tableting speed on the viscoelasticity parameters of stress relaxation test and tensile strength of tablets. Microcrystalline cellulose Avicel[®] PH-200, lactose monohydrate SpheroLac[®] 100, calcium hydrogen phosphate dihydrate Di-Cafos[®] D 160 and potato starch were used as model excipients and magnesium stearate was used as lubricant.

The theoretical part is devoted to informations about tablets as a dosage form and description of excipients, which were used in experimental part. Subsequently, plasticity and elasticity of material were characterized and methods of their evaluation were described. The stress relaxation test and its evaluation using the three exponential equation were characterized in more detail. The following chapters describe the influence of tableting speed and lubricants on tensile strength of tablets.

The experimental part deals with viscoelastic properties of individual materials and their mixtures with lubricant at concentration of 1 %. These properties were evaluated using the stress relaxation test. Tablets were compressed by compression forces of 10 kN with constant dwell time 180 s. The dependence of elasticity parameters A_{1-3} and plasticity parameters P_{1-3} on tableting speed 0,1; 0,25; 0,5; 1 and 2 mm/s was evaluated. Further, the tensile strength of tablets was evaluated. The highest tensile strength was measured in the tablets prepared from microcrystalline cellulose. The lowest tensile strength was measured in tablets prepared from lactose monohydrate. By addition of lubricant the strength of tablets from used material decreased, only the strength of tablet prepared from calcium hydrogen phosphate dihydrate increased. With increasing tableting speed the tensile strength in most cases increased.

Parameters of the stress relaxation test were reduced in most cases after the addition of lubricant. With increasing tableting speed, the plasticity parameters P_{1-3} and the elasticity parameters $A_{2,3}$ decreased for all fillers, except of lactose, where all the elastic parameters increased. No direct correlation between the tableting speed and the viscoelastic parameters was found in the case of calcium hydrogen phosphate dihydrate.