

## Abstract

This thesis deals with the characterisation of a specific compression process by monitoring the viscoelastic properties of pressed material.

The theoretical part of the thesis describes the substances – microcrystalline cellulose and magnesium stearate. It also describes methods for the assessment of tablet viscoelasticity using the force-displacement diagram and factors influencing the viscoelasticity of tablets.

The aim of the experimental part of the work is to characterise the viscoelastic properties of microcrystalline cellulose as well as a mixture of microcrystalline cellulose and magnesium stearate lubricant of various lubricant concentrations using the force-displacement diagram and calculation of tablet relaxation. Tablets were pressed from a mixture of aggregates of microcrystalline cellulose and magnesium stearate lubricant using a T1-FRO 50 machine at 11 molding pressures in the range of 1,9 -113,0 MPa with lubricant concentration in the range of 0 % - 2,50 %. The height and diameter of each tablet were measured immediately after pressing and the measurements were repeated 24 hours later. Measurements determined viscoelastic parameters  $E_1$ ,  $E_2$ ,  $E_3$ ,  $E_{lis}$ , and  $P1$ , and the volumes of the tablets, both at time 0 and after 24 hours.

The result of the study was to determine the effect of pressing pressure and lubricant concentration on pressing energy and tablet relaxation. Parameters  $E_1$ ,  $E_2$ ,  $E_3$ , and  $E_{lis}$  increase with increasing pressing pressure. With increasing pressing pressure, parameter  $P1$  and tablet relaxation first increase, then reach a maximum and decrease. Parameters  $E_1$ ,  $E_2$ ,  $E_{lis}$  and  $P1$  decrease with increasing lubricant concentration. In contrast, parameter  $E_3$  increases at first and then remains constant. Tablet relaxation increases with increasing lubricant concentration.