

ABSTRACT

Alston, Kristine M. M.S.M.E., Purdue University, May 2012. Mechanical Property Variability in Lactose Monohydrate. Major Professor: Carl R. Wassgren, Jr., School of Mechanical Engineering.

This thesis work seeks to identify the level of inter-lot and inter-manufacturer variability present in the mechanical properties of two grades of α -lactose monohydrate obtained from two vendors. In addition, the lot-to-lot variability in a novel excipient, LubriTose SD, composed of spray-dried lactose monohydrate co-processed with distilled glyceryl monostearate, was also assessed. Several particle, powder, and compact level properties were measured on samples obtained from two to three lot numbers for each product. The particle level properties measured are particle size distribution and apparent density. The powder level properties include the poured and tapped bulk density, as well as shear cell parameters, such as the effective angle of internal friction and the powder flow function. The compact level properties measured include the elastic modulus, tensile strength, and critical stress intensity factor.

The overall lot-to-lot variability was small for Pharmatose and Foremost products, with the exception of Foremost 310, which demonstrated significant lot-to-lot variability in the powder flow function obtained from shear cell measurements. Small differences were observed from vendor-to-vendor, particularly for compact-level properties. Additionally,

LubriTose SD was shown to produce improved flow properties at the cost of reduced tensile strength and critical stress intensity factor. However, the extent to which the variability observed from vendor-to-vendor is significant in terms formulation functionality, is likely dependent on the critical quality attributes of the formulation in question.