

ABSTRACT

Ndamba, Tona. M.S., Purdue University, May, 2007. Effects of Moisture and Temperature on Strength of Pharmaceutical Incipient Tablets. Major Professor: Martin Okos.

This study is aimed at investigating the effects of humidity and temperature on the strength of powder compacts. The powders under study were α -monohydrate lactose, starch and MCC. Batches of each powder were prepared containing 0, 3, 6, 12 and 17% Moisture content (MC). Ten tablets were compressed into compacts for each batch and then allowed to dry. Compact strength was determined of the dry compacts and SEM images were taken.

Results have shown that for lactose, MCC and starch the compact strength increased as the initial MC increased. The compacts' strength for all 3 powders studied reached a critical value, and either decreased or remained constant as the MC further increased. The approximate critical initial MC values were 3, 12 and 15% for Lactose, MCC and starch respectively. Compact strength showed a significant increase at higher drying temperature.

Sorption isotherms of α -lactose monohydrate, MCC and corn starch were all compared and the results indicated a much higher sorption capacity for corn starch, which reached an average value of total moisture gained of 0.18 mg/mg (dry basis). MCC and lactose average of the total moisture gained was 0.10 mg/mg and 0.0009 mg/mg (dry basis) respectively. All three powder samples tested showed slower water uptake rates during the adsorption cycle below 20% RH and higher above 20% RH. Powder samples

containing highest moisture sorption capacities gave rise to stronger compacts, indicating a possible correlation between water sorption capacity and compacts' strength

