Thesis Title The Application of Force-Displacement Measurements on Prediction of Tableting Characteristics and Tablet Properties.

Name Damrongsak Faroongsarng

Degree Master of Science (Pharmacy)

Thesis Supervisory Committee

Ampol Mitrevej, Ph.D.

Narong Sarisuta, Ph.D.

Sunalinee Nikrothanonta, Ph.D.

Sarmardh Aungsusingh, D.Sc.(h.c.)

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ABSTRACT

The remote-site transducers and analog-to-digital computer (ADC) were applied for compression force, lower punch force and upper punch displacement measurements. The ADC data showed acceptable measurements of all variables.

Four directly compressible fillers, i.e., microcrystalline cellulose (MCC), pregelatinized starch (PGS), modified rice starch (MRS) and dibasic calcium phosphate (DCP) were solely compacted and compressed with hydrochlorothiazide (HCTZ) at various compaction loads on an instrumented tablet press. The tablet densifications established using Heckel and lower punch work (LPW) were

determined. There was almost linear relationship between compression force and LPW. The densification results illustrated that MCC, PGS and MRS exhibited plastic deformation under compression whereas DCP and HCTZ were brittle fracture materials. Among plastic materials, PGS also revealed a considerably illustrated elastic deformation. In the cases of HCTZ tableted with MCC, PGS or MRS, the total deformation of such a binary mixture may be predicted by the summation of weight fraction of either component.

The physical properties of tablets obtained were routinely evaluated. The results showed a controllable weight variation and tablets thickness at each compression load whereas the tablet friability was considerably high especially within the range of low compression force. Disintegration time and tablet hardness were increased with an increase in compression force as well as LPW in all cases. It was found that the relationship between LPW and tablet hardness seemed to be more linear and predictable than the compression force-hardness profile.

In order to study the dissolution behavior as a function of some other tablet properties, the area between dissolution curve and 100 % dissolved level, called cumulative undissolution time product(CUP) was introduced instead of dimly seen dissolution-time profiles. There was

an increasing trend of CUP value with an increase in compression force, LPW, surface area of HCTZ itself and the plastic deformation tendency of filler. However, the HCTZ-DCP tablet series was not the case since tablets dissolved without prior disintegration during dissolution process.