



**EVALUATION OF RHEOLOGICAL PROPERTIES OF WET POWDER MASSES USED IN THE
PREPARATION OF PELLETS BY EXTRUSION/SPHERONIZATION**

S. Majidi^a, G. H. Motlagh^{a,*}, I. Haririan^b, B. Kaffashi^a

^a Department of Chemical Engineering, Faculty of Engineering, University of Tehran, Tehran, Iran and ^b Department of Pharmaceutics, Faculty of pharmacy, Tehran University of Medical Science, Tehran, Iran

*Corresponding author: ghmotlagh@ut.ac.ir

Extrusion is currently used for the production of spherical pellets by spheronization in the pharmaceutical industry. The range of materials suitable for extrusion and spheronization is extremely narrow, suggesting specific rheological requirement for the process. In this study, the rheological properties of wet powder masses suitable for the preparation of pellets were measured by ram extrusion. The studied compositions were mixtures of microcrystalline cellulose (MCC), sucrose, lactose and starch with varying water content. A ram extruder was used as a capillary rheometer to draw flow and viscosity curve for each wet mass under different extrusion rates and die geometry. Shear thinning behavior was observed for the wet masses. The wall shear stress decreased with increasing water content. Variation of shear stress with shear rate decreased when the water content increased. A statistical model was derived that could describe the rheological properties of the wet masses. For a majority of formulations water separation and migration occurred during extrusion which led to uneven water content in the extrudate. The effect of extrusion condition, including extrusion speed, die geometry and water content on the occurrence of water migration during extrusion of wet masses was investigated. The extent of water separation with time was determined directly from drying the extrudates. It was found that higher extrusion speed and water content cause less water separation while no significant effect was observed for the die length.