Determining Wet Granulation End-point for Microcrystalline Cellulose (MCC, Avicel® PH 200) Prepared using Two Different Grades of Binder Polyvinylpyrrolidone (Kollidon® 90F and Kollidon® 30) using Thermal and Powder Rheological Analysis

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**Purpose**
MCC is commonly used as a diluent and PVP K90 and K30 are commonly used binders in the wet granulation process. The purpose of this study is to determine the effect of molecular weight of binders on the end-point of wet granulation and evaluate their powder properties.

**Methods**
600gms of MCC-200 was granulated using 5% w/w of PVP K90F and K30 binder solutions. Samples granulated were collected and characterized after addition of 40%, 45%, and 50% w/w (For K 90F) and 45%, 50% and 55% w/w (For K 30) respectively. Powder Rheometer (FT-4) was used to determine Basic Flowability Energy (BFE), Specific Energy (SE) and Pressure drop. Samples were also subjected to Differential Scanning Calorimetry (DSC) and thermal effusivity measurements.

**Results**
BFE was determined to be 1052mJ, 1403mJ, 5102mJ at 40%, 45% and 50% w/w and 698mJ, 916mJ, and 3855mJ at 45%, 50% and 55% w/w of binder solution of K90F and K30 for wet granules respectively. SE was determined to be 8.93mJ/g, 17.8mJ/g, 11.9mJ/g at 40%, 45% and 50% w/w and 7.69mJ/g, 12.6mJ/g and 21.7mJ/g at 45%, 50% and 55% w/w of binder solution of K90 and K30 respectively. Pressure drop for 40% and 45% is high compared to 50% w/w and similarly 45% and 50% is higher than 55% w/w of binder solution using K90F and K30 binder solutions respectively. Hence, high permeability for 50% and 55% was observed due to formation of better granules. Effusivity of wet granules increases drastically after 50% w/w and 55% w/w for K90F and K30 binder solutions respectively due to conversion of granules into wet mass. DSC results showed increase in enthalpy with the increase in granulating fluid in both the cases. By looking at the BFE, SE and pressure drop data it was found that the optimum end point for MCC 200 using 5% w/w PVP K90F was at 50% w/w and for K30 it was found to be at 55% w/w.

**Conclusion**
This work shows a different method to analyze wet granulation end point and would be helpful for pharmaceutical scientist to obtain an optimum region for end-point using different grades of binder with varying molecular weights.