

# A Continuation of Exploring the Connection Between Particulate Composition and Mean Granule Size

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## Introduction

The process of high shear granulation has been consistently used in the pharmaceutical industry for hundreds of years to produce tabulated medicine. This continuing experiment seeks to further deepen the understanding of different compositions of a powder bed containing microcrystalline cellulose and acetaminophen and the resulting impact on granule size.

## Method

Different mixtures of microcrystalline cellulose and acetaminophen ranging from 100% microcrystalline cellulose to 100% acetaminophen in 10% increments were examined. Each mixture was granulated at a liquid addition rate of 10 mL/min for 32 minutes to achieve a liquid/solid ratio of 110%.

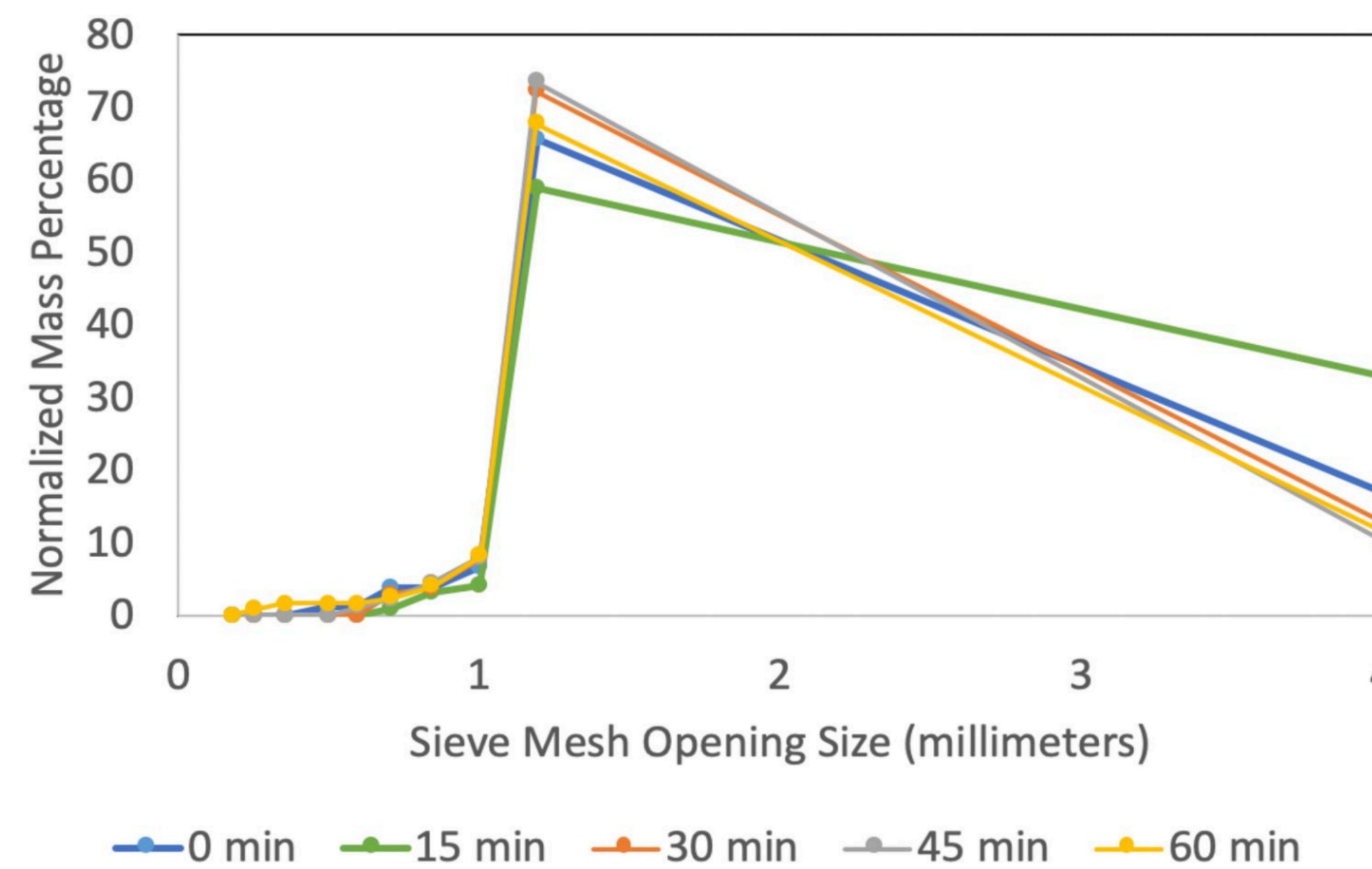


Figure 5: Granulation of 100% MCC at Different Mixing Times

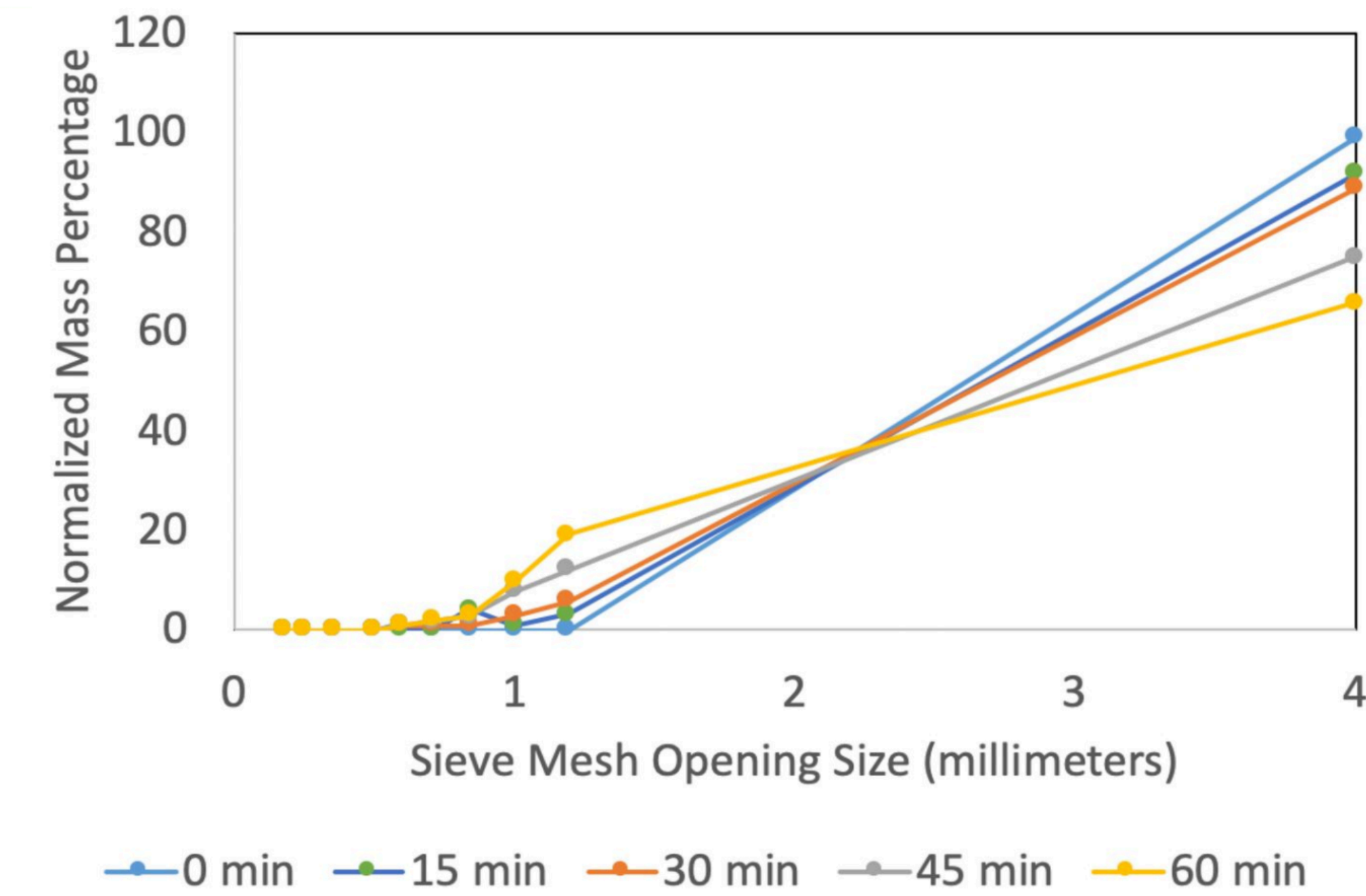


Figure 6: Granulation of 40% Acetaminophen at Different Mixing Times

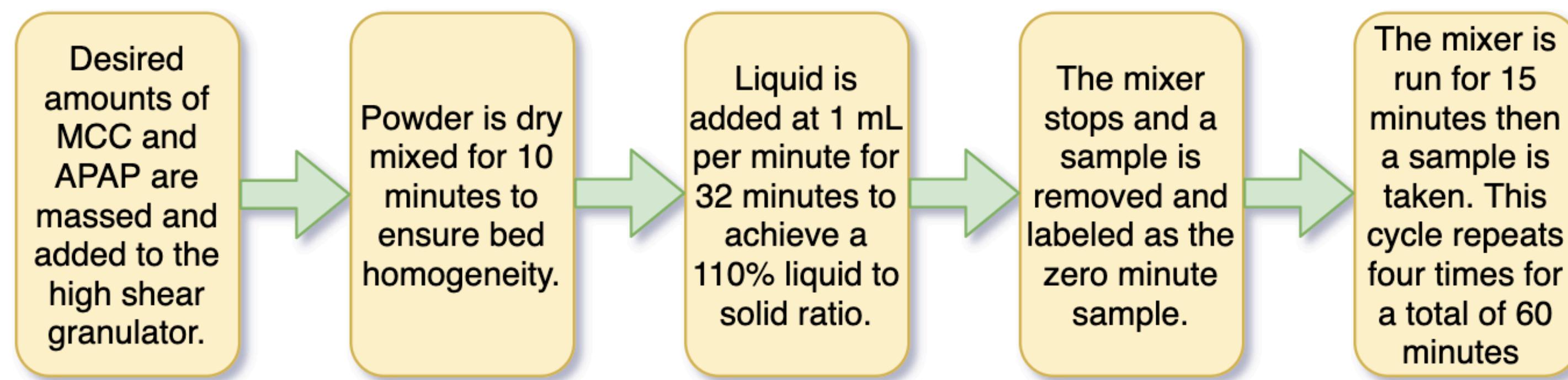


Figure 1: Granulation Procedure

## Results

- Compositions with higher microcrystalline cellulose content resulted in more desirable granule sizes as most of the granules at any point in the granulation process were around 1 millimeter and large agglomerates were less common.
- As acetaminophen content increases, its hydrophobic property causes water to sit on the surface of the particles, which resulted in many granules becoming large agglomerates, which are undesired.
- Optimum mixtures of microcrystalline cellulose to acetaminophen were determined to be around 80%-90% to maintain the desired granule size (similar to those produced by the granulation of microcrystalline cellulose) while containing enough acetaminophen for a proper dosage.

## Going Further

Future research should be performed on two hydrophilic and two hydrophobic substances.



Figure 2: Experimental Setup Figure 3: 100% MCC Resulting Granules Figure 4: 60% MCC Resulting Granules