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AN APPLICATION NOTE

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CALEVA

# THE MINIMUM USABLE BATCH SIZE IN THE CALEVA VARIABLE DENSITY EXTRUDER

How small can my granulation sample be to produce extrudate?



## MINIMUM USABLE BATCH SIZE IN THE CALEVA VARIABLE DENSITY EXTRUDER

### INTRODUCTION

Several customers who are considering the Caleva Variable Density Extruder (VDE) are asking more and more frequently about the use of the VDE for very small batches when used in the axial mode. In order to respond to these questions a series of small batches were extruded through the VDE and the percentage recovery was measured.

### METHODS

A mix of microcrystalline cellulose (Avicel – pH 101) was mixed for five minutes in a planetary mixer with water at a ratio of 1 to 1.1. The resulting mix was stored in bulk overnight in a refrigerator and then samples were taken with different batch sizes.

The extruder was run at 70 rpm. Extruders seem to work better when slightly starved of material and the Variable Density Extruder from Caleva is no exception to this, consequently the product was added at a slow rate. The samples were weighed out from the bulk mix as needed and batches with different weights were passed one at a time through the Variable Density Extruder. The extruder was cleaned and dried between extrusion runs.

All trials were completed using the axial configuration only with a 1 mm diameter and 1 mm depth hole die.



## MINIMUM USABLE BATCH SIZE IN THE CALEVA VARIABLE DENSITY EXTRUDER

### RESULTS

Batch wet weight (grams)	Extrudate wet weight (grams)	Lost product (grams)	Recovery (%)
400	331	69	83%
200	161	39	80%
100	73.8	26.2	74%
50	30.2	19.8	60%
25	14.0	11.0	56%
15	5.2	8.8	35%

### DISCUSSION

There will always be “dead” space in any screw extrusion system and the full amount of product added to the extruder will not be recovered.

The objective in this small demonstration was to answer the question of the smallest amount of product that can be successfully extruded through the Caleva VDE.

The results show that with the product chosen and the amounts of product used in each batch it is possible to extrude very small batches. The % loss is higher as the batches become smaller but it is possible to extrude batches as small as 15 grams. In this case the % losses are quite high. With a 50 gram batch size then about 30 gram of extrudate could be recovered. This is considered exceptionally good for an extruder of this size.

# MINIMUM USABLE BATCH SIZE IN THE VDE



**Radial configuration**



**Axial configuration**

## TALK TO US

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