



TECHNICAL UNIVERSITY OF MOLDOVA
Ministry of Education and Research of Moldova
Ministry of Agriculture and Food Industry of Moldova

PROCEEDINGS

of the International Conference

**MODERN TECHNOLOGIES
IN THE FOOD INDUSTRY–2024**

MTFI – 2024

17–18 October, 2024
Chisinau (Republic of Moldova)



2024

INCREASING THE TECHNICAL EFFICIENCY OF BEAD MILLS FOR ULTRA-FINE GRINDING OF COMPONENTS OF MEDICINAL AND COSMETIC PRODUCTS

Kateryna HRININH¹, ORCID: 0009-0003-3927-7672

Oleksii GUBENIA^{1*}, ORCID: 0000-0003-2773-4373

Artem ZHYTNETSKYI¹,

Serhii SAMARCHUK¹

¹National University of Food Technology, Kyiv, Ukraine

*Corresponding author: Kateryna HRININH, neacriss@gmail.com

Introduction. Research was conducted with the aim of determining changes in the particle size distribution of drug and cosmetic suspensions during processing in a bead mill and improving the efficiency of its operation.

Material and methods. Ultrafine grinding of model suspensions based on castor oil and solid dye particles is being studied. The research was carried out on an experimental stand based on a vertical type bead mill. The particle size distribution of the suspension was determined by the method of photo registration of images magnified by 100-900 times and their further processing by software.

Results. Experimental studies of changes in the particle size distribution of suspensions and the analysis of the obtained results show that the composition of suspensions within the investigated range is actively crushed and redistributed during the entire time interval of measurements.

The resulting curve of the degree of grinding during grinding shows an active reduction in the size of the particles in the first 4 minutes of the process. Grinding rate curves and size distribution diagrams demonstrate that slurries with a higher solid phase content are ground more intensively than slurries with a lower solid phase content.

The obtained results of studies of the distribution of suspension particles by size classes make it possible to monitor and adjust the necessary parameters of the ultrafine grinding process to achieve the required product quality, as well as to be used for simulation modeling of the process in bead mills.

Accordingly, for the production of medicinal and cosmetic products, it is advisable to use formulations of suspensions that have a higher concentration of the solid phase in their composition.

Conclusions. The obtained results are useful for choosing rational modes of operation of the bead mill and conducting the grinding process, in particular, choosing the construction of working elements, kinematic parameters, grinding time.

Keywords: *bead mill, granulometric composition, grinding, suspension, ultrafine*

References

1. Грінінг К., Десик М. (2022). Зміна гранулометричного складу суспензій лікарських та косметичних засобів під час оброблення у бісерному млині. Наукові праці НУХТ, В. 28, №4, 72-83.

2. Mende, S., Rapp, M. (2014). Mill performance matched to the task. Throughput enhanced by optimising cooling and disc configuration. European Coatings Journal, 12, 88—91.