

Ministry of Education and Science of Ukraine

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**International scientific conference**  
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**April, 11-12 2024**

**Part 2**

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**Частина 2**

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**Київ НУХТ 2024**

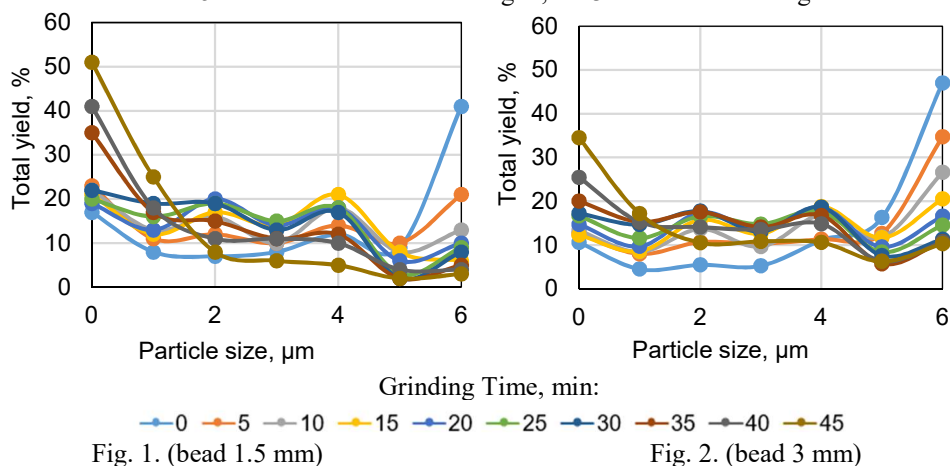
## 8. Changes in the granulometric composition of suspensions during grinding in a bead mill

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**Introduction.** The size of the beads significantly affects the quality of ultra-fine grinding of suspensions in a bead mill, particularly their granulometric composition.

**Materials and Methods.** The grinding of suspension particles based on castor oil and iron oxide pigment "Red 120" in a ratio of 60%/40% was studied. The diameters of the beads were 1.5, 2.0, and 3.0 mm. The type of working organ of the bead mill was disc. The particle size and granulometric composition were determined by the method of software processing of the obtained images under a microscope, with a magnification of 200–900 times.

**Results and Discussion.** Up to 45 minutes, there is an intensive reduction in the size of the solid phase particles of the suspensions and, accordingly, their redistribution by size classes. Data for 1.5 mm beads are shown in Fig. 1, for 3 mm beads – in Fig. 2.



The compositions of suspensions within the studied range are actively ground and redistributed throughout the entire measurement interval. The curves obtained for the grinding time over 30 minutes can be described by the Weibull distribution, however, a Gaussian distribution is likely to be observed in the size zone of 1 micron.

Grinding with 1.5 mm beads is more effective; within 45 minutes, more than 50% of the particles will have a size of less than 1 micron (Fig. 1), compared to 3 mm beads, where at 45 minutes, only 35% of the particles are less than 1 micron in size. The rational grinding time decreases from 45 to 30 minutes for finer beads.

**Conclusion.** Reducing the bead size from 3 to 1.5 mm decreases the grinding time from 45 to 30 minutes and improves the quality of the process, namely, the granulometric composition, when more than half of the particles are within a narrow size range.

### References

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