

Modelling of Milling Behaviour of Pharmaceutical Materials

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ABSTRACT

Milling is an important process for controlling the size of particles, especially for active pharmaceutical ingredients and excipient in pharmaceutical industries. Achieving desirable particle size is a primary aim of such processes. Milling performance of particulate solids depends on the equipment operating conditions (geometry, process conditions and input energy etc.) as well as material properties (particle size, shape, and mechanical properties, such as Young's modulus, hardness and fracture toughness).

A novel approach has been developed to assess the grindability of pharmaceutical materials using the Scirocco disperser of Malvern Mastersizer 2000 [1]. In this work, we combine this approach with the Distinct Element Method (DEM) to simulate the dynamic behaviour of a number of pharmaceutical materials in the PicoPlex mill (the pin mill unit of Picoline). A sensitivity analysis is carried out addressing the effect of the milling condition (rotational speed of the mill and feed particle flow rate) and feed properties on the particles size distribution of the mill product. The ease of material grinding is then assessed using the change in specific surface area of the particles after milling, and compared to that of Scirocco testing.

Keywords: Milling; DEM; impact, Picoline

References

[1] Bonakdar, T., Ali, M., Dogbe, S., Ghadiri, M., and Tinke, A. (2016). A method for grindability testing using the scirocco disperser. *International Journal of Pharmaceutics*, 501: 65-74