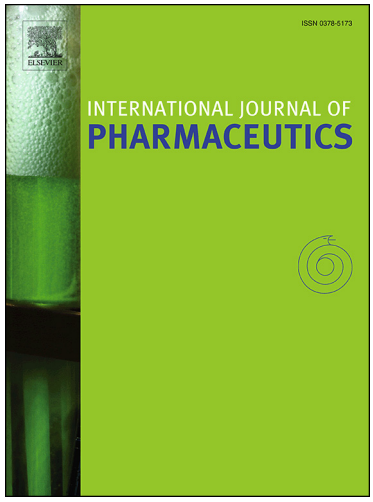

Analysis of Pin Milling of Pharmaceutical Materials

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Analysis of Pin Milling of Pharmaceutical Materials

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Abstract

Milling is an important process for tailoring the particle size distribution for enhanced dissolution, content uniformity, tableting, etc., specially for active pharmaceutical ingredients and excipient in pharmaceutical industries. 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). In this work, a newly developed approach to assess the breakability of pharmaceutical materials using an aerodynamic dispersion method has been combined with the Discrete Element Method (DEM) to simulate the dynamic behaviour of a number of pharmaceutical materials in a pin mill. A sensitivity analysis is carried out addressing the effect of the milling conditions (rotational speed of the mill and feed particle flow rate) and feed properties on the milled products in terms of the shift in the specific surface area of the milled particles. The outcome of the work is used as a method to predict the breakage of the particles for the milling conditions where chipping takes place.

KEYWORDS: milling; breakage; impact; Picoline; pin mill

1 Introduction

Particle size reduction is a common and crucial process in food, chemical and pharmaceutical industries (Patel et al, 2008) to tailor the particle size distribution to meet the process and product