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Combined effect of moisture and electrostatic charges on pharmaceutical powder flow

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It is well known in pharmaceutical applications involving powders and granular materials that the relative air humidity and the presence of electrostatic charges influence drastically the material flowing properties. In particular, API powders are highly sensitive to both humidity and electrostatic charges leading to inhomogeneity in powder blends. On the one hand, the relative air humidity induces the formation of capillary bridges (leading to cohesiveness) and modifies the grain surface conductivity. The apparition of electrostatic charges due to the triboelectric effect at the contacts between the grains and at the contacts between the grains and the container produces electrostatic forces. Therefore, in many cases, the powder cohesiveness is the result of the interplay between capillary and electrostatic forces. Unfortunately, the triboelectric effect is still poorly understood, in particular inside a powder. Moreover, reproducible electrostatic measurements are difficult to perform. We developed an experimental device to measures the ability of a powder to charge electrostatically during a flow in contact with a selected material. Both electrostatic and flow measurements have been performed in different hygrometric conditions with a set of pharmaceutical powders. The correlation between the powder electrostatic properties, the hygrometry and the flowing behavior are analyzed.

Biography

Geoffroy Lumay has done his PhD thesis on Granular Materials Flow in 2007. This fundamental study was the starting point of a series of research projects at the intersection between fundamental sciences and industrial applications. He is leading a research project in collaboration with pharmaceutical and chemical industries. Currently, he is an Associate Professor (Soft Matter Physics Chair) at University of Liege in Belgium. He co-founded the company Granutools developing, producing and commercializing a range of laboratory instruments dedicated to powder characterization. He has published 46 papers in the peer reviewed journals during a period of 10 years.

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