

Thermally Stimulated Current (TSC) technique, qualitative and quantitative tool for pharmaceutical domain

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This thermal analysis has been developed in 1964 by Bucci and Fieschi to study specific faults in insulating crystals and semi-conductors. Since the 1970's, it has been frequently applied to macromolecular materials – amorphous and semi-crystalline polymers [1]; synthetic and biological materials and to small molecules and polar liquids. The principle of this technique is to submit the sample to an electric static field that reveals any molecular mobility within it. At specific temperatures, peaks associated with molecular mobility are observed and subsequently associated with a chemical sequence. Thanks to its specific probe, this method is well designed to the study of amorphous phase characterized by a high degree of disorder. With any pharmaceutical compound synthesized in crystalline form one must ask whether an amorphous fraction might be present in this compound. Any such fraction must be quantified because it can influence the therapeutic role of the medication in terms of bioavailability. Moreover, recent studies showed that we can distinguish two polymorphs as well [2].

The aim of this work is to demonstrate that this method:

- is sensitive enough to detect low level of amorphous phase (0.3%)
- is non destructive for the sample allowing reproducible experiments; the amorphous or crystalline phase keeping stable.
- could determine the amount of amorphous phase in a unknown mixture after the establishment of a calibration process.

[1] G.Teyssedre, P. Demont, ; C. Lacabanne, . *J. Appl. Phys.*79, 1996.

[2] N. Boutonnet-Fagegaltier, J.Menegotto, A. Lamure, H.Duplaa, A. Caron, C. Lacabanne, M. Bauer. *J. of Pharmaceutical Sciences*, 91, 2002.