New Advances in the Application of Inverse Gas Chromatography (IGC) to the Characterisation of Amorphous Powders

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The characterisation of the amorphous state is an important task within the pharmaceutical industry since amorphous contributions can affect product life, stability, bio-availability etc.

IGC is a versatile tool for the characterisation of pharmaceutical powders. It involves the sorption of a known adsorbate (vapour) and an unknown adsorbent stationary phase (solid sample). This approach inverts the conventional relationship between mobile and stationary phases found in analytical gas-solid chromatography.

IGC has been shown to be a useful tool to measure glass transitions in materials with amorphous contents of less than 2%. This sensitivity is used to determine thermodynamic properties at infinite dilution. In this range only the interaction with the amorphous regions are considered, which have the highest energy sites.
A variation of the probe molecule concentration can also provide information about the energy heterogeneity of the surface. With increasing partial pressure an increasing number of less active sites becomes involved in the interaction, which can provide the heterogeneity profile.
The measurements described above have been undertaken to characterise the amorphous state of Lactose-á-monohydrate. Samples with different amorphous contents have been investigated at infinite and finite concentration. Infinite dilution parameters show values generally independent of the amorphous content while at high concentrations considerable changes can be measured. This has been applied to quantify the amorphous content. A comparison to other techniques will be presented.