

Grazing Incidence X-Ray Diffraction Studies of Pharmaceutical Tablets

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Grazing incidence diffraction (GID) is a technique not yet being used in the field of pharmaceutical physics widely. However, GID is a very potential alternative to the other surface sensitive techniques, e.g. various spectroscopic methods, used in the pharmaceutical materials analysis. With GID it is possible to monitor phase transitions on the surface of tablet as a function of time and depth, for example.

In the present study GID has been utilized to study the disorder of the tablet surface after the compaction. Three active pharmaceutical ingredients, namely tolbutamide, carbamazepine and chlorpropamide, were chosen to act as model tablet compounds. Several tablets were compacted using different compaction pressures. The prepared tablets were then analysed with GID with various incident angles in order to depth profile the surface disorder and possible pressure induced phase transitions.

The results indicate that all of the studied compounds were changed due to the compression. The GID analysis shows that the surface regions of the compacted tolbutamide, carbamazepine and chlorpropamide tablets were disordered. The manifestations of the disordering in the diffractographs are the increased peak intensity and height and the decreased peak width. Moreover, a polymorphic phase transition was observed in chlorpropamide tablets. The biggest changes took place at the very surface of the tablets. The transitions were also dependent on the used compaction pressure.

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