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Investigation of drug-matrix interaction in directly compressed matrices

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Personalized medicine is recently emerging trend, therefore pharmaceutical industry faces a new challenge on providing solid dosage forms, which as still the most favourable medicines, with tailorable properties. A novel approach may be the utilization of drug-polymer interactions in the development of solid delivery matrices.

A line of chemically similar drugs with increasing acid strength were mixed various matrix forming agents and directly compressed with an instrumented IMA Kilian SP300 tablet press. Kawakita and Walker analysis were made to evaluate the composition's compressibility. Compressibility studies showed an increment in the energy value needed for deformation, which may be due to particles attracted to each other causing chemical interactions.

The presence of solid-state drug-polymer interactions based on the formation of H-bonds were confirmed by FT-IR spectroscopy.

A custom-made device was applied to perform dissolution tests to obtain information on the effect of interactions on the drug liberation kinetics. The results of dissolution tests proved that strength of interactions have increased due to formation of polyelectrolyte complexes which exerted considerable influence on both the quantity of liberated drug and the speed of drug liberation.

According to the findings it may be concluded that inclusion of the physico-chemical properties of raw materials and careful evaluation of their potential interactions during the development phase of the drug delivery systems may open new ways to provide medicines with tailored properties.

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