INVESTIGATION OF THE SOLID STATE PHOTOCHEMICAL REACTIVITY AND POLYMORPHISM OF THREE COMMON DRUGS

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INVESTIGATION OF THE SOLID STATE PHOTOCHEMICAL REACTIVITY AND POLYMORPHISM OF THREE COMMON DRUGS

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The concept of solid state chemistry of drugs has been integrated into the pharmaceutical discovery process, but it is not very common in the pharmaceutical development arena. Multidisciplinary scientific researchers make efforts to discover new drugs, and methods for analyzing, and synthesizing them, to identify active pharmaceutical ingredients, and polymorphic behaviour, and to develop storage and stability conditions. Hence, the work, in this publication was mainly focused on the study of solid state photochemical reactivity and polymorphism of three pharmaceutical products readily used in Sri Lanka.

Powdered samples of Aspirin, Paracetamol and Vitamin C tablets under different commercial brands were selected as analytes and photoreactivity was investigated upon irradiation.

Although several methods can be applied for the analysis of solid state reactivity of drugs, powder X-ray diffraction was used as the key technique here. Quantitative determination of their photoreactivity was estimated as a percentage conversion, based on the intensities of three selected peaks in the XRD patterns before and after irradiation, along with UV-Visible, and FT-IR spectroscopy and titrometry. It was found that all three drugs are photochemically reactive.

X-ray diffraction analysis was done for all commercially available formulated drug products as well as for laboratory synthesized pure compounds to identify and compare their polymorphic behaviour, because formation of any polymorphs could adversely affect drug performance and toxicity. Although polymorphs of Aspirin have not been found so far, it was observed that the active compound in tablet samples and in laboratory synthesized sample are not identical.