CHAPTER 1

AIMS AND OBJECTIVES

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Didanosine and lopinavir represent two antiretroviral (ARV) agents whose polymorphism and physicochemical properties are yet to be thoroughly investigated. Scientific articles on didanosine and lopinavir are centred around clinical trials and, in the case of lopinavir, single-crystal x-ray diffraction (SXRD) data on the drug in its receptor binding site to elucidate its mechanism of action. Better understandings of the physicochemical properties of each drug are often the first steps in helping the pharmaceutical scientist develop new dosage forms, or improve on existing preparations, in order to address any weakness in the drug's pharmaceutical and/or pharmacological profile(s). Similarly, knowledge of the different polymorphic forms each drug can adopt under certain pharmaceutical preparative conditions (increased or decreased pressure, drying, storage, agitation or contact with pharmaceutically relevant solvents etc.) are crucial when deciding on a dosage form. The stabilities of these polymorphs are equally important.

In this study, the abilities of didanosine and lopinavir to form different polymorphs will be investigated, as well as their respective physicochemical properties. Any meta- or instabilities will be identified and the mechanism behind these will be investigated. Shortcomings specific to each drug will be discussed in their respective chapters and attempts will be made to address these issues.

In preparation for the studies on didanosine (chapter 5) and lopinavir (chapter 6), literature reviews on the crystalline and amorphous states of condensed matter, with specific focus on themes relevant to this study, will be given. A detailed description of the methodology employed to investigate the polymorphism and different physical and chemical properties of each system will also be presented.

By the end of this study, we wish to present the first thorough polymorphism and physicochemical studies on didanosine and lopinavir and, where possible, try to address any unwanted physical or chemical characteristics by manipulation of the solid-state properties of the drug in question.