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Nitroimidazoles have been widely used for the treatment of trichomoniasis, amoebiasis and giardiasis and have also shown to be active against a variety of anaerobic bacteria. Literature survey has revealed that 5-nitroimidazoles are poorly water-soluble. Therefore, in the present work, it is proposed to start systematic studies on drug-carrier systems of these drugs with polyvinylpyrrolidone, β-cyclodextrin and its derivatives in binary as well as in ternary systems. Preparation of solid dispersion is one of the technique used to increase the solubility of poorly water-soluble drugs. However, the utility of this approach is still empirical and there are not much marketed products available out of this approach in spite of simplicity of the manufacturing process as well as the chemical simplicity of the solid dispersions. This may be due to the poor understanding of the physical nature of the drug as well as the mechanism by which dissolution enhancement occurs. Therefore it is envisaged to elucidate the nature of drug-polymer conjugates both in solid and solution state by studying their physical mixtures and solid dispersions. It is also envisaged to characterize the binary complexes of nitroimidazoles with PVP using the techniques of X-ray diffraction (XRD), Fourier Transform Infrared spectroscopy (FTIR), Differential Scanning Calorimetry (DSC) and solubility studies.

The rational design of formulation which take advantage of cyclodextrin inclusion complexation requires a good understanding of encapsulation equilibrium through parameters such as stoichiometry and binding constant of the inclusion complex. Very few studies have been involved in a physicochemical characterization of the microencapsulation. It is envisaged to study drug-cyclodextrin complexes using spectroscopic and calorimetric techniques. Calorimetry is the only technique for directly determining the thermodynamic parameters associated with the binding process. Effect of PVP on the binding ability of cyclodextrin by determining the equilibrium constant, standard enthalpy changes ($\Delta H^\circ$) standard free energy ($\Delta G^\circ$) and standard entropy ($\Delta S^\circ$) in ternary complexes using non-linear least square method is also envisaged.

Reviewing through the previous work have shown that although there are many reports about the stability of metronidazole and tinidazole utilizing HPLC and derivative spectroscopy, but not much literature is available about the stability studies of ornidazole and secnidazole. Moreover, no data is available about the degradation studies of
nitroimidazoles using the technique of calorimetry. Microcalorimetry is a growing technique for the characterization of pharmaceuticals which works on the principle that all physical and chemical processes are accompanied by a heat exchange with their surroundings. Stability testing can be carried out at any stage (from drug powder, to mixes, to final form) often at ambient, or at worst near ambient conditions, with the possibility of controlled atmospheric conditions. So, it is envisaged to determine the degradation rate constants and half life as a function of temperature and pH from the variation of heat evolution with time and compared them with the literature wherever available. It is also envisaged to calculate the Arrhenius parameters.

The literature survey have shown that nitroimidazoles along with proton pump inhibitors and macrolides are most commonly used for the treatment of *H. pylori* in almost all patients with duodenal ulcer and in approximately 80% of patients with gastric ulcer in the absence of other precipitating factors. The eradication of the organism in patients with single agents have been reported to be poor. Combination therapy probably attacks the organism through different mechanisms of action producing at least additive or perhaps synergic effect. Unfortunately not much data is available about the in vitro compatibility of these drugs. The compatibility of drugs in a combined preparation or combined therapy is critical factor for the development of pharmaceutical formulations. So, it is envisaged to predict any specific and non-specific interaction between the drugs prescribed in triple regimen therapy involving nitroimidazoles, macrolides and omeprazole in combined dosage forms using the technique of solution calorimetry. The technique was further employed for simultaneous determination of excess enthalpy of solution of drugs in triple dosage regimen available in some marketed kits.