INTRODUCTION
The solubility, stability and therapeutic efficacy of drugs are closely related to their physicochemical properties and those of vehicles, bases or carriers used along with them. Various intermolecular forces such as van der Waals forces, ion dipole and ion-induced dipole forces, hydrogen bonding, crystal lattice interactions etc. between the drug and vehicle, nature, polarity and temperature of the solvent affect the drug solubility and dissolution rate. By selecting suitable excipients in proper proportions, drug stability and desired dissolution rate can be achieved.

In the present work, three poorly water soluble drugs, viz., norfloxacin, ciprofloxacin and tinidazole are selected for studying the effect of an excipient betacyclodextrin (BCD), reported to have inclusion complex forming property with certain drugs, on their dissolution, diffusion and stability. The interactions between the drugs and excipients are evaluated by various physicochemical studies.

Norfloxacin and ciprofloxacin are fluoroquinolone antibacterials having varying degree of antibacterial properties. They are primarily used in urinary tract infections and are also widely used in the other type of infections, viz., Periodontal diseases, bone and joint infections, gastro-enteritis, meningitis and respiratory tract infections etc. (Goldstein, 1987 a,b; Robert et al., 1987)

Tinidazole is used in the treatment of amoebic dysentery and vaginitis. These drugs are gaining importance as antibacterials in dental and ophthalmic preparations. Cyclodextrins (CDS) are cyclic and nonreducing α-1, 4-malto-oligosaccharides consisting of six to twelve glucose units. Different types of cyclodextrins, viz., alpha, beta, gamma, delta and substituted betacyclodextrins are also being used in formulations. Cyclodextrins are gaining a lot of importance as excipients in increasing the solubility, dissolution and diffusion of various hydrophobic drugs (Czekus
et al., 1992; Martin et al., 1976; Duchene et al., 1986; 1990 a,b, Szejtli, 1982, 1990, 1991; Koch et al., 1988; Ahmed et al., 1991, Bekers et al., 1991) BCD is extensively used with advantage over other CDS to trap certain drugs inside its cavity, thus modifying their physicochemical properties and biological activities. BCD forms inclusion complexes with various drugs under different experimental conditions.

The complex is prepared by kneading, neutralisation and aqueous solution methods at different ratios of the components and their properties were compared with that of the physical mixture. The interactions of the drugs with the excipients at different ratios are studied by evaluating the following properties, viz; ultra violet (UV), infrared (IR), fluorescence and nuclear magnetic resonance (NMR) spectra, thermal properties including thermogravimetry (TG), differential thermal analysis (DTA), differential scanning calorimetry (DSC) and X-ray diffractometry (XRD). High pressure liquid chromatography (HPLC) is used for studying the nature of the complex formed by interaction. The optimisation of the ratio of the drug to the excipient to achieve maximum drug solubility has been carried out by phase solubility studies. In vitro dissolution and diffusion studies have been carried out at pH 1.2 and 7.2. The antibacterial efficacy of the drugs upon complexation is also studied. The drug-BCD complexes are incorporated in implantable films and the in vitro drug release is compared with similar implants containing the plain drug. The suitability of these implants for dental and ocular preparations is also examined. The stability of the drug alone as well as that of the complexes with BCD at various ratios is evaluated under conditions of higher temperatures, higher relative humidity (82%) and after exposure to sunlight.

These drugs are also incorporated into sodium and calcium alginates and their effect on certain physicochemical properties...
of drugs is evaluated. The effects of these excipients on the dissolution and stability of the drugs is also evaluated.

Fluoride is a widely used inorganic antibacterial, commonly available as sodium fluoride (NaF), calcium fluoride (CaF₂) and sodium monofluorophosphate. The efficacy of fluoride in controlling caries was first investigated by Crichton et al., (1982) and then put into practice to use in different dental formulations. These are used as fluoride (F⁻) supplements such as fluoridated water, milk, juice and also in the form of fluoride formulations in dental caries (Melberg et al., 1983). The fluoride formulations were attempted both by oral route and local route. Due to its toxic effect on other organs (Murray et al., 1982), the systemic administration though effective in caries prevention and control, is replaced by local fluoride therapy. Optimum levels of fluoride surrounding the tooth for a prolonged time impart effective protection against caries and also provide antibacterial environment for decayed tooth.

Fluoridated mouth washes, drops, dentifrices, dental floss, prophylactic pastes and gels are a few quick releasing devices, wherein the tooth is exposed to a high concentration of F⁻ for a short duration of time, resulting in higher buccal absorption and increased toxicity (Tinanoff et al., 1976). This necessitated repeated administration resulting in the underutilisation of the formulation. To overcome these disadvantages, sustained release formulations, viz., fluoridated varnishes, cements, amalgams, chewing tablets, sublingual and lozenge tablets, implants, and other intra-oral devices, providing minimum required F⁻ concentrations are prepared and utilised for better therapeutic efficacy (Meier et al., 1978, Melberg et al., 1966, Melberg, 1991, Mirth et al., 1983, Murray et al., 1982, Stephen et al., 1983; Driscoll et al., 1977; Esther, 1976, Friedman, 1980, 1981, Sundari, 1991, Tyle, 1988; Goodson et al., 1985 Suppl, Hanes et al., 1986, Kimura et al., 1991; Karunakar et al., 1992).
However, in certain disease conditions warranting higher initial loading of $F^-$, quick release formulations are used followed by a sustained release therapy. Thus both of these formulations are widely used in clinical practice for prophylactic and curative measures. 

Various celluloses, certain synthetic acrylic polymers and naturally available gums are used in the preparation of different types of sustained release $F^-$ formulations. However, the use of these excipients as matrix materials has not been explored in the preparation of sustained release NaF formulations. Matrix technique being a cost effective, reliable and effective way of controlling the release of drugs from tablets, this technique is employed in the present work for the preparation of sustained release $F^-$ tablets. Various celluloses, certain polymers including modified celluloses and Eudragits, rosin and its derivatives are widely used as sustained release materials. These materials are incorporated as matrix materials for sustained release of $F^-$. The effect of these materials on the tablet characteristics and on the dissolution pattern is evaluated. A clinical trial is taken up with the help of a team of dentists for selected chewable tablets containing $F^-$. 

With the help of different physicochemical characteristics viz., UV, IR, XRD, DTA, DSC, NMR patterns, dissolution, diffusion, release and stability studies of antiinfective drugs along with the selected excipient BCD and alginates, it is possible to predict the different types of drug-excipient interactions. Such preformulation interaction studies will be a very useful tool for selecting suitable carrier or excipient for optimising the efficacy of the dosage form. Similarly, the type and proportion of the matrix material used for preparing sustained release $F^-$ tablets also affect the physical properties including dissolution of $F^-$. Our preformulation study of sustained release $F^-$ tablets in this direction may help in developing cost effective fluoride tablets for the treatment of caries.