On the theory of cholesteric ordering in solutions of macromolecules.

Michael A.Osipov
Department of Mathematics, University of Strathclyde
26 Richmond Street, Glasgow, UK.

Main results of the general statistical theory of cholesteric ordering in solutions of rigid long macromolecules are presented including expressions for the helical pitch obtained in the second virial and mean-field approximations. Different kinds of chiral intermolecular interactions are discussed including steric and van der Waals interactions. It is shown that the temperature variation of the pitch in cholesteric solutions is mainly determined by the balance between steric and attraction interactions. It is discussed in detail how the theory enables one to explain experimentally observed helical sens ne inversions induced by the change of temperature , properties of the solvent of concentration. The role of biaxial ordering is also considered in detail. Finally we discuss the role of chiral electrostatic forces between DNA macromolecules which have been described recently by Kornyshev and Leikin, and consider how these novel chiral interaction potentials may be incorporated into the existing statistical theory of cholesteric ordering.