The research work embodied in the present thesis commenced a few years ago to investigate complex formation in solution of some quinoline derivatives with a series of rare earth metal ions. The ligands included 8-hydroxyquinoline-5-sulphonic acid, 7-iodo-8-hydroxyquinoline-5-sulphonic acid, 2-methyl-8-hydroxyquinoline-5-sulphonic acid and 4-hydroxyquinoline-2-carboxylic acid. 8-hydroxyquinoline and its derivatives are very popular organic precipitating agents. Because of the demands of analytical chemistry these reagents were widely investigated by previous workers as regards their various aspects including complex equilibria in solution with metal ions.

We had been fully conscious of the above background and therefore planned our investigation from a different standpoint. Our chief objective had been the study of these equilibria in different mixed aqueous solvent so as to gain an insight into the solvent effects. Ternary complex formation was also studied systematically with primary ligands like EDTA and NTA. Thermodynamic parameters were measured for the ternary step and these values are discussed along with the data obtained by previous workers on complexation at the binary steps.
We could not acquire a microcalorimeter to measure $\Delta H$ with greater accuracy. We are aware of the fact that the temperature coefficient method has its limitations and yields approximate results. However, $20^\circ C$ temperature difference used in this present work is considered nearly appropriate to give reliable values of $\Delta H$ and $\Delta S$. The error ranges indicated in the tables are based on the calculation methods, actual error range may be a little higher. It is because of these facts that we used our data with some caution and have often ignored small differences in the values of $\Delta H$ and $\Delta S$ while attempting to reach significant conclusions.

The thesis as usual starts with an introduction, where the background of the present work has been detailed and motivation of this research specified.

The first chapter deals with the description of the materials used, the experimental methods followed and the computational procedure adopted in this work. The next four chapters viz. second, third, forth and fifth deals with the investigations on the four ligands. In these chapters the discussions are often repetitive. But this could not be avoided for sake of achieving clarity.

The sixth and concluding chapter contains discussions on the comparative account of the ligational activities of the ligands. For this the tables showing the experimental
data, in earlier chapters, are once again reoriented and regrouped, in order to show the trends explicitly.

Three papers in connection with this work have been communicated. Uptil now one of them has been accepted by Indian Journal of Chemistry and is now in press.