PREFACE

Oxidation plays an important role in the organic chemical industry. The controlled catalytic oxidation of hydrocarbons or other organic compounds is the promising field to obtain commercially important intermediate oxidation products. Maleic acid is one such important compound which is precursor to many chemical products. It is one of the most important basic chemicals in the field of plastics and paints.

Considering various other indispensible uses of benzene it would be rational to find out an alternative source of maleic acid. In this regard, furfural can be a very good substitute for benzene because, the sources of furfural are abundant mostly as byproducts and waste materials.

Since there is generally a scope for improvements in conversion and reduction in cost, research and development efforts are being constantly pursued in this segment of the chemical process industry. With this end in view, the catalytic oxidation of furfural to maleic acid has been exhaustively studied in the present investigation using both fixed bed and fluidised bed reactors.

Following the process development work the kinetic investigation of this contact catalytic reaction has been conducted to evolve rate equations suitable for industrial reactor design. An

attempt has also been made to put forward a tentative mechanism of the oxidation of furfural to maleic acid.

The thesis has been presented in five chapters. The introductory chapter presents the current manufacturing methods of maleic acid and its anhydride. A light has also been thrown on various pertinent uses of it. A critical survey of the published literature and patents in related field has been put forward. The chapter concludes with a critical appraisal of the scope and importance of the present investigation.

Chapter II records the thermodynamic calculations and data relevant to this problem.

The experimental arrangement and analytical techniques which were deployed for the fixed bed and fluid bed operations and also for kinetic investigations, have been described in detail in Chapter III. A full explanation of the different terms used as well as the methods of calculation have also been included in this chapter. The results of the investigation in fixed bed and fluid bed have been recorded in the fourth chapter. The results have also been critically discussed.

The kinetic data and their interpretation have been the subject matter of the Chapter V. The rate equations for the oxidation of furfural have been derived and their merits and demerits have been critically assessed. It is worth mentioning

here that the kinetic investigation has been carried out in fluidised bed reactor in optimum conversion range as arrived at by extensive process development study.

The thesis concludes with a summary of the work.