Chapter - I
PREFACE

It is about 25 years since the electroreduction was shown to be applicable to the synthesis of organic compounds. This was followed by a number of fundamental investigations and basic synthesis using various transition metal electrodes, which can be easily reduced in situ electrochemically to low-valent reactive intermediates. The aim of this thesis is to inform the organic chemist about the possibilities and limitations of electrochemical methods in the synthesis of organic compounds and in the interpretation of mechanisms. It shows that the electrochemical processes described here offer valuable advantages in organic synthesis.

In the results presented in the thesis entitled "Electroorganic Synthesis. Carboxylation and Hydrogenation", a deviation is made from the conventional procedures for the synthesis of Non-steroidal anti-inflammatory drugs (NSAIDs). Electroorganic synthesis of Benoxaprofen, Carprofen, Pranoprofen, Protiznic acid, Flurbiprofen, Isoprofen, Flunoxaprofen, Purprofen and 6-Aminonicotinic acid have been carried out from their respective precursors by electrochemical hydrogenation and carboxylation. These reactions were carried out at a cathode surface in the presence of sulphuric acid and carbon dioxide in a dimethylformamide (DMF) solution at different
electrode materials in quaternary ammonium salts as supporting electrolytes. Cyclic
voltammetric studies have also been carried out to investigate the mechanism of the
electrosynthetic reactions. In the bench scale experiments, this electrochemical synthesis
has been observed to exhibit some novel features and selectivity for the desired products.

The thesis has been divided into nine chapters on the basis of the reviewed
literature and the results from the electrochemical techniques employed.

Chapter-1 describes the preface of the present work.

Chapter-2 deals with the general introduction of NSAIDs and the utility of
electroorganic synthesis and how the electroorganic synthesis is a better method in
transforming the existing feedstocks.

Chapter-3 describes the experimental and the preparation of precursors of
NSAIDs based on the existing literature reports.

Chapter-4 explains the literature survey and also gives the electroorganic
synthetic procedures for the synthesis of NSAIDs using an undivided cell at different
electrolytic conditions.

In chapter-5 of the thesis, the details of the electrochemical reduction behaviour
of precursors are discussed.

Chapter-6 explains the electroorganic synthesis of 6-aminonicotinic acid using
an undivided cell at different electrolytic conditions and also discusses the mechanistic
investigations.

Chapter-7 discusses the electroorganic synthesis by using low-valent metal
electrodes.

Chapter-8 deals with the summary of the work and results obtained for the
electroorganic synthesis of NSAIDs and also gives the conclusions of the present work.

References are given at the end. The papers published and communicated given
as Appendix.