# SUMMARY

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## GENERAL INTRODUCTION

The present investigation aims at the possible electrochemical glucosylation of six monohydroxyflavones. Also, the electrochemical reduction behaviour of 6-monohydroxyflavones and their acetyl derivatives have been studied by using polarographic and cyclic voltammetric techniques. The compounds selected for the study are 2'-, 3-, 4'-, 5-, 6- and 7- hydroxyflavones. The study has been carried out in both aqueous and non-aqueous media. The chapterwise summary of this thesis follows.

## CHAPTER-I

A brief introduction to flavonoids with special reference to their various pharmacological properties and different electrochemical techniques used throughout the conduct of this study are presented in this chapter. Pulse polarographic technique, cyclic voltammetric technique, preparative scale electrolysis and electrophoresis are outlined. Also, a comprehensive discussion on the chemical glucosylation and electrochemical study of flavonoid compounds are offered.

## CHAPTER-II

A broad outline of the experimental procedures adopted for the work is described in this Chapter.

2.1. The oxidation potential of acetobromoglucose has been determined with the help of cyclic voltammetric study on a Pt electrode. Controlled potential electrolysis was carried out at this potential with acetobromoglucose and the monohydroxyflavone with a supporting electrolyte in wet acetonitrile and in 2% sodium hydroxide solutions.

2.2. Cyclic voltammetric study on six different monohydroxyflavones and their acetyl derivatives has been attempted on glassy carbon electrode in aqueous DMF and DMF media containing TBAB as supporting electrolyte.

2.3. Similar studies on polarographic reduction of these compounds have been made and the effect of pH on half wave potential has been discussed.

# CHAPTER-III

This chapter deals with results and discussion aspects of the work reported in the preceeding pages.

A successful attempt of its first kind has been made on the electrochemical glucosylation of monohydroxyflavones. The extent of electrochemical glucosylation of monohydroxyflavones supported by cyclic voltammetric studies has been discussed and a probable reaction mechanism has been suggested. The percentage yield of the glucosylated product and the current efficiencies have also been compared. The isolated product has been analysed by chemical tests, paper chromatography, electrophoresis, elemental analysis and hydrolytic study. The structures have been confirmed by modern techniques such as UV, IR, PMR, MS, as well as EPR spectral data.

Based on the cyclic voltammetric and polarographic results, a qualitative discussion on the electrochemical reduction behaviour of six different monohydroxyflavones and their acetyl derivatives has been presented.

Based on the results the following general conclusions have emerged:

i) By changing the nature of the substituent from electron donating (-OH) to that of electron withdrawing group (-OAc) the half wave potential/peak potential has been shifted to a more positive value.

ii) In aqueous medium at acidic pH, the protonated form has been more easily reduced than the anionic form present in alkaline pH.

iii) The kinetic parameters like $\alpha n_a$, D and $k^{o}_{f,h}$ have been calculated for each compound.

iv) Effect of changing the position of substituent on the ease of electrochemical reduction has been studied. It has been observed that substitution in a position conjugated to the carbonyl group is capable of affecting the reduction potential of carbonyl group.

v) Simultaneous determination of cyclic voltammetric peak potentials of components in binary mixtures has been made.

vi) Based on the cyclic voltammetric and polarographic wave analysis, a probable mechanism has been suggested.

## CHAPTER-IV

The antimicrobial activity of the six monohydroxyflavones, their acetyl and glucosyl derivatives have been studied by disc diffusion method. The test organisms chosen are Staphylococcus aureus and Streptococcus pneumoniae of the Gram-positive bacteria group and Escherichia coli, Klebsiella pneumoniae and Pseudomonas aeruginosa of the Gram-negative group. The results show that there exists a pattern of selective toxicity of the flavonoids towards Gram positive bacteria.

## CONCLUSION

Scope for further research in this area is wide. Other sugars like galactose, rhamnose, xylose and arabinose with monohydroxy, dihydroxy - and polyhydroxy - flavonoids in 1:1 and 2:1 molar ratios in a wider electrolytic environment can be studied. Also, cyclic voltammetric and pulse polarographic studies of dihydroxy and polyhydroxy flavonoids in aqueous and non-aqueous media can be made as an extension work of this research programme and is being carried out in our laboratory.

Only some systematic experimental results of cyclic voltammetric and polarographic study on six different monohydroxyflavones and their acetyl derivatives have been presented in the present study. There is immense scope for research in this area by employing new electrodes to study newer processes in a wider electrolytic environment.