CHAPTER WISE ABSTRACT OF THE THESIS

“A Polarographic Study of the Reactivity of Some Nucleotides and their Halogenated Derivatives in Aqueous Solution”

Chapter I; Introduction

This chapter is a general introduction and theoretical background of the nucleic acids and the methods used. In this chapter nucleic acid, their structure and their role in the origin, evolution and functioning of life has been discussed. The investigation methods of voltammetry, the dropping mercury electrode (dme) and by the kinetics of halogenations at a rotating platinum electrode (RPE) by hydrodynamic voltammetry have also been discussed. The scope of our study has been outlined.

Chapter II; Instruments and Methods

This chapter discusses the instrumentation and methods used in performing all the study, starting with voltammetry and ending at magnetic resonance. The chapter is a detailed explanation of all the instruments used in the study.

Chapter III; Polarographic Determination of Cytosine and Quantitative Estimation of its Nucleophilicity in a Complementary Manner by Hydrodynamic Voltammetry

This chapter summarizes the work done for the determination and reactivity study of cytosine by Polarography and hydrodynamic voltammetry in a complementary manner. Determination of cytosine at dropping mercury electrode by classical D.C Polarography has been carried out and the dependency of cytosine reactivity with pH has been obtained. To validate the Polarographic results a halogenation study of cytosine with molecular bromine has been carried out by hydrodynamic voltammetry at a rotating platinum electrode. The results obtained are compared to estimate the reactivity of cytosine. The study has been performed in purely aqueous solution.

Chapter IV; Polarographic Determination of the Nucleotide Cytidine Monophosphate at Dropping Mercury Electrode

This chapter summarizes the Polarographic determination of cytidine monophosphate a RNA nucleotide. The electroreduction of the nucleotide at the (dme) and the effect of pH on the half-wave reduction potential were studied.
Chapter V; Study of Rapid Bromination of Uracil and Adenine Nucleobases by Molecular Bromine in Aqueous Medium

This chapter is the kinetic study of the bromination of two nucleobases uracil and adenine both pyrimidine nucleobase by molecular bromine in aqueous medium using a rotating platinum electrode. The monobromo derivatives obtained has been confirmed by FT-IR and NMR spectroscopy. The kinetic and related thermodynamic parameters of these reactions have been evaluated.

Chapter VI; Study of Rapid Iodination of Uracil and Cytosine Nucleobases by Molecular Iodine in Aqueous Medium by Hydrodynamic Voltammetry

This chapter summarizes the detailed kinetic study of pyrimidine nucleobases cytosine and uracil with molecular iodine by rotating platinum electrode. The iodinated nucleobases have various pharmaceutical applications. Hence it is important to study them. In this chapter we have used a voltammetric method to observe the reaction kinetics of these reactions.

Chapter VII; The Chlorination Study of the Nucleotide Guanosine Monophosphate (GMP) by Hypochlorous acid (HOCl) at a Rotating Platinum Electrode

This chapter deals with chlorination of a RNA nucleotide Guanosine Monophosphate (GMP) by Hypochlorous acid. In vivo chlorination of nucleobases and nucleotides seem to give rise to mismatch pairing in genetic coding which in turn gives rise to abnormal protein synthesis and finally diseases. In this chapter we have observed in vitro reaction kinetics of Guanosine monophosphate with Hypochlorous acid at biological pH by hydrodynamic voltammetry.

Chapter VIII; Conclusion and Summary

This chapter is the summary of the work performed in the thesis and applications of the work performed during the whole time of the work including the experimentation data obtained and the results. There is also an aspect given for the future work in this field of study