CHAPTER II

SCOPE OF THE PRESENT INVESTIGATION
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In general, there are two kinds of problems that arise in any kinetic investigation. The first is the establishment of the relationships between velocity and various factors such as concentration, temperature etc. When this has been done, one can consider the second problem, which is to arrive at an interpretation of the empirical laws in terms of a reaction mechanism and to throw light on the general principles of reactivity. In doing so, one frequently obtains valuable help from studies of a nonkinetic nature like stoichiometry determination and product analysis.

Reduction of 4-piperidones to two epimeric piperidinols, oxidation of 4-piperidinols to corresponding piperidones and, hydrolysis of cyanohydrins, formation of semi carbazones have been studied in detail to reveal the conformation and conformational effects. 4-piperidones are chlorinated and the versatility of N-chloropiperidone as oxidant has been studied. Complete rupture of 4-piperidones by acid permanganate oxidation has been carried out. Restricted oxidation producing the acyloin, the first product in the oxidation of cyclohexanone, oxanone and 4-piperidone which are similar in structure by quinquivalent vanadium has been investigated.
The various products, during the course of oxidation of 2,6-diphenyl-4-piperidones have been identified as \( \alpha \)-hydroxy-ketone and 1,2-diketone without cleavage, ketonic acid and dicarboxylic acid with bond fission and the final product is benzoic acid with the complete rupture of the ring. The stage at which the oxidation stops depends on the experimental conditions and the vigour of the oxidant used.

However, the literature survey made, reveals that neither the oxidation nor the kinetic study of oxidation of 4-piperidones by manganese(III) acetate in acetic acid has been investigated. Hence the present work is undertaken to study the kinetics of Mn(III) oxidation of 2,6-diphenyl-4-piperidones with a view to correlate the structure with reactivity and propose a probable mechanism.

The following seventeen 2,6-diphenyl-4-piperidones are taken for the present kinetic investigation.
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The experimental evidences are obtained from the study of concentration variation of the reactants, ionic strength, solvent polarity, addition of mineral acid, vinyl monomer, effect of manganese(II) and temperature dependent factors such as energy of activation, enthalpy of activation and entropy of activation and temperature independent factor such as frequency factor (A) in order to throw some light on the spontaneity of the reaction and to have an insight into the probable mechanism. It is further confirmed by the stoichiometry and product analysis. An attempt has also been made to study the effect of varying the alkyl group in the 3-position of 4-piperidones and 1-Methyl-4-piperidones and introducing substituents in the phenyl rings to provide further support.