

**Minor Research Project**  
**Dr.Magar B.k**  
**Associate Professor**  
**Department of Chemistry,**  
**Shivaji Arts Commerce and Science College Kannad.**

**KINETIC STUDY OF FORMATION OF NITROGEN AND SULPHUR  
HETEROCYCLES**

**Executive Summary**

The formation of 4-thiazolidinone from Schiff base and TLA by cyclocondensation reaction and its dependence on various factors such as TLA concentration, SB concentration, p-TsOH concentration and temperature of the medium was studied in the present work.

The cyclocondensation reaction has been studied with various substituted SB in order to propose the possible reaction mechanism.

**A. EFFECT OF VARIATION OF TLA CONCENTRATION:-**

The rate of cyclocondensation reaction was found to depend on concentration of TLA. It was found that the rate of this reaction increases by increasing concentration of TLA.

**B.EFFECT OF VARIATION OF SCHIFF BASE CONCENTRATION:-**

In the present study the reaction was studied at various concentrations of Schiff base by keeping the concentration of [TLA] and p-TsOH constant at particular temperature. The plot of concentration of product versus time is non linear. The initial rates were determined from the slope of the tangent  $dc/dt$  i.e. rate of reaction. This indicates that the rate of reaction increases with increase in concentration of Schiff base.

**C.EFFECT OF CATALYST:-**

Toluene-4-sulphonic acid used as a catalyst and its effect on the rate of cyclocondensation reaction was determined. The rate of cyclocondensation reaction increases with increasing concentration of a catalyst.

**D. EFFECT OF TEMPERATURE:-**

In the present work, measurements were carried out at four different temperatures. The rate of reaction increases with increasing temperature. The thermodynamic parameters  $\Delta H^*$ ,  $\Delta S^*$ ,  $E_a$  and frequency factor (A) were evaluated from the results obtained.

**F.STRUCTURE AND REACTIVITY:-**

The cyclocondensation of Schiff bases and thiolactic acid was studied. The rate of reaction depends on the nature of para-substituent in aromatic amine and salicylaldehyde.

**G. MECHANISM OF FORMATION OF 4-THIAZOLIDINONE.**

On the basis of kinetic result the rate law is proposed as

$$dc/dt = k' [SB][TLA][H^+] \text{ i.e.}$$

$$\text{Rate} \propto [\text{Schiff base}] [\text{Thiolactic acid}] [\text{Acid}]^2$$

The reaction is first order with respect to [SB], with respect to [TLA] and the overall order of the reaction is second.

The experimental kinetic result obeys the proposed rate law, which indicates that rate law is in agreement with the experimental observations.