***EXPERIMENT -9***

**Determination of reaction rate constant first order.**

**AIM:**

To determine the reactant rate constant and half-life and the ester (methyl acetate or number of globules) at 0.5M HCL at room temperature.

**APPARATUS AND CHEMICALS REQUIRED**:  
Conical flask (250 ml)  
10 ml volumetric pipette  
Burette

Ethyl acetate or methyl acetate  
Test tube  
0.5 N HCL solution  
0.25 N NAOH solution  
Phenolphthalein indicator  
Ice cold water

**PROCEDURE:**

Preparation of hydrochloric acid solution (0.5N) [IP](https://pharmacyinfoline.com/salient-features-indian-pharmacopoeia/):

[Solutions of any normality](https://pharmacyinfoline.com/normal-saline-solution/) XN may be prepared by diluting 85 x ml of HCL to 1000ml with water. Measure 850 ml of distilled water into a 1000ml volumetric flask. Add 42.5 ml of conc.HCL and slowly added. Finally make up the water in 1000ml.

Preparation of NAOH solution (0.25 N) IP:

Solutions of any normally XN may be prepared by dissolving 40 x gm of NAOH in water and diluting to 1000ml. weigh 10gm of NAOH and transferred into 1000ml volumetric flask. Add water slowly with stirring finally makeup the water into 1000ml.

**PROCEDURE:**

*KINETIC METHOD*

* 100ml of 0.5N HCL solution is measured and transferred into a 250ml conical flask
* It should be kept in the water bath for equilibrium (do not heat)
* 10ml of the given ester it transfer into the test tube and kept in the water bath for equilibrium. Normally it takes 10minutes
* The acid solution its mix ester sample thoroughly and kept in water bath
* Immediately after mixing 5ml of the mixer is withdrawn using the pipette and transferred in to a conical flask containing 10ml ice water (0 time)
* The few drops of phenolphthalein indicator is added to the mixture
* The reaction mixer is titrated against 0.25N NAOH solution. This value of alkali consumed represents V0.
* 5ml samples by periodically at 10, 20, 30, 40, 50, 60, 75 minutes. The volume consumed at each time interval represent Vt.
* The reaction mixture is heated at water bath at the 600c at 20 minutes.
* The mixture cooled to room temperature  
  ϖ 5ml of sample by withdrawn at transfer into the conical flask containing 10 ml ice cold water. The titration is repeated and this value represents Vα.

**REPORT:**

The reaction rate constant (k) of the given data (methyl acetate or ethyl acetate) in 0.5N HCL acid is  
From graphical method= minutes From substitution method= minutes  
The half -life (t1/2) of the given ester (methyl acetate or ethyl acetate) in 0.5N HCL acid is From graphical method=  
From substitution method=