

## Lab. 3: Chemical Kinetic

### Determination of Specific Reaction Rate Constant of Ethyl Acetate In Presence of HCl

Chemical kinetic studies rate of reaction and factors affecting this rate.

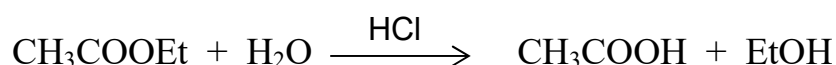
- Factors affecting rate of reaction:

- 1-Temperature.
- 2-Catalysts.
- 3-Concentration.
- 4-Radiation.

- Type of chemical reaction:

- 1- Zero order reaction.
- 2- First order reaction.
- 3- Second order reaction.
- 4- Third order reaction.

Ethyl acetate hydrolyzed in presence of HCl on first order bimolecular reaction. As shown in reaction below:



#### Procedure:

- 1- Prepare 0.2N of HCl in 100mL and 0.2N of NaOH in 100mL.
- 2- Place HCl solution in water bath at 40°C for 15 min.
- 3- Add 5mL ethyl acetate to HCl solution, shake well the mixture.
- 4- Pipette 10mL of solution in step (3) and titrate against 0.2N NaOH, use ph.ph as an indicator. This value represents  $V_0$  at initial time  $t_0$ .
- 5- Pipette 10mL of solution in step (3) at different time, as shown in table below, and titrate against NaOH ( $V_t$ ).
- 6- After 48hr, pipette 10mL of solution and titrate against NaOH ( $V_\infty$ ).
- 7- Use the table below to record the results:

$V_o = V_{\text{mL}}$  of NaOH at  $t=t_o$ .

$V_{\infty} = V_{\text{mL}}$  of NaOH at  $t=t_{\infty}$ .

**Table (6)**

<b>Time (min)</b>	10	20	30	40	50	60
<b><math>V_t</math> (mL)</b>						

**Calculations:**

Use first order kinetic equation to plot  $\log \frac{V_{\infty} - V_o}{V_{\infty} - V_t}$  versus  $t$ , and calculate  $k$ .

$$\log \frac{V_{\infty} - V_o}{V_{\infty} - V_t} = \frac{k}{2.303} t \dots\dots\dots (16)$$

