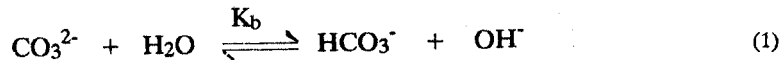


**E2-10 : A MODEL STUDY ON THE POSSIBILITY OF USING SODIUM CARBONATE AS A HYDROLYSING AGENT IN INDUSTRY**

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Sodium hydroxide is widely used in industry as a hydrolysing agent as well as a precipitating agent. For example NaOH is added to the effluent of commercial nickel electroplating baths at the I.P.Z. Katunayake, to precipitate Ni(OH)<sub>2</sub>. The addition of Na<sub>2</sub>CO<sub>3</sub>, instead of NaOH, leads to the precipitation of NiCO<sub>3</sub>. 2Ni(OH)<sub>2</sub>, which shows the importance of equilibrium (1).

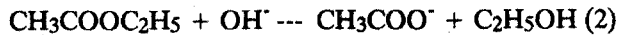


The thermodynamic equilibrium constant,  $K_b$ , can be expressed by the equation:

$$\text{pH} = 1/2 \log \left( \frac{\gamma_2 \gamma_3 K_b}{\gamma_1 K_w} \right) + 1/2 \log [\text{CO}_3^{2-}]$$

where  $\gamma_1$ ,  $\gamma_2$  and  $\gamma_3$  are the activity coefficients of  $\text{HCO}_3^-$ ,  $\text{OH}^-$  and  $\text{CO}_3^{2-}$  respectively. Although  $\gamma_1$ ,  $\gamma_2$  and  $\gamma_3$  vary with ionic strength, the measured pH of 0.002 - 0.5 mol dm<sup>-3</sup>  $\text{Na}_2\text{CO}_3$  in the present study, using a glass - Ag/AgCl combination electrode shows a linear relationship with  $\log[\text{CO}_3^{2-}]$ .

The hydrolysing ability of  $\text{Na}_2\text{CO}_3$  was investigated by monitoring the progress of reaction (2) in solutions of  $\text{NaOH}$ ,  $\text{Na}_2\text{CO}_3$  and  $\text{NaOH} + \text{Na}_2\text{CO}_3$  within the above range of concentration using pH and conductance measurements at 25°C.



The measured pH in each case decreases to a constant value when the reaction goes to completion. However the time dependence of measured conductance in mixtures of  $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{NaOH} + \text{Na}_2\text{CO}_3$  indicate that participation of reaction with  $\text{Na}_2\text{CO}_3$  begins only after a significant decrease in  $\text{NaOH}$  composition. The results also show that the observed second order rate constant of reaction (2) increases with increasing ionic strength.