SUMMARY

The first chapter gives the survey of literature on corrosion characteristic of aluminium and its alloys, the corrosion of aluminium in hydrochloric acid, inhibitors for the corrosion of aluminium in hydrochloric acid and methods of studying corrosion.

The second chapter reports the result obtained with twenty four amines and seven other substances as corrosion inhibitors for aluminium-3S in 0.5N to 4.0N solution of hydrochloric acid. In 0.5N hydrochloric acid, paraldehyde accelerates the corrosion of aluminium-3S. In 3.0N hydrochloric acid, aniline, and substituted aniline and ring substituted aniline (with exception of m-chloroaniline) fail to protect aluminium-3S. In general, inhibitor efficiency increases with an increase in inhibitor concentration. However, in 2.0N hydrochloric acid it was observed that maximum inhibition is given at 26.1 ml/l concentration, further increase in inhibitor concentration induced a fall in inhibitor efficiency. The effect of time on the performance of inhibitors has been studied at all the concentrations of hydrochloric acid. Ethylenediamine and diethylenetriamine completely arrest the corrosion of aluminium-3S in 0.5N and 1.0N hydrochloric acid. For ten
minutes duration it was noted that the efficiency of methylamine, dimethylamine, morpholine, cyclohexanone, diacetone alcohol, ethylmethylketone, paraldehyde, acetone increases with an increase in hydrochloric acid concentration. All the inhibitors obey Freundlich adsorption isotherm. All inhibitors are predominantly cathodic in action. The efficiency evaluated from the extrapolation of cathodic tafel line to open circuit potential and the intersection of cathodic and anodic tafel line show a satisfactory agreement with the efficiency calculated by loss in weight method.

The third chapter gives the result obtained in the investigation of the performance of inhibitors at 40°, 45°, 50° and 55°C. The activation energies were calculated from the plots of log corrosion rate against the reciprocal of the temperature. In most of the cases the activation energies were lower than those in uninhibited hydrochloric acid, however, in the case of dimethylamine, trimethylamine, triethylamine, diethanolamine, and acetone the values of activation energies were higher than those in uninhibited hydrochloric acid.

The fourth chapter reports the results obtained with impressed cathodic and anodic current on the performance