The Asian Journal of Experimental Chemistry, Vol. 3 No. 1&2 : 36-40 (June & Dec. 2008)

An investigation of inhibition property and the trend of inhibition capacity of anisidine on 1060 Aluminium alloy in Trichloroacetic acid

ARUNABH MISHRA, DIVYESH SANJA, ANIL SANGHANI AND D.R. GODHANI

Accepted : ***September, 2008***

See end of the article for authors' affiliations

Correspondence to:

ARUNABH MISHRA
Department of Chemistry,
Bhavnagar University,
BHAVNAGAR
(GUJARAT) INDIA

ABSTRACT

The Inhibition of corrosion of Aluminium alloy 1060 in aqueous solution of trichloro acetic acid and trend of the maximum inhibition trend of anisidine was measured by weight loss method, in relation to the concentration of corroding media, period of immersion of Aluminium alloy at different temperature range from 25 to 45^{0}C with respect to the concentration of inhibitor and for the support corrosion potential and polarization behaviour are also observed.

Key words : Aluminium alloy 1060, Tri-chloroacetic Acid, Weight loss method, Anisidine, Aniline, Galvanic coupling.

The use of chloro-substituted acetic acids in Cellulose industry (Machu, 1937) brings in serious corrosion problems. This fact inspired us to work on anisidine (Jurgens *et al.*, 1948 and Bose, 1955). Also in the manufacture of chloro-substituted acetic acids no metal satisfactorily withstands corrosion. Aluminium metal is commonly used in almost all the industries and automobiles (Rao and Sharma, 1987).

The corrosion of aluminium in acetic and chloro-substituted acetic acids has been studied by many investigators; however, data regarding inhibition of corrosion of aluminium 1060, purity 99.2%, are not so plentiful (Uhlig, 1948; Shreir, 1963; Godard *et al.*, 1967; Mahan, 1972 and Sampat *et al.*, 1974).

Corrosion of aluminium alloys and its inhibition studies has been done by many workers. Talati and Patel (1969) observed that aluminium shows a high affinity for oxygen ($\Delta G° = -376.8$ kcal.mole^{-1}). Aluminium surfaces are usually covered with a thin but tightly adherent and protective film of aluminium oxide, however, as aluminium hydroxide is precipitated (Tomashov, 1966 and Evans, 1968) only at pH values >4.1 and <10, the film fails to protect aluminium in solutions of strong acids and alkalies.

Talati and his co-workers (Talati and Patel, 1970; Talati *et al.*, 1972, 1972, 1974, 1974, 1974, 1973 and Talati and Patel, 1976) studied the inhibition of corrosion of aluminium in different acids using various colloids, inorganic salts and organic amines and suggested these are the cathodic inhibitors.

RESULTS AND DISCUSSION

Percentage inhibition efficiency calculated as

$$E = \frac{W_u - W_i}{W_u} \times 100$$

where:

W_i = Weight loss in inhibited solution
W_u = Weight loss in uninhibited solution

The values of the energy of activation (E_a) and heat of adsorption (Q_{ads}) were given in Table 4. These values were calculated from data of Table 3 using the following equation:

$$\text{Log}\frac{P_2}{P_1} = \frac{E_a}{2.303R}\left\{\frac{1}{T_2} - \frac{1}{T_1}\right\}$$

where, P_1 and P_2 are the corrosion rates mg.dm^{-2} per 6-hour at temperatures T_1 and T_2 in K, respectively. The Q_{ads} values were calculated using the equation:

$$Q_{ads} = 2.303 \times R\left(\log\frac{\theta_2(1-\theta_1)}{\theta_1(1-\theta_2)}\right) \times \left(\frac{T_1 \times T_2}{T_2 - T_1}\right)$$

where

Q_{ads} = heat of adsorption.
R = Gas constant=1.987kcal mol^{-1}
θ_1 = inhibition efficiency at a temperature T_1.
θ_2 = inhibition efficiency at a temperature T_2.

Table l includes the effects of inhibitor concentration on inhibitive efficiency of aniline and ortho, meta and p-anisidine in 0.1N trichloroacetic acid. From the figure it was concluded that in case of all the compounds investigated, is showing direct relation with inhibitor concentration. However, the increase in efficiency was maximum with aniline and minimum with m-anisidine. Thus when the inhibitors concentration was increased from 0.1% to 1.5% the efficiency increased from 28% to 100% in the case of aniline, whereas in the case of m-anisidine it increased from 84% to 100%.

A comparison of inhibitor efficiencies of the