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Research Paper :

Diamines as corrosion inhibitors for aluminium alloy in organic acid

■**ARVNABH MISHRA**, D.R. GODHANI **AND** ANIL SANGHANI

See end of the paper for authors' affiliations

Correspondence to:

ARVNABH MISHRA
Department of Chemistry, Advance Research Institute of Basic and Appied Sciences, New Vallabh Vidyanagar, ANAND (GUJARAT) INDIA

ABSTRACT

Aluminium and its alloys are light weight and corrosion resistant material and vitally preferred as materials of construction in many chemical and engineering fields. Nitrogen-containing organic compounds, such as amines and diamine derivatives on the corrosion for many metals in acidic solutions offer good protection of metallic materials. In the present investigation of corrosion inhibition of aluminium alloys of grade 1060, 1100 and 3003 in trichloroacetic acid are analysed by using conductivity and potentiostatic polarization in different inhibitors of diamine such as ethyl amino ethylamine, di-methyl amino ethylamine, 1:3 di-amino propane, tetra methyl ethylene di-amine. Cathodic and anodic polarization curves are showing diamines are acting as mixed inhibitors in the case of alloy of 3003 grade.

KEY WORDS : Diamnes, Conductance, Cathodic and anodic polarization, Trichloroacetic acid

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Aluminium and its alloys are light weight and corrosion resistant material and vitally preferred as materials of construction in many chemical and engineering fields. [1,2]. In every day applications the pure aluminium is not used but an intimate blend of aluminium and other elements are preferred.

Nitrogen-containing organic compounds, such as amines[3-8] and diamine derivatives[9-11] on the corrosion for many metals in acidic solutions offer good protection of metallic materials. Diamine holds two NH_2 groups having the presence of electronegative nitrogen atom in the molecule amines should show good corrosion inhibition.

In the present investigation of corrosion inhibition of aluminium alloys of grade 1060, 1100 and 3003 in trichloroacetic acid are analysed by using conductivity and potentiostatic polarization were measured in different inhibitors of diamine such as ethyl amino ethylamine, di-methyl amino ethylamine, 1:3 di-amino propane, tetra methyl ethylene di-amine.

EXPERIMENTAL METHODOLOGY

Potentiostatic polarization experiments [12] were carried out using a Wenking Potentiostate. The working electrodes for polarization studies were flag-shaped, 2 cm^2, with a side tag of length 40 mm. Part of the tag was blocked off with paraffin wax leaving the upper part bare to make electrical contact. The experiments were carried out in a 200 ml pyrex glass cell containing 100 ml test solution 0.1 N chloro substituted acetic acids, without and with concentration of inhibitors at which maximum efficiency was observed. Platinized platinum foil was used as the auxiliary electrode. Standard calomel electrode with Luggin capillary was used for the measurement of electrode potentials.

EXPERIMENTAL FINDINGS AND ANALYSIS

To measure the effect of concentrations of the inhibitor molecules on the corroding surface the conductance has been determined in the presence of different compounds at the concentration of 2, 4, 6, 8, 10 and 15 ppm for a fixed immersion period of 24 hours at 30^0C.

Table 1 shows that the conductance of the solution in the presence of different concentrations of the compounds before dipping the specimens.

It is evident from the Table that a fall in the conductance of the solution has been noticed. From the Table it can be seen further that the added compound affects the conductance of the solution. Conductance