BONDING OF THE CARBONYL GROUP OF THE MOLECULAR STRCTURE OF PALM OLEIN ON ALUMINIUM ALLOY IN ACIDIC SOLUTION

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ABSTRACT

Aluminium (Al) is an amazing material due to its low cost, lightweight and corrosion resistance. However, Al is easily corroded when exposed in solution containing pitting agents. Suitable corrosion inhibitor should be used and palm olein has a promising characteristics. For this work, formulation of palm olein (PO) as corrosion inhibitor for Al in aqueous solution was developed. Tween 20, hexane and diethyl triamine were used as the additives and the formulated inhibitor was labeled as POT20HA. The X-ray diffractometer (XRD) spectrum revealed that the POT20HA was from an amide compound. The inhibition efficiency (IE) and behaviour of the POT20HA were determined through weight loss (WL) and potentiodynamic polarization (PP). For the tests, Al 6061 was immersed in 1 M HCl solution at different temperatures of 26°C (299 K), 50°C (323 K) and 70°C (343 K) with different concentrations of POT20HA of 0, 0.03, 0.07, 0.10, 0.13 and 0.17 M. The WL test had shown that the IE increased with increasing concentration of POT20HA at all temperatures under study. However, the IE decreased with increasing of temperature and immersion time. The PP study revealed the POT20HA as a mixed type of inhibitor, which is capable of protecting both the anodic and cathodic reactions of the corrosion process. The corrosion tests showed that POT20HA adsorbed on the Al 6061 surface through physical adsorption according to the Langmuir isotherm relationship. The adsorption mechanism of POT20HA on the Al 6061 was through protonation of micelles by the HCl solution. The protonated micelles, with the presence of Cl^- ions, adsorbed both on the cathodic and anodic sides of the corroding surface. In such a way, bonding behavior of the carbonyl group of the molecular structure of the palm olein on aluminium alloy in acid solution was understood.