

H. Nady, M. M. El-Rabiei, M.A. Migahed, M. Fathy, Corrosion Control of Cu-10Al-10Ni and Cu-10Al-10Zn Alloys in Seawater Environment by Some Ethoxylated Tolyltriazole Derivatives, Zeitschrift für Physikalische Chemie (2017) Accepted.

الملخص الانجلىزى للبحث:

Protection of metals from being damaged under the effect of corrosion occurs by several methods like the addition of alloying elements or inhibitors. A new family of some nonionic surfactants based on tolyltriazole derivatives (TTAs) having various ethoxyl chain lengths were prepared and their chemical structure was elucidated by using different spectroscopic techniques (FTIR and ¹H-NMR). The corrosion inhibition capability of these surfactants [TTA, TTA (12) and TTA (24)] was investigated on two Cu-ternary alloy surfaces (Cu-10Al-10Ni and Cu-10Al-10Zn) in seawater by potentiodynamic polarization and electrochemical impedance spectroscopy measurements. The results revealed that ethoxylated tolyltriazole compounds, TTAs, inhibited corrosion of Cu-ternary alloys in the investigated sea water environment, yielding maximum inhibition efficiencies of 92 % and 91 % for Cu-10Al-10Ni and Cu-10Al-10Zn, respectively. The corrosion and corrosion inhibition behavior of the Cu alloy specimens were influenced by the metal composition and microstructure. The presence of inhibitors and increase of concentration greatly decreases corrosion rate, parameters determined from polarization curves and EIS plots show that inhibitors decrease both cathodic and anodic current densities, suppressing charge transfer processes by adsorption on alloy surface. The corrosion inhibition process is based on the adsorption of the TTAs molecules on the alloy surface, and the adsorption follows the Langmuir adsorption isotherm. The free energy of adsorption of the different tolyltriazole derivatives on the alloy surfaces was in the range of $\approx -38 \text{ kJ mol}^{-1}$, which reveals a strong physical adsorption of the inhibitor molecules on the metallic surface. SEM/EDX studies confirmed that TTA inhibitors could protect Cu alloys by adsorption on the alloy surface.

