10th INTERNATIONAL CONFERENCE ON COMPUTATIONAL AND EXPERIMENTAL SCIENCE AND ENGINEERING (ICCESEN-2023)

2023

Bio-molecule as a sustainable protection against corrosion of ductile iron in acid solution: Experimental and computational studies

Brahim IDIR, Farida Kellou-Kerkouche, Lynda BENHADDAD, Mustapha DJAMA, Amel KOUACHE

Abstract : The present work is devoted to study the inhibition effect and adsorption mechanism of Loratadine (LRD) on cast iron in 1 M HCl. Polarization curve, electrochemical impedance spectroscopy (EIS) and surface analysis were carefully investigated to indicate the inhibition effect of LRD on cast iron in 1 M HCl. On the other hand, Theoretical study evidenced the good loratadine reactivity toward cast iron surface. Polarization curves revealed that LRD behaves as mixed type inhibitor. The inhibition efficiency increased with the increasing concentration of LRD and reached 91 % (by EIS) at 0.46 mM of inhibitor. It showed that the adsorption of LRD on cast iron surface followed the Langmuir isotherm. The value of ?G°ads (-37.52 kJ/mol) and the effectiveness of LRD at high temperatures, suggest physicochemical interactions of LRD with the cast iron surface. A good correlation was made between some electronic properties of LRD molecules and adsorption mode. The obtained results showed that Loratadine is an efficient corrosion inhibitor for cast iron in 1 M HCl.

Keywords : corrosion inhibitor, EIS, Quantum calculations, Biomolecule