Assessment of Allium sativum and Persea americana as a Natural Corrosion Inhibitor on Carbon Steel

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Corrosion inhibitors are substances that slow down the process of corrosion in metals. In this study, an innovative natural corrosion inhibitor was synthesized using avocado oil and garlic extract. The intention of this study was to determine whether the combination of garlic extract and avocado oil as a corrosion inhibitor will create an efficient corrosion inhibitor against metal corrosion in HCl and NaCl water. Stabilized garlic extract and avocado oil were prepared and combined in various concentrations, which was mixed with HCL, with the control being the HCL with no inhibitor, in three replicates. A piece of carbon steel was placed in each container and the sets were put under a fume hood for 48 hours. After 48 hours, the mass loss and corrosion rate of the steel were calculated. Also, the surface coverage and inhibition efficiency of the inhibitors were calculated using the corrosion rate and the results were analyzed. These same procedures were repeated using NaCl water as the medium. This study demonstrated that the 2.5:7.5 ml garlic extract to avocado oil inhibitor showed the lowest mass loss and corrosion rate in HCl and NaCl water set. This inhibitor also showed the highest surface coverage and inhibition efficiency in both sets, making it more efficient than the other combinations in this experiment. As the amount of avocado oil in the combinations increased, the mass loss and corrosion rate decreased and the surface coverage and inhibition efficiency increased. TTEST analysis at $p<0.05$ performed on the mass loss showed that all the inhibitors were significantly different compared to the control in both sets. Overall, this experiment demonstrates that a combination of corrosion inhibitors is more efficient than a single inhibitor against metal corrosion.