



جامعة الإمارات العربية المتحدة  
United Arab Emirates University

The College of Graduate Studies and the College of Engineering Cordially  
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**Master Thesis Defense**

Entitled

*PRODUCTION OF ANTI-CORROSION MATERIALS FROM UAE DATE PALM WASTE*

by

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Date & Venue

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Abstract

Palm tree serves as the main source of biomass in the Gulf countries. The United Arab Emirates (UAE) alone is blessed with more than 40 million date palm trees, which generate a huge amount of waste annually. The main objective of this thesis is to examine the ability of producing a corrosion inhibitor from date palm tree, waste, starting by extracting lignin from different parts of the date palm tree and characterizing the extracted lignin, converting lignin to sodium lignosulfonate, while selecting the optimum condition for the conversion reaction and characterizing the prepared lignosulfonate. Finally, the corrosion efficiency for the prepared lignosulfonate is examined using Potentiostat corrosion test. The results show successful extraction of lignin from three different parts of palm tree (fibers, rachis and leaflet) with lignin percentage of 20, 10 and 19, respectively. Klason lignin extraction method and characterization of lignin was performed and the results were compared with literature indicating similar physical and chemical properties to previous works and studies. Furthermore, the optimum conditions for the reaction were determined to be: 4 hours reaction time, 100 °C temperature, 0.9 (g/g) reactants to lignin ratio, 25 (g/L) lignin concentration, and 0.5 M NaOH concentration. Corrosion rate of the produced sodium lignosulfonate was determined by using the Potentiostat corrosion test, the corrosion rate of tested samples reached 1.05 (mm/yr) with the addition of sodium lignosulfonate, which indicates that the produced sodium lignosulfonate can act as a good inhibitor and can be used to protect carbon steel from corrosion. Moreover, the increased of sodium lignosulfonate concentration from 5 ppm to 30 ppm decreased the corrosion rate by 19.49 %.

This study can be of high benefit to the country as the organic non-toxic corrosion inhibitor can then be produced locally from a feedstock, which is currently used as a waste in UAE society. This goes in line with UAE government's 2021-2030 vision of ensuring more sustainable development while preserving the environment

**Keywords:** Sustainability; UAE Date Palm Waste; Anti-corrosion; Lignocellulosic Biomass; Environment; Corrosion.