Ain Shams University
Faculty of Science
Chemistry Department

Studying the inhibition efficiency of the synthesized novel surfactants on the corrosion of heat exchanger tubes during chemical cleaning

A Thesis Submitted By

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Department of Chemistry – Faculty of Science

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To

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2018

APPROVAL SHEET FOR SUBMISSION

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Candidate

Khalil Mohamed

Dedication

To my lovely parents *with my deep and sincere appreciation for their great efforts during my life and my studies.*

To my Wife *Thank you for encouragement and supporting.*

To my Children *Thank you for seeing the world through your tinny beautiful eyes.*

To my friends *Thank you for helping me.*

Khalil Mohamed

Aim of the work

Aim and scope of the work

1. Synthesis of novel inhibitors

Preparation of two amides namely; N-(4-hydroxyphenyl)-3-(1H-indol-3-yl)-2-((1-methylpyrrolidin-2-ylidene)amino)propanamide (A 1) and (E)-2-((4-hydroxy-3-methoxybenzylidene)amino)-N-(4-hydroxyphenyl)-3-(1H-indol-3-yl)propanamide (A 2) and two cationic surfactants 1-dodecyl-3-(2-((1-dodecyl-1-methylpyrrolidin-1-ium-2-ylidene)amino)-3-((4-hydroxyphenyl)amino)-3-oxopropyl)-1H-indol-1-ium bromide (S 1) and (E)-1-dodecyl-3-(2-((4-hydroxy-3-methoxybenzylidene)amino)-3-((4-hydroxyphenyl)amino)-3-oxopropyl)-1H-indol-1-ium bromide (S 2).

2. Structure elucidation

Structure conformation of the prepared inhibitors carried out using different spectroscopic techniques:

- ^{1}HNMR spectroscopy.
- Mass spectroscopy.

3. Determination of the physical properties

Determination the surface properties for the prepared surfactants and the thermodynamic parameters of the micelle formation.

4. Application:

Evaluation the inhibition efficiency of the novel inhibitors for the corrosion of carbon steel and copper-zinc alloy in 1 M HCl solution during the acid cleaning of heat exchanger. The inhibition efficiency was determined using weight loss technique, potentiodynamic polarization and electrochemical impedance spectroscopy techniques. The thermodynamic parameters for corrosion and adsorption processes were calculated for interpretation the inhibition mechanism of the synthesized inhibitors. The surface morphology of carbon steel and copper-zinc alloy samples was investigated by scanning electron microscopy (SEM). Also energy dispersive X-ray (EDX) survey spectra were used to determine which elements were present on the carbon steel surfaces before and after exposure to the inhibitors solutions.

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