Supporting Information's

Novel Imine-Tethering Cationic Surfactants: Synthesis, Surface Activity, and Investigation of the Corrosion Mitigation Impact on Carbon Steel in Acidic Chloride Medium via Various Techniques

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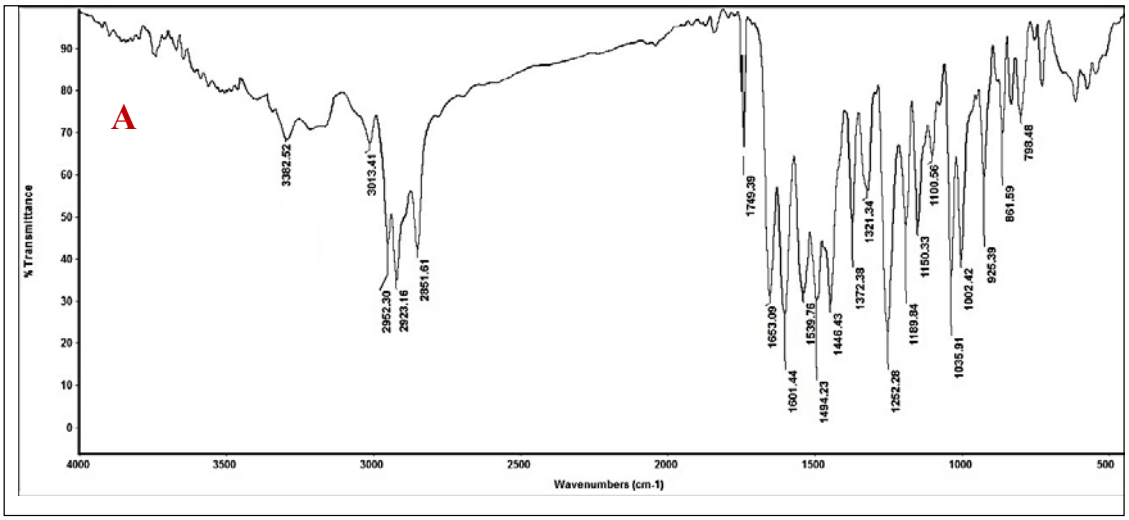
Materials

The metal used is carbon steel (C-Steel) which has the following structure (wt./wt.%): 0.05 Ni, 0.02 Cr, 0.0256 Si, 1.81 Mn, 0.09 P, 0.1 C, 0.001 V, 0.01 Mo, 0.03 Cu, and the remainder is iron.

3-(*N, N* Dimethylamino)-1-propylamine (99%), 2-Chlorobenzaldehyde (97%), and Decyl (98%) were purchased from Acros organics Company (Belgium). Hexadecyl (97%) alcohol was attained from M/s S.D. Fine chemicals Pvt. Ltd (India) and tetrahydrofuran (99%) were obtained from Alnasr-chemical Company. Solvents (ethyl acetate, ethyl alcohol absolute (99%), and diethyl ether (99%) were obtained from Algomhoria Chemical Co., Cairo, Egypt. All the utilized solvents and reagents were received without further purification.

Figure S1. IR, ^{1}H, and ^{13}C NMR spectra of *((2-chlorobenzylidene)amino)-N,N-dimethyl-N-(2-oxo-2-(decyloxy)ethyl) propan-1- ammonium chloride* [ICS-10].



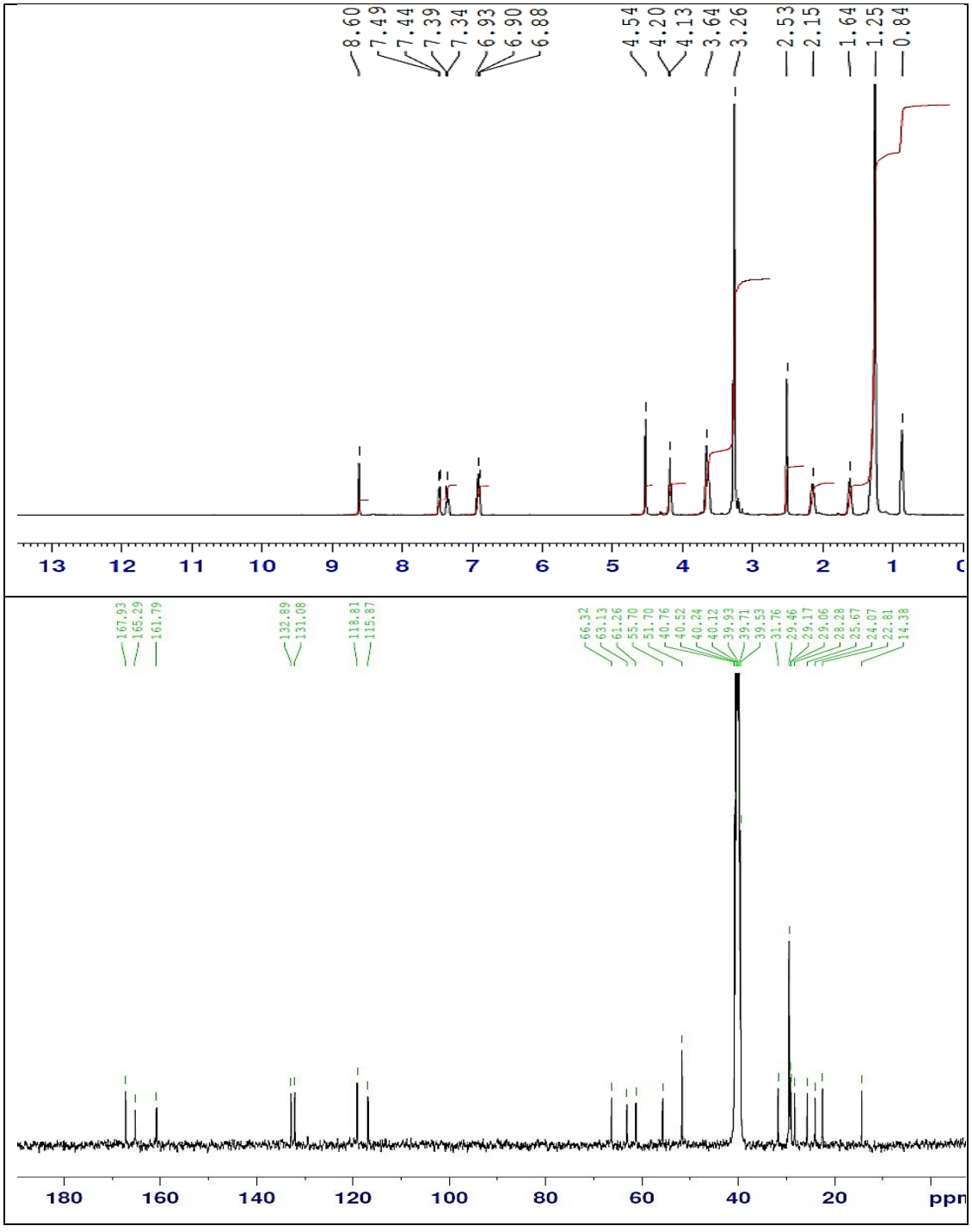

8.60
7.49
7.44
7.39
7.34
6.93
6.90
6.88
4.54
4.20
4.13
3.64
3.26
2.53
2.15
1.64
1.25
0.84
13
12
11
10
9
8
7
6
5
4
3
2
1
167.93
165.29
161.79
132.89
131.08
118.81
115.87
66.32
63.13
61.26
55.70
51.70
40.76
40.52
40.24
40.12
39.93
39.71
39.53
31.76
29.46
29.17
29.06
28.28
25.67
24.07
22.81
14.38
180
160
140
120
100
80
60
40
20
ppm

Table S1: The effects of the addition of various concentrations of ICS-10 and ICS-14 on the weight of carbon steel in 1.0 M HCl solution.

Inhibitor code	Inh. Conc. (M)	Weight loss (gm)	θ	*I.E/.*%
-	0	0.137	-	-
ICS-10	5×10^{-6}	0.070	0.4891	48.91
	1×10^{-5}	0.049	0.6423	64.23
	5×10^{-5}	0.027	0.8029	80.29
	1×10^{-4}	0.019	0.860	86.00
	5×10^{-4}	0.012	0.9113	91.13
ICS-14	5×10^{-6}	0.053	0.6131	61.31
	1×10^{-5}	0.040	0.7080	70.80
	5×10^{-5}	0.018	0.8686	86.86
	1×10^{-4}	0.014	0.8978	89.78
	5×10^{-4}	0.008	0.9416	94.16

Table S2: The inhibition capacity comparisons for some conventional Surfactants

Inhibitor type	Corrosive medium	Inhibitor concentration	Substrate type	Inhibition capacity / %	Reference
ICS-10	1 M HCl	0.5 mM	C- steel	~92	**Current study**
ICS-14	1 M HCl	0.5 mM	C- steel	~ 95	**Current study**
4-Diethyl Amino Benzaldehyde Schiff base cationic	2N HCl	200 ppm	C- steel	~94	**[1]**
Cetyl trimethyl ammonium bromide	0.5 M HCl	200 ppm	Mild-steel	~ 86.5	**[2]**
dodecyl trimethyl ammonium chloride	0.5 M HCl	200 ppm	Mild-steel	~ 87.1	**[2]**
3-((2-hydroxybenzylidene)amino)-N,N-dimethyl-N-(2-oxo-2-(decyloxy)ethyl) propan-1-ammonium chloride	3.5%NaCl +0.5 M HCl	150 ppm	Carbon Steel	~ 88.88	**[3]**
3-((2-hydroxybenzylidene)amino)-N,N-dimethyl-N-(2-oxo-2-(tetradecyloxy) ethyl) propan-1-ammonium chloride	3.5%NaCl +0.5 M HCl	150 ppm	Carbon Steel	~ 93.80	**[3]**
Quaternary ammonium surfactants	1.0 M HCl	720 ppm	C-steel	~ 85.0	**[4]**

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