

**Ain Shams University  
Faculty of Science  
Department of Chemistry**



# **"Preparation and Characterization of Some Cationic Surfactants Capped Metal Nanoparticles and Their Applications"**

**A Thesis Submitted for Degree of Ph.D. in Organic Chemistry  
To Department of Chemistry – Faculty of Science  
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**By**

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إهداء

أهدي هذه الرسالة إلى روح والدي رحمه الله  
وأسأل الله العظيم أن يتغمده بواسع رحماته  
وإلى أمي الحبيبة  
وإلى زوجتي

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## **List of Abbreviation**

<b>Symol.</b>	<b>Abbreviation Name</b>	<b>Unit</b>
$\gamma$	Surface Tension	mN/m <sup>-1</sup>
CMC	Critical Micelle Concentration	mM/L
$\Gamma_{max}$	Maximum Surface Excess	mol.cm <sup>-2</sup>
A <sub>min</sub>	Minimum Surface Area	A <sup>2</sup>
$\pi_{CMC}$	Effectiveness	mNm <sup>-1</sup>
PC <sub>20</sub>	Efficiency	-----
$\Delta G^o_{mic}$	Change free energy of micellization	Kj mol <sup>-1</sup>
$\Delta G^o_{ads}$	Change free energy of adsorption	Kj mol <sup>-1</sup>
$\Delta H_{mic}$	Change in enthalpies of micellization	Kj mol <sup>-1</sup>
$\Delta H_{ads}$	Change in enthalpies of adsorption	Kj mol <sup>-1</sup>
$\Delta S_{mic}$	Change in entropy of micellization	Kj mol <sup>-1</sup> K <sup>-1</sup>
$\Delta S_{ads}$	Change in entropy of adsorption	Kj mol <sup>-1</sup> K <sup>-1</sup>
CR	Corrosion rate of carbon steel	mg/cm <sup>2</sup> .h
W	weight loss	mg
S	Area of mild steel species	Cm <sup>2</sup>
t	time of immersion	hrs
I <sub>Corr</sub>	Corrosion current densities	mA cm <sup>-2</sup>
$\beta_a$	Anodic Tafel slope	mV dec <sup>-1</sup>
$\beta_c$	Cathodic Tafel slope	mV dec <sup>-1</sup>
E <sub>corr</sub>	Corrosion potential	mV

### *List of Abbreviation*

$R_s$	Solution resistance	ohm cm <sup>2</sup>
$R_{ct}$	Charge transfer resistance	ohm cm <sup>2</sup>
$C_{dl}$	Double layer capacitance	μF cm <sup>-2</sup>
$Z''_{img}$	Frequency at maximum imaginary component	Hz
$E_a$	Activation Energy	kJ mol <sup>-1</sup>
$\Delta H^*$	The change in enthalpy of activation	kJ mol <sup>-1</sup>
$\Delta S^*$	The change in entropy of activation	J mol <sup>-1</sup> K <sup>-1</sup>
$\Theta$	Surface coverage	-----
$\eta$	Efficiency of inhibition	-----
TEM	Transmission Electron Microscope	-----
DLS	Dynamic Light Scattering	-----
EDX	Energy Dispersive X-ray spectroscopy	-----
EIS	Electrochemical impedance spectroscopy	-----
SRB	Sulfate reducing Bacteria	-----
AgNPs	Silver Nanoparticles	-----

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