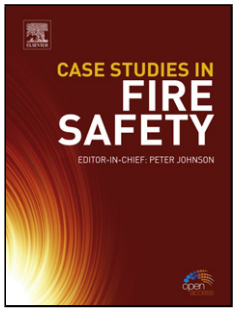

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Authors: Mohammad Mahdavian, Ali Reza Tehrani-Bagha, Eiman Alibakhshi, Shabnam Ashhari, Mohammad Javad Palimi, Sajad Farashi, Soheila Javadian, Fatemeh Ektefa

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Corrosion of mild steel in hydrochloric acid solution in the presence of two cationic gemini surfactants with and without hydroxyl substituted spacers

Mohammad Mahdavian[a,*], Ali Reza Tehrani-Bagha[b], Eiman Alibakhshi[a], Shabnam Ashhari[c], Mohammad Javad Palimi[a], Sajad Farashi[d], Soheila Javadian[e], Fatemeh Ektefa[e]

[a] *Surface Coatings and Corrosion Department, Institute for Color Science and Technology, Tehran, Iran*

[b] *Chemical Engineering Department, American University of Beirut (AUB), Beirut, Lebanon*

[c] *Technology Department, MAPNA Generator Engineering and Manufacturing Company (PARS), Karaj, Iran.*

[d] *Faculty of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran*

[e] *School of Basic Sciences, Tarbiat Modares University, Tehran, Iran*

[*] Corresponding author: mahdavian-m@icrc.ac.ir, Tel.: +98 2122969771; Fax: +98 2122947537

Research highlights:

- Corrosion of mild steel in hydrochloric acid solution was studied.
- Effect of hydroxyl group on inhibition of gemini surfactants was evaluated.
- Electrochemical tests showed higher inhibition in the presence of hydroxyl group.
- AFM and SEM showed less corrosion attack for hydroxyl functional surfactant (HFS).
- Better inhibition of HFS was connected to its quantum chemical parameters.

Abstract:

The corrosion inhibition mechanism of mild steel in acidic solution and in the presence of two cationic gemini surfactants have been studied. These are two surfactants having 12-carbon hydrophobic tails: one with a tetramethylene spacer and the other one with the same spacer containing two hydroxyl groups. EIS and polarization and electrochemical noise measurements revealed superior corrosion inhibition of hydroxyl functional surfactant compared with its counterpart with no hydroxyl group. Surface analysis including AFM, and SEM confirmed less corrosion attacks on the sample exposed to hydroxyl functional surfactant solution. Quantum chemical parameters revealed a good correlation with electrochemical results.

Keywords: A. Acid solutions; B. Mild steel; B. EIS; B. AFM, C. Acid inhibition.