

Author's response:

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≤ Adsorption and corrosion inhibitive properties of novel surfactants in the series of fatty acids based on palm oil on carbon steel in CO₂-containing solution ≥

Reviewer #1:

1. Line 72: Correct structures of the compounds cited according to table 2.

√ the structures of compounds was corrected.

2. Paragraph 3.1. Line 138: about Figure 1, you only interpret the change in corrosion rate without inhibitor, you must supplement the interpretation even for the case in the presence of inhibitor.

√ the interpret the change in corrosion rate in the presence of inhibitor was done.

3. Paragraph 3.1: The authors have interpreted the best efficiencies achieved by the compounds IV and V for two reasons: I- line 176 and II- line 178. The second reason is to eliminate because the surfactans studied have the same alkyl chains.

√ the second reason was deleted.

4. Line 291: under cathodic control [?]. put a reference to the end.

√ the reference was cited.

5. Based on the obtained curves in Figure 3, it is preferable to reproduce the figure 4 (Potentiodynamic curves) stabilizing the corrosion potential on the bearing of variation, that is to say, after 3 hours of immersion.

√ Steady state of open circuit corrosion potential (E_{corr}) for the investigated electrode in the absence and presence of the studied inhibitor was attained after 60 min from the moment of immersion, because at this time the corrosion potential got stable.

6. Line 332: The donor group which exists in the compounds IV and V, and not in the other compounds is oxygen but not nitrogen. So the authors have to change: such as nitrogen by such as oxygen.

√ The word nitrogen was replaced by oxygen in the revised manuscript.

7. Paragraph 3.4. line 354: why the authors have used the product II instead of the product V which is better inhibitor.

√ we take inhibitor II as example

8. Change the quality of Figure 6 (a) and set the magnification scales on figures 6 (b) and 7 (b).

√ the images was replaced and High resolution is used for improvement micrograph (see Figs. 6 and 7)

9. To better understand the mechanism of action of these inhibitors, in perspective The study can be completed by the impedance measurements (EIS). and establish the equivalent circuit corresponding to the interface carbon steel/1% NaCl solution-CO₂.

✓ the electrochemical impedance spectroscopy was studied and will be published in another work as part II.

10. line 344: The electron pairs present on the N and O are Sp³ but not Sp².

✓ Sp² was replaced by Sp³.

Reviewer #2:

1. Fig 6b and 7b are too small; especially Fig. 7b shows absolutely nothing. There are no data of the magnification and it is really hard to believe why the pictures are so small. It looks like a small detail which is magnifying too much and from this reason the resolution of the Fig. 7b is so bad. Figure 7b must be replaced with better snap (image).

✓ the images was replaced and High resolution is used for improvement micrograph (see Figs. 6 and 7)

2. Authors said that chemisorption process had occurred. If this is true, then peaks of chemical elements, which inhibitor contains in its structure and which are reacted with metal should appear on the Fig. 7a. Otherwise we are talking about the physical adsorption. A hydrophobic part of the inhibitor represents a protective barrier between the corrosion medium and the metal surface, while the chemical reaction between the inhibitor and the metal does not occur.

✓ the data in Fig. 7a in the presence of 100 ppm of inhibitor II show additional peak characteristic of K element, and the lower peaks height of Fe than those observed in the absence of inhibitors. Indicating that, adsorption of inhibitor molecule on the electrode surface. These results also were confirmed by FT-IR. The data for inhibitor I (SS) showed that, S=O stretching frequency drops from the level of 1355 cm⁻¹ to the level of 1320 cm⁻¹. This suggests that electron cloud of S=O is shifted from S=O up to Fe⁺² resulting in formation of Fe⁺²-SS complex on metal surface. This data was included in the revised manuscript (see page 10)

3. I propose to extend the experimental work. The electrochemical impedance spectroscopy (EIS) is particularly the most useful or the most appropriate method for the characterization of the adsorbed protective layer. This means quality of the protective layer, its homogeneity or porosity, etc. Therefore I recommend additionally electrochemical impedance spectroscopy.

✓ the electrochemical impedance spectroscopy was studied and will be published in another work as part II.

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