1st International Congress on Analytical Chemistry,
Electrochemistry and Separation Techniques

October 15th-16th, 2022

# A NEW SCHIFF BASE DERIVATIVE AS AN EFFECTIVE CORROSION INHIBITOR FOR A9 STEEL IN ACIDIC MEDIA

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## INTRODUCTION

The study of corrosion is one of the hottest topics in chemistry because of the direct and indirect losses caused by this scourge. Several methods have been adopted to prevent this phenomenon, especially the application of inhibitors, which is an easy, low-cost, and effective method [1]. Schiff bases possess the basic properties of compounds that are primarily qualified to be tested as corrosion inhibitors for different metal/electrolyte systems [2].

In this study, a Schiff base named 4-((4-hydroxyphenyl) imino) methyl)-2-methoxyphenol (fig 1) was synthesized, and its ability to inhibit A9 steel corrosion in 1 M hydrochloric acid was investigated using electrochemical methods (potentiodynamic polarization) and weight loss methods. The influence of the concentration, the immersion time and the temperature on the corrosion processes was further explained.

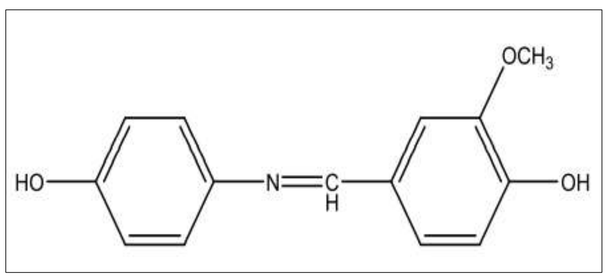


**Figure 1 :** Schematic structure of the Schiff base

## RESULTS AND DISCUSSION

### 1. Effect of inhibitor concentration on the rate of corrosion:

We carried out gravimetric measurements of A9 steel in an acid medium in the absence and in the presence of the inhibitor at different concentrations. Inhibitory efficacy is determined after 2 hours of immersion at 20°C.

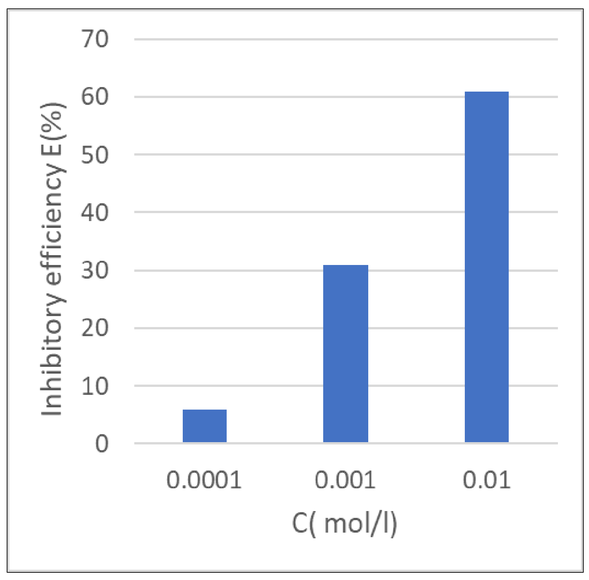


**Figure 2 :** Effect of sb concentration on the inhibitory efficiency of mild steel in 1M HCl

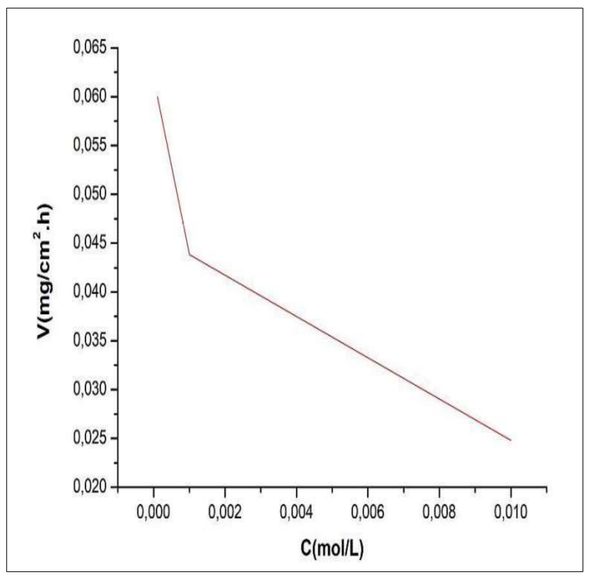


**Figure 3 :** Effect of sb concentration on the corrosion rate of mild steel in 1M HCl

It is observed that the inhibitory efficiency increases while the corrosion rate decreases with the increase in the concentration of the inhibitors. The inhibitory efficiency reaches a maximum value of 61% for a concentration of 10 -2 M

### 2. Effect of temperature on corrosion rate:

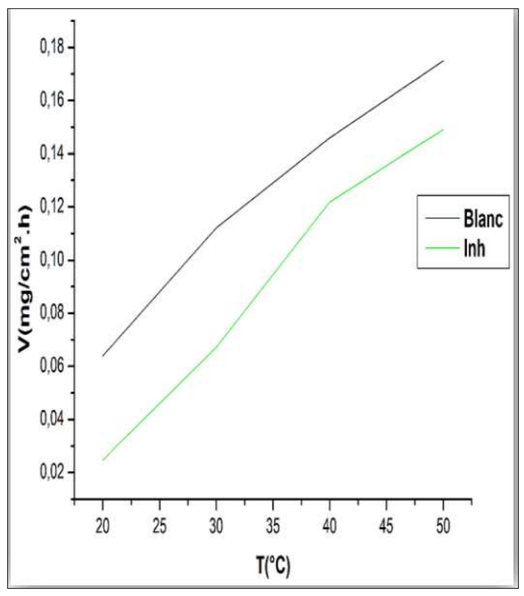


**Figure 4:** Effect of temperature on the corrosion rate of mild steel in 1M HCl

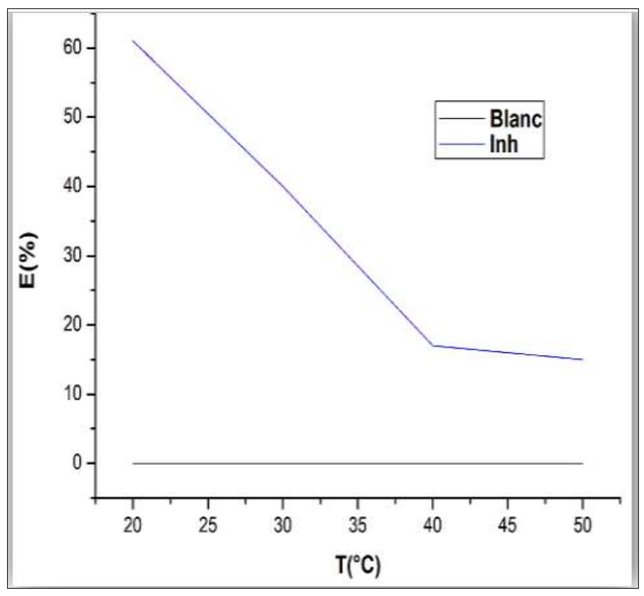


**Figure 5 :** The inhibitory efficiency of mild steel in 1M HCL

### 3. Electrochemistry study: Polarization Curve:

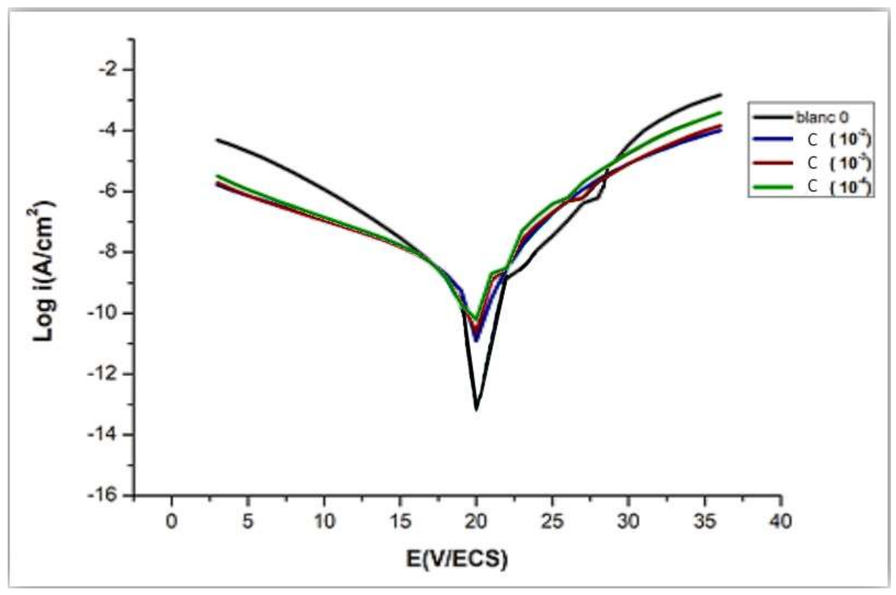


**Figure 6 :** Potentiodynamic Polarization curves for A9 steel in 1M HCl obtained at 25 ° C without and with inhibitors

The cathodic polarization curves are in the form of straight lines indicating that the hydrogen reduction reaction on the surface of the mild steel is carried out according to a pure activation mechanism. The decrease in the density of the corrosion current is due to the blocking effect of the active sites on the metal surface by the adsorbed molecules of the extract. Both anodic and cathodic partial currents are also diminished. These observations confirm the mixed character of the inhibitor.

## CONCLUSION

- According to the weight loss method, the studied Schiff base functions as an effective corrosion inhibitor for the corrosion of A9 steel in 1 M HCl, and it could be a potential alternative for hazardous corrosion inhibitors. Its efficiency is concentration and temperature dependent.
- The potentiodynamic polarization measurement indicates that the Schiff base is a mixed-type inhibitor and protects by forming a surface film through adsorption obeying the Langmuir isotherm.

## REFERENCES

[1] Messali, M., Larouj, M., Lgaz, H., Rezki, N., Al-Blewi, F. F., Aouad, M. R., ... & Chung, I. M. (2018). A new schiff base derivative as an effective corrosion inhibitor for mild steel in acidic media: Experimental and computer simulations studies. Journal of Molecular Structure, 1168, 39-48.

[2] Verma, C., & Quraishi, M. A. (2021). Recent progresses in Schiff bases as aqueous phase corrosion inhibitors: Design and applications. Coordination Chemistry Reviews, 446, 214105.