

Synthesis of ketimine and evaluation of its anticorrosion activity

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Abstract

This work is inscribed in the frame of synthesis of 3 -[(1E)-N-(2-aminophenyl)ethanimidoyl]-4-hydroxy—methyl-2H-pyran-2-one from the DHA which condenses with o-PDA and its evaluation as a corrosion inhibitor in HCl 1M solution. To measure the anti corrosion action we used the method with weight loss. The tests highlighted, concerning the corrosion of copper, an inhibition efficiency of 42.10%.

Keywords: DHA; o-PDA; Ketimine; weight loss method; Anticorrosion activity.

1. Introduction :

The present work aims to present the study of an heterocyclic system derived from dihydroacetic acid, a cheap commercial product at the origin of many heterocyclic systems of great interest.

Our study presents an original approach in the study of the behavior of the heterocyclic ketimine system as a corrosion inhibitor given the good results obtained on the Schiff bases in an aggressive corrosive medium of acid type on copper.

Our work is based on:

- Synthesis and characterization of the structure for the synthesis of 3 - [(1E) -N- (2-aminophenyl) ethanimidoyl] -4-hydroxy-methyl-2H-pyran-2-one from DHA and o -PDA;
- The evaluation of its corrosion inhibiting activity on copper in hydrochloric acid medium.

2. Bibliographic update on the synthesis of some derivatives from DHA in the presence of o-PDA:

The literature [1, 2] shows that the reflux of DHA **1** with o-PDA **2** in ethanol gives ketimine **3**

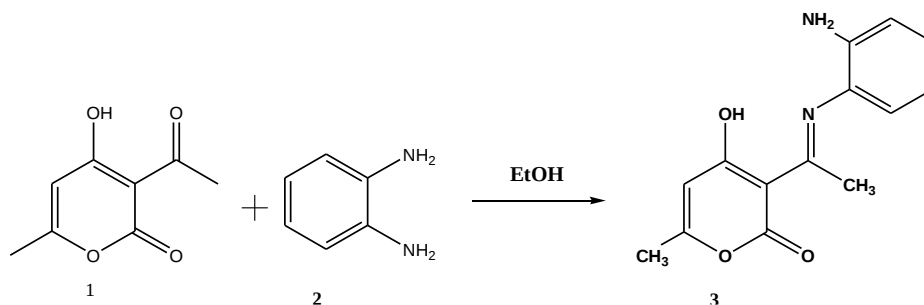


Figure1: Synthesis of 3-[(1E)-N-(2-aminophényl) éthanimidoyl]-4-hydroxy-méthyl-2H-pyran-2-one **3**

2.1. Spectroscopic analysis:

IR (KBr) cm^{-1} : 1357 (C-N), 1600 (C=N, imine), 1657 (C=O, pyrone), 3357 (NH_2).

^1H NMR spectroscopy:

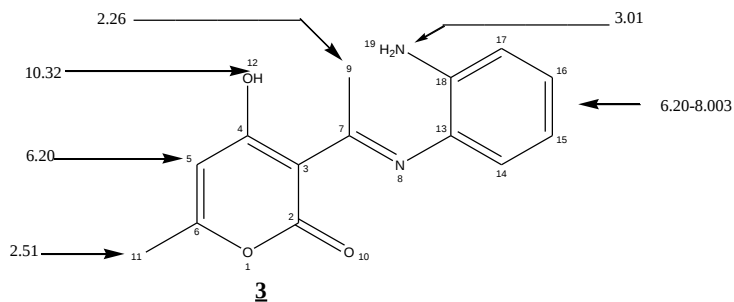


Figure 2: ^1H NMR analysis of compound **3**

2.2. Study of anti-corrosion activity by weight loss method:

In order to assess the corrosion inhibiting capacity of compound **3** in 1M hydrochloric acid medium, the weight loss approach was adopted.

In order to carry out the gravimetric measurements, tests were carried out on a copper-plated metal previously prepared in the form of rectangular pieces 2.2x2.2cm and 01mm thick.

Electrolytic solutions were prepared with the selected concentrations of inhibitors.

3. Results and discussion:

3.1. Gravimetric study:

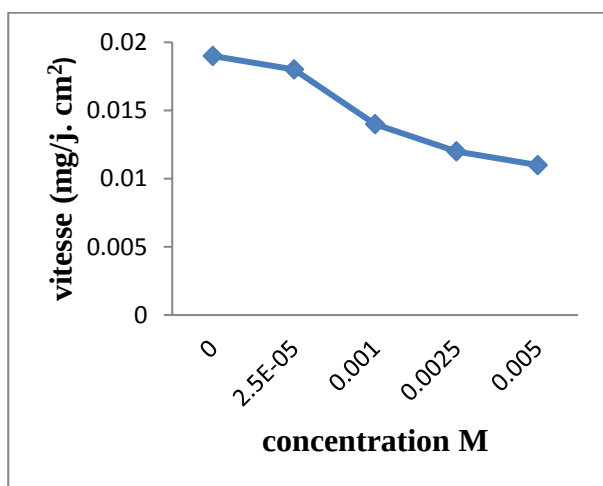


Figure 3: Evolution of the corrosion rate in terms of the concentration

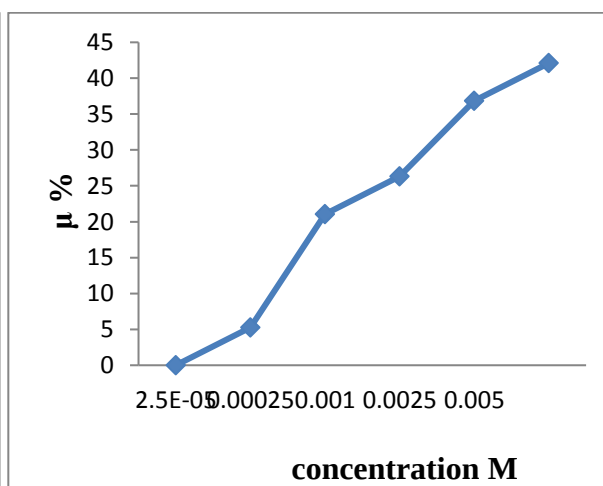


Figure 4: Evolution of the inhibition efficiency in terms of the concentration

The corrosion rate decreases while the inhibition efficiency increases with the inhibitor concentration.

3.2. Isothermal adsorption:

Langmuir isotherm:

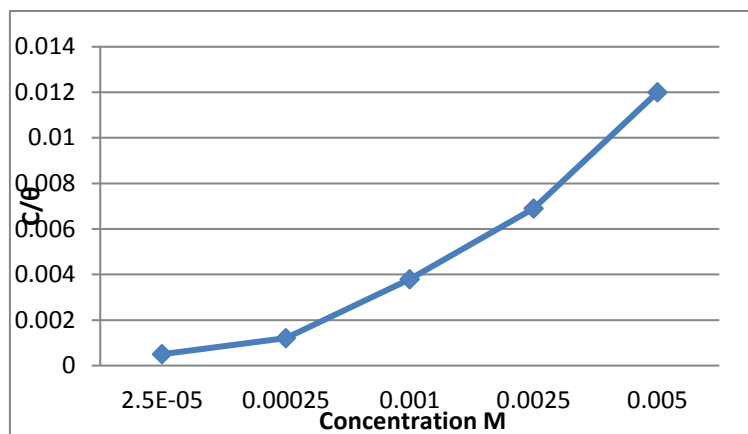


Figure 5: Langmuir adsorption isotherm of copper in 1M HCl medium in the presence of inhibitor

The C / θ curve in terms of the concentration is not linear for the inhibitor at 24 ° C in the 1M HCl solution, this suggests that the adsorption of the inhibitor on the surface of the copper does not obey the Langmuir isotherm.

These results are interesting since the curve is not far from linearity.

Future work could refine these results, since there is no such work on this structure to our knowledge.

4. Conclusion

The realization of the present work allowed us to synthesize the 3 - [(1E) -N- (2-aminophenyl) ethanimidoyl] -4-hydroxy — methyl-2H-pyran-2-one a ketimine of DHA commercial product can be inexpensive, simple efficient and with good yields of around 88%.

The study of their anticorrosion activity in a 1M HCl medium by weight loss:

Simple and effective method which allowed us to make a first approach in the evaluation of this activity for our molecule, the following main results were obtained:

- The corrosion rate decreases while the inhibitory efficiency increases with the inhibitor concentration for a maximum value $C = 5 \times 10^{-3}$ M.

-A minimum corrosion rate of 0.011 (mg / d.cm²) which corresponds to a maximum efficiency of 42.10% could be obtained.

- The efficiency rate of 42.10% represents a very promising result for the use of this type of compound: simple to synthesized and inexpensive.

In perspective:

Other methods of evaluating corrosion may be considered in order to study the phenomena that occur on the surface of the metal.

References:

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