SINTHESYS OF CINNAMIC ACID DERIVATIVES WITH CORROSION INHIBITION ACTIVITY FOR CARBON STEEL ALLOY

VIANA, Thiago Silva (IC)[1], DUQUE, Pedro Henrique Fonseca (IC)[1], PINTO, Camila Prestes (IC)[1], AGUIAR, Ana Luiza Carvalho Guimaraes (IC)[1], SOUZA, Flávia Carvalho (PQ)[2], COTRIM, Bruno Almeida (PQ)[3], RESENDE, Gabriel de Oliveira (PQ)[3], BARRETO JR, Cleber Bomfim (PQ)[3*]

[1]Aluno do curso técnico do IFRJ-Campus Rio de Janeiro, [2]IFRJ-Campus São Gonçalo, Rio de Janeiro,

[3]IFRJ-Campus Rio de Janeiro

**cleber.barreto@ifrj.edu.br*

Keywords: corrosion inhibitor, aromatic thioureas

INTRODUCTION

Corrosion is a type of deterioration found mainly in metal structures. Metals that compose these structures oxidize when they come into contact with substances with high reduction potential, therefore care requires to prevent these reactions. The corrosion products cause negative changes in metal alloys properties as mechanical strength, aesthetics, ductility, elasticity, among others. Reversing the corrosion process is extremely expensive, making prevention the best way to solve this problem.[1]

Researchers conducted to minimize the corrosion phenomena in copper, iron and other metal alloys, several classes of organic compounds such as indole, azoles, thiazoles, oxazolidines, ammonium salts, and others were tested and have demonstrated a good anticorrosion activity profile.[2] These compounds exhibit this anticcorrosive activity due to the presence of π electrons and/or atoms which have non binding electron pair (O, N, S, and others), causing a phenomenon of adsorption and thus creating a protective film on the metal surface. Depending on the structure of the molecule and the functional groups present, there may be two types of sorption: physisorption or chemisorption, the latter involving coordination with the metal, and therefore better adsorption efficiency.[3]

Because of the economic importance in obtaining substances with potential anticorrosion activity, we propose the synthesis of cinnamic acid thiourea derivatives, in order to obtain a high efficiency corrosion inhibitor that could be at the same time easy to obtain and have low production cost.

RESULTS AND DISCUSSION

The cinnamic acid and *m*-nitrocinnamic were synthesized from benzaldehyde and m-nitrobenzaldehyde by aldol condensation with malonic acid in pyridine/ethanol at 72% and 52% yield respectively.

The synthesis of *o*-nitrocinnamic and *p*-nitrocinnamic acid was obtained by nitration of cinnamic acid (73% yield) with a para:ortho regioisomers ratio of 9:1.

After the obtaining of cinnamic acid and its nitrated derivatives in the ortho, meta and para positions, we started the synthesis of its thiourea derivatives, converting carboxylic acids into acyl chlorides followed by reaction with ammonium thiocyanate and an aromatic amine. The results are summarized in Table 1.

Table 1. Thioureas synthesized from cinnamic acid and its derivatives

ENTRY	CARBOXILIC ACID	AMINE	SOLVENT	OVERAL YIELD
1	cinnamic acid	4-nitro aniline	acetonitrile	30
2	*p*-nitro cinnamic acid	4-nitro aniline	acetonitrila	29%
3	*p*-nitro cinnamic acid	2-amino pirimidine	acetonitrile	X
4	*m*-nitrocinnamic acid	4-nitro aniline	acetone	26%

CONCLUSION

A series of cinnamic acid thiourea derivatives was synthesized with reasoable yields. New thiourea derivatives and optimization of chemical process is underway. Tests to determine the corrosion activity are under evaluation.

ACKNOWLEDGEMENTS

Acknowledgments to IFRJ - Campus Rio de Janeiro and the program PFRH/PETROBRAS

REFERENCES

[1] Jóia, C. J. B. M.; Brito, R. F.; Barbosa, B. C.; Moraes, F. D.; Pereira, A. Z. I.; Marques, L. C. C.; *Corrosion*, **2001**, 57, 1007.
[2] Ali, S. a.; Al-Muallem, H. a.; Rahman, S. U.; Saeed, M. T. *Corrosion Science* **2008**, *50*, 3070–3077.
3 Niamien, P. M.; Kouassi, H. a.; Trokourey, A.; Essy, F. K.; Sissouma, D.; Bokra, Y. *ISRN Materials Science* **2012**, *2012*, 1–15.