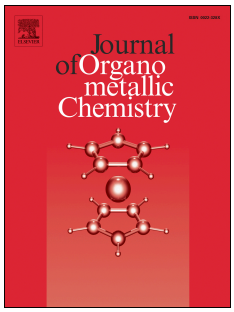
Accepted Manuscript



Organotin(IV) compounds derived from ibuprofen and cinnamic acids, an alternative into design of anti-inflammatory by the cyclooxygenases (COX-1 and COX-2) pathway

Maria M. Romero-Chávez, Kayim Pineda-Urbina, David J. Pérez, Fernando Obledo-Benicio, Angelina Flores-Parra, Zeferino Gómez-Sandoval, Ángel Ramos-Organillo

PII: S0022-328X(18)30155-4

DOI: 10.1016/j.jorganchem.2018.02.049

Reference: JOM 20348

To appear in: *Journal of Organometallic Chemistry*

Received Date: 23 January 2018

Revised Date: 23 February 2018

Accepted Date: 28 February 2018

Please cite this article as: M.M. Romero-Chávez, K. Pineda-Urbina, D.J. Pérez, F. Obledo-Benicio, A. Flores-Parra, Z. Gómez-Sandoval, Á. Ramos-Organillo, Organotin(IV) compounds derived from ibuprofen and cinnamic acids, an alternative into design of anti-inflammatory by the cyclooxygenases (COX-1 and COX-2) pathway, *Journal of Organometallic Chemistry* (2018), doi: 10.1016/j.jorganchem.2018.02.049.

Organotin(IV) compounds derived from ibuprofen and cinnamic acids, an alternative into design of anti-inflammatory by the cyclooxygenases (COX-1 and COX-2) pathway

Maria M. Romero-Chávez[a], Kayim Pineda-Urbina[a], David J. Pérez[b], Fernando Obledo-Benicio[a], Angelina Flores-Parra[c], Zeferino Gómez-Sandoval[a] and Ángel Ramos-Organillo[a]*.

[a] *Facultad de Ciencias Químicas, Universidad de Colima, Km. 9 Carr. Colima-Coquimatlán, C.P. 28400, Coquimatlán, Colima, México. mariaromerochavez@ucol.mx; aaramos@ucol.mx.*

[b] *Faculty of Pharmacy and Pharmaceutical Sciences , University of Alberta , Edmonton, Alberta, Canada, T6G 2E1.*

[c] *Departamento de Química, Centro de Investigación y de Estudios Avanzados-IPN. Apartado Postal 14-740. México 07000, D. F. México*

Abstract

New tributyl-, dibutyl- and diphenyl-tin(IV) complexes derived from ibuprofen and cinnamic acids were synthesized. All compounds were structurally characterized by FT-IR, multinuclear ^{1}H, ^{13}C, ^{19}F and ^{119}Sn NMR and corroborated by 2D spectra. The NMR data in $CDCl_3$ revealed several hexacoordinated compounds with octahedral geometry. Moreover, in DMSO-d_6 some of these complexes switched to heptacoordination with a pentagonal-bipyramidal geometry due to the inclusion of a solvent's molecule; their ^{119}Sn signals moved up field by around 58 ppm compared to their chemical shifts in non-coordinated solvent $CDCl_3$. The structural results were supported by Density Functional Theory (DFT) computational calculations. In addition, a docking study was performed to evaluate the ability of ligands to interact within the active site of cyclooxygenases (COX-1 and COX-2). Docking results showed a possible binding of stannoxanes theoretically more selective towards COX-2 than ibuprofen.

Keywords: Stannoxanes; Ibuprofen; Coordination; DFT; Docking; Cyclooxygenase.

1. Introduction

Tin compounds offer a large structural variety due to the range of coordination numbers that the tin atom can adopt (4-8). This leads to different chemical shifts in ^{119}Sn NMR spectroscopy, ranging of +800 to -600 ppm [1-3]. The type and size of the substituents attached to the tin(IV) atom determines the spatial geometry, as well as their industrial and biological applications. It is well known that an increase in the coordination number of the tin atom is related to an increase in electron shielding around the nucleus, that is monitored by the NMR spectra of ^{119}Sn, as well as the $^{n}J(^{13}C\text{-}^{117/119}Sn)$ coupling