The Electrocatalytic Activity of Pyrazolyl-thioimidazolyl borate-based Zinc(II) Complexes Towards the Hydrolysis of Tris(*p*-nitrophenyl)phosphate

Gaber A. M. Mersal^{1,2,*}, Mohamed M. Ibrahim^{1,3}, Sahar Fadllalh^{1,4}, Hamdy S. El-Sheshtawy³, Mona M. B. Al-Malki¹

¹ Chemistry Department, Faculty of Science, Taif University, 888 Taif, KSA.

² Chemistry Department, Faculty of Science, South Valley University, Qena, Egypt

³ Chemistry Department, Faculty of Science, Kafr El-Sheikh University, Kafr El-Sheikh 33516, Egypt.

⁴ Chemistry Department, Faculty of Science, Cairo University, Egypt

*E-mail: gamersal@yahoo.com

doi: 10.20964/2017.01.50

Received: 13 August 2016 / Accepted: 24 October 2016 / Published: 12 December 2016

Two zinc(II) compounds of pyrazolyl-thioimidazolyl containing ligands of the types [HB(Pz^{MePh})(Tt^{OMe})₂ZnCl] **1** and [HB(Pz^{MePh})(Tt^{OMe})₂ZnClO₄] **2** were synthesized and characterized as new electrocatalysts for the hydrolysis of the phosphotriester tris(4-nitrophenyl)phosphate (TPP). Their structures were characterized spectroscopically by infrared and ¹H-¹³C NMR spectroscopies as well as elemental analysis and thermal analysis. The zinc atoms adopt distorted tetrahedral geometry with coordination chromophores ZnS₂NCl and ZnS₂NO for complexes **1** and **2**, respectively. The electrochemical behavior of the obtained zinc complexes-modified carbon paste electrode (Zn-CPE) has been studied by cyclic voltammetry. The Zn-CPE shows good electrocatalytic activities toward the hydrolysis of TPP, generates the oxidized *p*-nitrophenol at the surface of CPE. Several parameters were investigated to evaluate the performance of the biomimetic sensor obtained after the incorporation of zinc(II) complexes **1** and **2** in a carbon paste electrodes.

Keywords: Pyrazolyl-Thioimidazolyl borate containing ligand Biomimetic sensors; Electrocatalytic; DFT calculations.

[FULL TEXT](#)

© 2017 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).