New Journal of Chemistry 2018 vol.42 N1, pages 177-183

Tetracarboxylic acids on a thiacalixarene scaffold: Synthesis and binding of dopamine hydrochloride

Kutyreva M., Stoikov I.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

For the first time thiacalix[4]arene derivatives in 1,3-alternate conformation simultaneously containing amide, carboxyl and hydroxyl groups capable of forming 1:1 stoichiometry complexes with dopamine hydrochloride were obtained. The efficiency of dopamine hydrochloride binding was evaluated by a number of spectral methods. Using the methods of fluorescent, UV-Vis and NMR spectroscopy, the mechanism of interaction of the synthesized macrocycles with dopamine has been studied. It was shown that quenching of dopamine fluorescence by the studied macrocycles is carried out through a static mechanism.

http://dx.doi.org/10.1039/c7nj03953k

References

[1] C. M. Cameron R. M. Wightman R. M. Carelli Neuropharmacology 2016 111 223
[2] M. Leyton Curr. Opin. Behav. Sci. 2017 13 130
[3] P. Li G. L. Snyder K. E. Vanover Curr. Top. Med. Chem. 2016 16 3385
[4] K. Kamińska K. Noworyta-Sokołowska A. Jurczak A. Górska Z. Rogóż K. Gołembiowska Pharmacol. Rep. 2017 69 13
[5] In vivo Neuropharmacology and Neurophysiology, Neuromethods, ed., A. Philippu, 2017, 1 21, p. 428
[6] B. J. Jongkees L. S. Colzato Neurosci. Biobehav. Rev. 2016 71 58
[7] A. Dawson N. Stensson B. Ghafouri B. Gerdle T. List P. Svensson M. Ernberg J. Headache Pain 2016 17 65
[8] F. H. Khan C. D. Ahlberg C. A. Chow D. R. Shah B. B. Koo J. Neurol. 2017 264 1634
[9] P. Młynarz E. Rudzińska Ł. Berlicki P. Kafarski Curr. Org. Chem. 2007 11 1593
[10] T. Oshima K. Oishi K. Ohto K. Inoue J. Inclusion Phenom. Macrocyclic Chem. 2006 55 79
[11] S. M. Santos P. J. Costa M. D. Lankshear P. D. Beer V. Félix J. Phys. Chem. B 2010 114 11173
[12] S. Le Gac J.-F. Picron O. Reinaud I. Jabin Org. Biomol. Chem. 2011 9 2387
[13] E. Makrlík P. Vaňura P. Selucký J. Radioanal. Nucl. Chem. 2013 295 2077
[14] G. Gattuso A. Notti S. Pappalardo M. F. Parisi I. Pisagatti S. Patanè New J. Chem. 2014 38 5983
[15] F. Zou B. Wu X. Wang Y. Chen K. Koh K. Wang H. Chen Sens. Actuators, B 2017 241 160
[16] G. Arena A. Pappalardo S. Pappalardo G. Gattuso A. Notti M. F. Parisi I. Pisagatti C. Sgarlata J. Therm. Anal. Calorim. 2015 121 1073
[17] P. Vitovič D. P. Nikolelis T. Hianik Biochim. Biophys. Acta 2006 1758 1852
[18] X.-D. Xiao L. Shi L.-H. Guo J.-W. Wang X. Zhang Spectrochim. Acta, Part A 2017 173 6
[19] Q. Zhang Y. Ni S. Kokot Spectrosc. Lett. 2012 45 85
[20] J. Li H. Duan W. Wei Sh. Luo Phys. Chem. Liq. 2012 50 453
[21] M. Shi J. Lu M. S. Shoichet J. Mater. Chem. 2009 19 5485

[22] B. Mokhtari K. Pourabdollah N. Dalali J. Inclusion Phenom. Macrocyclic Chem. 2011 69 1

[23] Y. Zhou H. Li Y.-W. Yang Chin. Chem. Lett. 2015 26 825

[24] O. A. Mostovaya M. N. Agafonova A. V. Galukhin B. I. Khayrutdinov D. Islamov O. N. Kataeva I. S. Antipin A. I. Konovalov I. I. Stoikov J. Phys. Org. Chem. 2014 27 57

[25] I. I. Stoikov A. Y. Zhukov M. N. Agafonova R. R. Sitdikov I. S. Antipin A. I. Konovalov Tetrahedron 2010 66 359

[26] P. Zlatušková I. Stibor M. Tkadlecová P. Lhoták Tetrahedron 2004 60 11383

[27] P. L. Padnya E. A. Andreyko O. A. Mostovaya I. K. Rizvanov I. I. Stoikov Org. Biomol. Chem. 2015 13 5894

[28] O. A. Mostovaya P. L. Padnya D. N. Shurpik A. A. Vavilova V. G. Evtugyn Yu. N. Osin I. I. Stoikov Macroheterocycles 2017 10 154

[29] A. A. Vavilova R. V. Nosov A. N. Yagarmina O. A. Mostovaya I. S. Antipin A. I. Konovalov I. I. Stoikov Macroheterocycles 2012 5 396

[30] E. A. Andreyko P. L. Padnya R. R. Daminova I. I. Stoikov RSC Adv. 2014 4 3556

[31] N. Morohashi F. Narumi N. Iki T. Hattori S. Miyano Chem. Rev. 2006 106 5291

[32] G. A. Evtugyn R. V. Shamagsumova R. R. Sitdikov I. I. Stoikov I. S. Antipin M. V. Ageeva T. Hianik Electroanalysis 2011 23 2281

[33] K. Press I. Goldberg M. Kol Angew. Chem., Int. Ed. 2015 54 14858

[34] K. Kan M. Fujiki M. Akashi H. Ajiro ACS Macro Lett. 2016 5 1014

[35] A. E. Baydar G. V. Boyd J. Aupers P. F. Lindley J. Chem. Soc., Perkin Trans. 1 1981 2890

[36] H. Y. Wang X. G. Feng M. Zhang H. Zhao Anal. Sci. 2007 23 1297

[37] S. Garabagiu, AIP Conference Proceedings, 1565, 215

[38] Y. J. Jang J. H. Jun K. M. K. Swamy K. Nakamura H. S. Koh Y. J. Yoon J. Yoon Bull. Korean Chem. Soc. 2005 26 2041

[39] Y. Suzuki Sens. Actuators, B 2017 239 383

[40] S. Niu Y. Fang K. Zhang J. Sun J. Wan Sci. Technol. 2017 45 101

[41] R. P. Rava T. G. Spiro J. Phys. Chem. 1985 89 1856

[42] W. J. Barreto S. Ponzoni P. Sassi Spectrochim. Acta, Part A 1999 55 65

[43] J. R. Lakowicz, Principles of Fluorescence Spectroscopy, Springer, US, 2006, p. 954

[44] P. Thordarson Chem. Soc. Rev. 2011 40 1305

[45] D. B. Hibbert P. Thordarson Chem. Commun. 2016 52 12792

[46] M. Tlustý P. Slavík M. Kohout V. Eigner P. Lhoták Org. Lett. 2017 19 2933

[47] Bindfit v0.5 (Open Data Fit, 2016); http://supramolecular.org/bindfit/

[48] Anion Sensing (Top. Curr. Chem., 255), ed., I. Stibor, Springer, Berlin, 2005, p. 238

[49] A. A. Vavilova I. I. Stoikov Beilstein J. Org. Chem. 2017 13 1940

[50] L. S. Yakimova D. N. Shurpik I. I. Stoikov Chem. Commun. 2016 52 12462

[51] P. Dais M. Misiak E. Hatzakis Anal. Methods 2015 7 5226

[52] A. K. Sundaresan C. L. Gibb B. C. Gibb V. Ramamurthy Tetrahedron 2009 65 7277