

Monoaminophosphorylated pillar[5]arenes as hosts for alkaneamines

Nazarova A., Yakimova L., Klochkov V., Stoikov I.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© The Royal Society of Chemistry and the Centre National de la Recherche Scientifique. For the first time, monofunctionalized pillar[5]arenes containing a 1-aminophosphonate fragment have been obtained and characterized. As shown by NMR spectroscopy, the replacement of the amino groups by 1-aminophosphonate units in the macrocycle structure allows switching of “self-assembling-host-guest complexation” properties of the monofunctionalized pillar[5] arenes. Thus, new synthesized aminophosphonated pillar[5]arenes form host-guest complexes with aliphatic amines contrary to monoamine macrocycles that tend to self-assemble.

<http://dx.doi.org/10.1039/c6nj03345h>

References

- [1] L. Brunsveld B. J. B. Folmer E. W. Meijer R. P. Sijbesma Chem. Rev. 2001 101 4071-4097
- [2] T. Ogoshi S. Kanai S. Fujinami T. Yamagishi Y. Nakamoto J. Am. Chem. Soc. 2008 130 5022-5023
- [3] Y. Ma Z. Zhang X. Ji C. Han J. He Z. Abliz W. Chen F. Huang Eur. J. Org. Chem. 2011 5331-5335
- [4] G. Yu K. Jie F. Huang Chem. Rev. 2015 115 7240-7303
- [5] B. Xia B. Zheng C. Han S. Dong M. Zhang B. Hu Y. Yu F. Huang Polym. Chem. 2013 4 2019-2024
- [6] C. Li Chem. Commun. 2014 50 12420-12433
- [7] Z. Zhang Y. Luo J. Chen S. Dong Y. Yu Z. Ma F. Huang Angew. Chem., Int. Ed. 2011 50 1397-1401
- [8] Z. Zhang C. Han G. Yu F. Huang Chem. Sci. 2012 3 3026-3031
- [9] T. Ogoshi, Pillararenes, The Royal Society of Chemistry, Croydon, UK, 2016
- [10] N. T. Strutt R. S. Forgan J. M. Spruell Y. Y. Botros J. F. Stoddart J. Am. Chem. Soc. 2011 133 5668-5671
- [11] L. Gao S. Dong B. Zheng F. Huang Eur. J. Org. Chem. 2013 1209-1213
- [12] Y. Chen M. He B. Li L. Wang H. Meier D. Cao RSC Adv. 2013 3 21405-21408
- [13] X. Rao Z. Song L. He Heteroat. Chem. 2008 19 512-516
- [14] N. Ali S. Ali S. Zakir M. Patel M. Farooqui Eur. J. Med. Chem. 2012 50 39-43
- [15] A. Mucha P. Kafarski L. J. Berlicki J. Med. Chem. 2011 54 5955-5980
- [16] S. J. Ecker M. D. Erion J. Med. Chem. 2008 51 2328-2345
- [17] L. Azema R. Baron S. Ladame Curr. Enzyme Inhib. 2006 2 61-72
- [18] F. Orsini G. Sello M. Sisti Curr. Med. Chem. 2010 17 264-289
- [19] K. V. Turcheniuk V. P. Kukhar G.-V. Röschenthaler J. L. Aceña V. A. Soloshonok A. E. Sorochinsky RSC Adv. 2013 3 6693-6716
- [20] S. S. Sonar S. A. Sadaphal V. B. Labade B. B. Shingate M. S. Shingare Phosphorus, Sulfur Silicon Relat. Elem. 2010 185 65-73
- [21] V. P. Kukhar and H. R. Hudson, Aminophosphonic and Aminophosphinic Acids: Chemistry and Biological Activity, John Wiley & Sons, New York, 2000

- [22] N. J. Wardle S. W. A. Bligh H. R. Hudson *Curr. Org. Chem.* 2007 11 1635-1651
- [23] 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.* 2013 27 57-65
- [24] I. S. Antipin I. I. Stoikov E. M. Pinkhassik N. A. Fitseva I. Stibor A. I. Konovalov *Tetrahedron Lett.* 1997 38 5865-5868
- [25] A. K. Bhattacharya D. S. Raut K. C. Rana I. K. Polanki M. S. Khan S. Iram *Eur. J. Med. Chem.* 2013 66 146-152
- [26] S. Kandekar R. Preet M. Kashyap M. U. R. Prasad P. Mohapatra D. Das S. R. Satapathy S. Siddharth V. Jain M. Choudhuri C. N. Kundu S. K. Guchhait P. V. Bharatam *ChemMedChem* 2013 8 1873-1884
- [27] T. Ogoshi T. A. Yamagishi *Eur. J. Org. Chem.* 2013 2961-2975
- [28] M. Xue Y. Yang X. Chi Z. Zhang F. Huang *Acc. Chem. Res.* 2012 45 1294-1308
- [29] D. N. Shurpik L. S. Yakimova I. Kh. Rizvanov V. V. Plemenkov I. I. Stoikov *Macroheterocycles* 2015 8 128-134
- [30] D. N. Shurpik P. L. Padnya L. I. Makhmutova L. S. Yakimova I. I. Stoikov *New J. Chem.* 2015 39 9215-9220
- [31] D. N. Shurpik P. L. Padnya V. G. Evtugyn T. A. Mukhametzhanov A. A. Khannanov M. P. Kutyreva I. I. Stoikov *RSC Adv.* 2016 6 9124-9131
- [32] D. N. Shurpik P. L. Padnya L. T. Basimova V. G. Evtugyn V. V. Plemenkov I. I. Stoikov *Mendeleev Commun.* 2015 6 432-434
- [33] K. S. Shibaeva A. A. Nazarova D. I. Kuznetsova I. I. Stoikov *Russ. J. Gen. Chem.* 2016 86 579-583
- [34] L. S. Yakimova D. N. Shurpik L. H. Gilmanova A. R. Makhmutova A. Rakhimbekova I. I. Stoikov *Org. Biomol. Chem.* 2016 14 4233-4238
- [35] V. A. Smolko D. N. Shurpik R. V. Shamagsumova A. V. Porfireva V. G. Evtugyn L. S. Yakimova G. A. Evtugyn *Electrochim. Acta* 2014 147 726-734
- [36] L. Yakimova D. Shurpik I. Stoikov *Chem. Commun.* 2016 52 12462-12465
- [37] L. Yang X. Tan Z. Wang X. Zhang *Chem. Rev.* 2015 115 7196-7239
- [38] R. A. Cherkasov V. I. Galkin *Russ. Chem. Rev.* 1998 67 857-882
- [39] C. D. Gutsche, *Calixarenes Revisited*, Monographs in Supramolecular Chemistry, RSC, London, 1998
- [40] L. F. Lindoy and I. M. Atkinson, *Self-assembly in supramolecular systems*, RSC, Dunfermline, UK, 2000
- [41] M. D. Joeston and L. J. Schaad, *Hydrogen Bonding*, Marcel Dekker Inc., New York, 1974
- [42] V. V. Kormachov and M. S. Fedoseev, *Preparativnaya khimiya fosfora [The Preparative Chemistry of Phosphorus]*, UrO RAS Publ., Perm, 1992 (in Russian)
- [43] T. Boinski A. Szumna *Tetrahedron* 2012 68 9419-9422
- [44] Y. Chen M. He B. Li L. Wang H. Meier D. Cao *RSC Adv.* 2013 3 21405-21408