Journal of Developing Drugs
ISSN: 2329-6631

A Heidari, J Dev Drugs 2017, 6:2
DOI: 10.4172/2329-6631.1000e154

Editorial Open Access

Study of Synthesis, Pharmacokinetics, Pharmacodynamics, Dosing, Stability, Safety and Efficacy of Olympiadane Nanomolecules as Agent for Cancer Enzymotherapy, Immunotherapy, Chemotherapy, Radiotherapy, Hormone Therapy and Targeted Therapy Under Synchrotorn Radiation

Alireza Heidari*

Faculty of Chemistry, California South University, 14731 Comet St. Irvine, CA 92604, USA

***Corresponding author:** Heidari A, Faculty of Chemistry, California South University, 14731 Comet St. Irvine, CA 92604, USA, Tel: 1-775-410-4974; E-mail: Scholar.Researcher.Scientist@gmail.com

Received date: June 12, 2017; **Accepted date:** June 13, 2017; **Published date:** June 19, 2017

Editorial

Olympiadane nanomolecules are a mechanically-interlocked molecule composed of five interlocking macrocycles that resembles the olympic rings. The nanomolecule is a linear pentacatenane or a catenane [1,2]. It was synthesized and named by Fraser Stoddart and co-workers in 1994 [1,2]. The molecule was designed without any practical use in mind, although other catenanes may have possible application to the construction of a molecular **computer** in Nano scale (Figures 1 and 2) [1,2]. Furthermore, Olympiadane nanomolecules are an important class of ring fused heterocyclic Nano compounds exhibit a wide spectrum of biological, medical, medicinal, pharmaceutical, chemical and clinical activities as agent for cancer enzymotherapy, immunotherapy, chemotherapy, radiotherapy, hormone therapy and targeted therapy under synchrotorn radiation [3–34]. Therefore, development of new and efficient synthetic method for the preparation of these Nano compounds is of importance in both synthetic organic chemistry and also medicinal and pharmaceutical chemistry. The classical synthesis, pharmacokinetics, pharmacodynamics, dosing, stability, safety and efficacy of Olympiadane nanomolecules mainly involve the use of acylchlordie and 2–pyridylalkylamine, followed by subsequent functionalization to anchor various electrophilic reagents. Other approaches include the use of imine derivatives, 2–cyanopyridine, and recently, benzotriazoles. During the course of our studies towards the development of new routes to the synthesis, pharmacokinetics, pharmacodynamics, dosing, stability, safety and efficacy of fused Nitrogen heterocyclic Nano compounds, we wish to introduce a valid and an efficient procedure for the synthesis, pharmacokinetics, pharmacodynamics, dosing, stability, safety and efficacy of Olympiadane nanomolecules via one–pot condensation of pyridyl ketone with aldehyde and NH_4OAc in the presence of Lithium Chloride as an inexpensive neutral Lewis acid using microwave irradiation.

Alireza Heidari first examined one–pot reaction of benzaldehyde and amine and Trimethylsilyl Cyanide (TMSCN) in the absence of Lithium Trifluoromethanesulfonate (LiOTf). The reaction was very sluggish so that the corresponding α–amino nitrile was obtained in the low conversion (45%) even after 72 h. On the other hand, in the presence of a catalytic amount of Lithium Trifluoromethanesulfonate (LiOTf) (10–15 mol%) various types of aromatic and aliphatic aldehydes can effectively be converted into α–amino nitriles following the one–pot procedure under neutral conditions. However, we found that the Strecker amino acid synthesis with aliphatic amines under above conditions was failed. Interestingly, in presence of MS 4 Å as drying agent this reaction was very fast and the corresponding α–amino nitrile was obtained in high yield. It is important to mention that aliphatic aldehydes were also converted to their corresponding α–amino nitriles in excellent yields without any formation of aldolic product. Interestingly, we found that the catalyst can also be recovered and reused for at least five times for the Strecker amino acid synthesis without significant loss of catalytic activity.

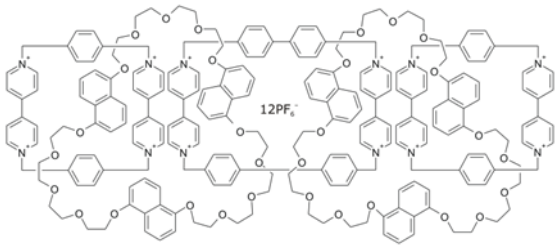

Figure 1: Molecular structure of Olympiadane nanomolecules as agent for cancer enzymotherapy, immunotherapy, chemotherapy, radiotherapy, hormone therapy and targeted therapy [1,2].

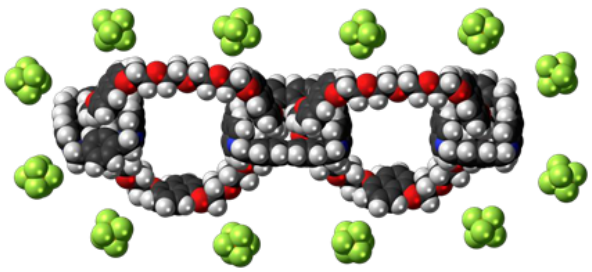

Figure 2: Molecular schematics of Olympiadane nanomolecules as agent for cancer enzymotherapy, immunotherapy, chemotherapy, radiotherapy, hormone therapy and targeted therapy [1,2].

References

1. Amabilino DB, Ashton PR, Reder AS, Spencer N, Stoddart JF (1994) Olympiadane. Angew Chem Int Ed Engl 33: 1286–1290.
2. Browne MW (1994) Chemists Make Rings of Interlocked Atoms, A Clue to Life's Origin. The New York Times. Retrieved 3 January 2016.

3. Albert JRH (2017) Molecular Reaction Dynamics Using Ion Imaging and Mass Spectrometry. In: John CL, George ET, David WK (eds.), Encyclopedia of Spectroscopy and Spectrometry. Academic Press, Oxford, pp: 830-836.
4. Meiyan Q, Xiaosong Z (2017) Molecular orbital imaging for partially aligned molecules. Optics & Laser Technology 87: 79-86.
5. Moreira L, Guimaraes NM, Azevedo NF (2017) Imaging strategies for bioinspired materials. In: Ligia R, Manuel M (eds.), Bioinspired Materials for Medical Applications. Woodhead Publishing, pp: 215-239.
6. Nikravesh M, Akbari GH, Poladi A (2017) A comprehensive study on the surface tribology of Ta thin film using molecular dynamics simulation: The effect of TaN interlayer, power and temperature. Tribology International 105: 185-192.
7. Zejiao D, Zhiyang L, Peng W, Xiangbing G (2017) Nanostructure characterization of asphalt-aggregate interface through molecular dynamics simulation and atomic force microscopy. Fuel 189: 155-163.
8. Soumendu B, Arun Kumar M, Venkat P, Susanta B (2017) Aromatic polyamides containing trityl substituted triphenylamine: Gas transport properties and molecular dynamics simulations. Journal of Membrane Science 522: 77-90.
9. Niall JE, John ST (2017) Equilibrium Born-Oppenheimer molecular-dynamics exploration of the lattice thermal conductivity of silicon clathrates. Computational Materials Science 126: 1-6.
10. Liu E, Vega S, Dhaliwal A, Treiser MD, Sung HJ, et al. (2017) High Resolution Fluorescence Imaging of Cell–Biomaterial Interactions. Reference Module in Materials Science and Materials Engineering.
11. Anna C (2017) Single Photon Imaging and Instrumentation. In: John CL, George ET, David WK (eds.), Encyclopedia of Spectroscopy and Spectrometry, Academic Press, Oxford, pp: 69-75.
12. Oh GG, Li X, Lee SB, Ji HD, Lee SB, et al. (2016) Non-invasive visualization of mast cell recruitment and its effects in lung cancer by optical reporter gene imaging and glucose metabolism monitoring. Biomaterials 112: 192- 203.
13. Ooms KJ, Feindel KW, Genuis K, Gritter K (2017) Imaging and Diagnosis of Biological Markers. In: Reference Module in Materials Science and Materials Engineering.
14. Wang H, Yuanming F, Yu S, Jun QL, Junhua D, et al. (2017) Pattern recognition and classification of two cancer cell lines by diffraction imaging at multiple pixel distances. Pattern Recognition 61: 234-244.
15. Zehua Q, Zhengbo Q, Xianfeng Z, Hui W, Guanxin Y, et al. (2017) Slow-electron velocity-map imaging study of aniline via resonance-enhanced two-photon ionization method. Spectrochimica Acta Part A Molecular and Biomolecular Spectroscopy 173: 432-438.
16. Jalaja K, Sheena MY, Yohannan PC, Stevan A, Sanja JA, et al. (2017) Spectroscopic characterization of 4-[2-(5-Ethylpyridin-2-yl)ethoxy]benzaldehyde oxime and investigation of its reactive properties by DFT calculations and molecular dynamics simulations. Journal of Molecular Structure 1128: 245-256.
17. Shichao W, Shasha X, Yiming W, Xiaohe T, Yujin Z, et al. (2017) Synthesis, crystals of centrosymmetric triphenylamine chromophores bearing prodigious two-photon absorption cross-section and biological imaging, Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy 173: 871-879.
18. Zhou A, Zhang A, Li Q, Xiao L (2017) AFM and Raman Spectroscopy, Applications in Cellular Imaging and Assays. In: John CL, George ET, David WK (eds.), Encyclopedia of Spectroscopy and Spectrometry, Academic Press, Oxford, pp: 18-25.
19. Abramczyk H, Kopec M, Jędrzejczyk M (2017) Raman Spectroscopy, Medical Applications: A New Look Inside Human Body with Raman Imaging. In: John CL, George ET, David WK (eds.), Encyclopedia of Spectroscopy and Spectrometry, Academic Press, Oxford, pp: 915-918.
20. Newell JD, Hoffman EA, Albert MS, Couch MJ (2017) CT and MRI Gas Ventilation Imaging of the Lungs. In: Mitchell S, Albert F, Hane T (eds.), Hyperpolarized and Inert Gas MRI, Academic Press, Boston, pp: 211-222.
21. Yunlong L, Shijie W, Quan W (2017) A molecular dynamics simulation study on enhancement of mechanical and tribological properties of polymer composites by introduction of graphene. Carbon 111: 538-545.
22. Javeed AW, Jalaja K, Sheena MY, Yohannan PC, Stevan A, et al. (2017) Spectroscopic characterization of 1-[3-(1H-imidazol-1- yl)propyl]-3-phenylthiourea and assessment of reactive and optoelectronic properties employing DFT calculations and molecular dynamics simulations. Journal of Molecular Structure 1129: 72-85.
23. Sanchis MJ, Carsí M, Gómez CM, Culebras M, Gonzales KN, et al. (2017) Monitoring molecular dynamics of bacterial cellulose composites reinforced with graphene oxide by carboxymethyl cellulose addition. Carbohydrate Polymers 157: 353-360.
24. Vidya VM, Egemen F, Sheena YM, Esin K, Yohannan PC, et al. (2017) Vibrational spectroscopic analysis, molecular dynamics simulations and molecular docking study of 5-nitro-2-phenoxymethyl benzimidazole. Journal of Molecular Structure 1129: 86-97.
25. Lik HT, Zhou A, Zechuan Y, Qiwen Q, Denvid L (2017) Understanding the effect of temperature on the interfacial behavior of CFRP-wood composite via molecular dynamics simulations. Composites Part B: Engineering 109: 227-237.
26. Sergey PB, Eugenia VP, Yves J, Kira EV (2017) Nickel(II) complex of a biradical: Structure, magnetic properties, high NMR temperature sensitivity and moderately fast molecular dynamics. Sensors and Actuators B: Chemical 239: 405-412.
27. Ruud JGVS, Demi L, Postema AW, Jean JMCH, Wijkstra H, et al. (2017) Ultrasound-contrast-agent dispersion and velocity imaging for prostate cancer localization. Med Image Ana 35: 610-619.
28. Nezbeda I, Jirsak J, Moucka F (2017) Molecular modeling and simulations. In: Mehdi A (eds.), Woodhead Publishing Series in Textiles. Woodhead Publishing, pp: 255-275.
29. Susanne WM, Van DB, Satoshi I, Johan WV, Artiom P, et al. (2008) Molecular Imaging of Interstitial Alterations in Remodeling Myocardium After Myocardial Infarction. Journal of the American College of Cardiology 52: 2017-2028.
30. Qinghua W, Yanen W, Yu C, Mingming Y, Xinpei L, et al. (2016) Molecular mechanisms in compatibility and mechanical properties of Polyacrylamide/Polyvinyl alcohol blends. Journal of the Mechanical Behavior of Biomedical Materials 65: 565-573.
31. Latour RA (2017) Molecular Simulation Methods to Investigate Protein Adsorption Behavior at the Atomic Level. Reference Module in Materials Science and Materials Engineering.
32. Peng X, Meguid SA (2017) Molecular simulations of the influence of defects and functionalization on the shear strength of carbon nanotube-epoxy polymer interfaces. Computational Materials Science 126: 204-216.
33. Renjith RP, Vidya VM, Shyma MY, Stevan A, Sanja JA, et al. (2017) Vibrational spectroscopic investigations, molecular dynamic simulations and molecular docking studies of N′-diphenylmethylidene-5-methyl-1H-pyrazole-3-carbohydrazide. Journal of Molecular Structure 1130: 208-222.
34. Hassan SA, Mehler EL (2007) In Silico Approaches to Structure and Function of Cell Components and Their Assemblies: Molecular Electrostatics and Solvent Effects. Reference Module in Life Sciences.