World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:14, No:12, 2020

Thermal Stabilisation of Poly(a)•Poly(U) by TMPyP4 and Zn(X)TMPyP4 Derivatives in Aqueous Solutions

Authors : A. Kudrev

Abstract : The duplex Poly(A)-Poly(U) denaturation in an aqueous solutions in mixtures with the tetracationic MeTMPyP4 (Me = 2H, Zn(II); TMPyP4 is 5,10,15,20-tetrakis(N-methylpyridinium-4-yl)porphyrin), was investigated by monitoring the changes in the UV-Vis absorbance spectrum with increasing temperatures from 20°C to 70°C (pH 7.0, I=0.15M). The absorbance data matrices were analyzed with a versatile chemometric procedure that provides the melting profile (distribution of species) and the pure spectrum for each chemical species present along the heating experiment. As revealed by the increase of Tm, the duplex structure was stabilized by these porphyrins. The values of stabilization temperature ΔTm in the presence of these porphyrins are relatively large, 1.2-8.4 °C, indicating that the porphyrins contribute differently in stabilizing the duplex Poly(A)-Poly(U) structure. Remarkable is the fact that the porphyrin TMPyP4 was less effective in the stabilization of the duplex structure than the metalloporphyrin Zn(X)TMPyP4 which suggests that metallization play an important role in porphyrin-RNA binding. Molecular Dynamics Simulations has been used to illustrate melting of the duplex dsRNA bound with a porphyrin molecule.

Keywords : melting, Poly(A)-Poly(U), TMPyP4, Zn(X)TMPyP4
Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development
Conference Location : Chicago, United States
Conference Dates : December 12-13, 2020

Open Science Index, Mathematical and Computational Sciences Vol:14, No:12, 2020 publications.waset.org/abstracts/75747.pdf