

ISMEC 2019

**International Symposium on Metal Complexes
Hajdúszoboszló/Debrecen, June 11-14, 2019**

Debrecen University Symposium, 2019

BOOK OF ABSTRACTS



International Symposium on Metal Complexes (ISMEC 2019) **June 11-14, Hajdúszoboszló/Debrecen, Hungary**

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Investigation on the Alcian Blue-tetrakis(methylpyridinium) chloride reactivity in presence of DNA, RNA, G-quadruplex structures and BSA

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Phtalocyanines have the potential to act as anticancer drugs, thanks to their interactions with proteins and polynucleotides [1]. Their strong and specific interaction with G-quadruplex structures may be responsible for inhibiting cancer cells proliferation [2]. Phtalocyanines are excellent macrocyclic ligands for transition metals and metal coordination deeply modulates their chemical and photophysical properties.

We focused our attention on Alcian Blue-tetrakis(methylpyridinium) chloride (ABTP), a commercially-available Cu(II)-phtalocyanine complex with promising features. The binding properties in presence of several polynucleotides and a protein were investigated at physiological conditions through spectrophotometric and spectrofluorometric techniques, thermal denaturation tests and calorimetric measurements. The measurements were repeated at different temperatures and ionic strengths in order to obtain information on the binding modes. The thermodynamic parameters were evaluated as well.

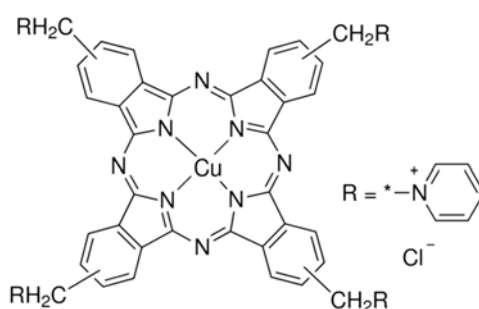


Figure 1. Molecular structure of Alcian Blue-tetrakis(methylpyridinium) chloride (ABTP).

The UV-vis absorption titrations suggested that an interaction does occur with calf thymus DNA, telomeric DNA G-quadruplex (Tel23), double stranded RNA (polyA·polyU) and triple stranded RNA (polyA·2polyU). The results were confirmed by the appearance of induced signals in the circular dichroism spectra. The isothermal titration calorimetry also corroborated

the interactions and provided the thermodynamic parameters for the bindings. On the other hand, ABTP does not seem to interact with bovine serum albumin at all.

The Foster Resonance Energy Transfer (FRET) was exploited in Real Time Quantitative PCR measurements in order to evaluate the binding's effect on double helix DNA and G-quadruplex structures. Although the previous measurements indicate that ABTP has a strong affinity for the biosubstrates, it does not affect the stability of the polynucleotides.

The overall results suggest an external binding mode, with partial intercalation of the substituents. This hypothesis does agree with the dimension and geometry of the system.

The obtained results are encouraging and further investigations will be performed in order to deepen the mechanistic details of the processes. Furthermore, quantum chemistry studies are still in progress and will be refined.

References:

- [1] N. Rasouli, N. Sohrabi, *Physical Chemistry Research*, **2016**, 4 (1), 83-94
- [2] H. Yaku, T. Murashima, D. Miyoshi, N. Sugimoto, *Molecules*, **2012**, 17, 10586-10613