

Joint Meeting on  
International Conference on  
**PHARMACOLOGY AND TOXICOLOGY**  
&  
18<sup>th</sup> International Conference on  
**MEDICINAL AND PHARMACEUTICAL CHEMISTRY**  
October 18-19, 2018 Dubai, UAE

## Na<sub>19</sub> [NaAs<sub>4</sub>W<sub>40</sub>O<sub>140</sub>Pd<sub>4</sub>]<sup>\*</sup>·34H<sub>2</sub>O a novel polyoxotungstate complex-synthesis and possible biological applications

Lavinia Berta, Andrei Gaz, Boda Francisc, Anca Mare, Adrian Man and Augustin Curticapean  
University of Medicine and Pharmacy of Tirgu Mures, Romania

**Statement of the Problem:** Polyoxotungstate are inorganic compounds with a broad range of pharmacological properties (antiviral, antibacterial, anti-tumoral activities). The purpose of this study was to synthesize Na<sub>19</sub> [NaAs<sub>4</sub>W<sub>40</sub>O<sub>140</sub>Pd<sub>4</sub>]<sup>\*</sup>·34H<sub>2</sub>O (As<sub>4</sub>W<sub>40</sub>Pd), a new Pd<sup>2+</sup> complex of Na<sub>27</sub> [NaAs<sub>4</sub>W<sub>40</sub>O<sub>140</sub>] aq (As<sub>4</sub>W<sub>40</sub>), a polyoxotungstate cryptand and to assess the antimicrobial activity.

**Method:** The As<sub>4</sub>W<sub>40</sub> cryptand was synthesized following methods already described in the literature. The complex was obtained by adding PdCl<sub>2</sub> solution to As<sub>4</sub>W<sub>40</sub> solution at pH 4, maintaining temperature between 70-80 °C. After purification the complex was analyzed by spectrometric methods, TGA, conductometry, X-ray diffractometry. The biological activity was studied *in vitro* on Gram positive and Gram negative bacterial strains by serial dilution method, with identification of Minimum Inhibitory (MIC) and Bactericidal Concentrations (MBC).

**Findings:** The As<sub>4</sub>W<sub>40</sub>Pd complex structure is a Leyrie assembly which consist of 4 identical tri lacunar Keggin anion structures ([AsW<sub>9</sub>O<sub>33</sub>]<sup>9-</sup>) joined together by 4 WO<sub>6</sub> octahedra in a ring-like form with high symmetry. The Pd<sup>2+</sup> cation is central coordinated inside the structure, in active positions formed in the lacunar places with high electron density. In case of Pd complex a new vibration was noticed at 544 cm<sup>-1</sup> corresponding to Pd-O bond. The results obtained by serial dilution method are the following (MIC, MBC=mg/ml): As<sub>4</sub>W<sub>40</sub>Pd for *Methicillin-resistant Staphylococcus aureus* (MRSA, ATCC 44003, Gram positive) MIC=1.48, MBC=1.48; for *Pseudomonas aeruginosa* (ATCC 27853, Gram negative) MIC=23.69, MBC=23.69; As<sub>4</sub>W<sub>40</sub>-for MRSA MIC=1.00, MBC=1.00 for *P. aeruginosa* MIC=64.60, MBC=no effect.

**Conclusion:** A new complex was synthesized Na<sub>19</sub> [NaAs<sub>4</sub>W<sub>40</sub>O<sub>140</sub>Pd<sub>4</sub>]<sup>\*</sup>·34H<sub>2</sub>O. Both compounds exhibit remarkable antibacterial activity on strains resistant to current therapeutics. The complex was more efficient than the cryptand. MRSA have proved to be more sensitive than *P. aeruginosa*, which developed resistance to the cryptand. This class of compounds presents biological properties that deserve to be exploited and optimized further more.

### References

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### Biography

Lavinia Berta is working as a Lecturer at General and Inorganic Chemistry Department, Faculty of Pharmacy, University of Medicine and Pharmacy, Tirgu Mures, Romania. Her expertise is in the field of inorganic chemistry-synthesis, identification and characterization of poly-oxometallic compounds (UV-VIS, FT-IR, TGA and ICP). She has two national grants as Principal Investigator. She has many articles published and has participated in many national and international conferences.

grama.lavinia@umftgm.ro