

A study on the reactivity of alumazene

Iva Kollhammerová

Alumazene is the only example of trimeric iminoalanes. Its structure consists of a six membered ring, where three aluminium and three nitrogen atoms regularly alternate. This ring is stabilized by a bulky organic substituent at each nitrogen atom and one methyl group at each aluminium atom. It is an inorganic analogue of benzene or borazine. In the comparison of aromaticity, borazine is less aromatic than benzene, alumazene exhibits no aromaticity in this series.^{1,2}

In case of borazine, a Lewis acid molecule can be coordinated to the nitrogen atom in the structure, or Lewis acid and Lewis base together can be coordinated to borazine. In contrast alumazene coordinates only Lewis base molecules to the aluminium atoms.^{3,4,5}

One group of reactions is substitution of alumazene. The three methyl groups at aluminium atoms are sequentially substituted with another atom or group. In our case we substituted the methyl groups with halogens (Cl, Br). In this area four new compounds were prepared and their crystal structures characterized.^{6,7}

Another group of reactions is coordination reactions of Lewis bases. In this area two new adducts with acetonitrile and deuterioacetonitrile were prepared, subsequently structurally characterized and their stability was studied by tensimetric method and quantum-chemical calculations.

Reactions of alumazene with quinolones constitute the last group of reactions. This type of reaction can be characterized as addition at a formal double bond Al-N in the ring. In this type of reaction, the ring is destroyed and new structures are formed.

References:

- [1] Power, P. P., *J. Organomet. Chem.*, **1990**, 400, 49
- [2] Lisovenko, A. S., Timoshkin, A. Y., *Russ. J. General Chem.*, **2011**, 81, 831
- [3] Löbl, J., Necas, M., Pinkas, J., *Main Group Chemistry*, **2006**, 5, 79
- [4] Löbl, J., Ph.D. Thesis, **2007**
- [5] Lisovenko A. S., Timoshkin A. Y., *Inorganic Chemistry*, **2010**, 49, 10357

[6] Davydova, E.I., Sevastinova, T. N., Suvorov, A. V., Timoshkin, A. Y., *Coordination Chemistry Reviews*, **2010**, 254, 2031

[7] Doinikov, D. A., Kollhammerova, I., Löbl, J., Necas, M., Timoshkin, A. Y., Pinkas, J., *J. Organomet. Chem.*, **2016**, 809, 38