Design of Novel Poly(oximinoalkyl) amines and their Applications in Catalysis

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The polydentate ligands have a great importance in catalysis, design of biomimetics and supramolecular chemistry. Recently poly(oximinoalkyl)amines were proposed as prospective polydentate ligands. The present project deals with synthesis of novel types of poly(oximinoalkyl)amine ligands and their applications in catalysis. Thus, our project consists of two parts. The first one describes the synthesis of previously practically unknown tris(gamma-oximinoalkyl)amines and the second one is devoted to the application of poly(oximinoalkyl)amines in copper-catalyzed azide-acetylene cycloaddition (CuAAC, click chemistry). The synthetic approach towards tris(gamma-oximinoalkyl)amines was developed. The strategy is based on using aza-Michael addition and oximation reactions. The suggested approach is combinatorial and makes available both symmetrically and unsymmetrically substituted tris(gamma-oximinoalkyl)amines. A range of tris(gamma-oximinoalkyl)amines was prepared and their structure was confirmed with use of NMR, high-resolution mass-spectrometry and elemental analysis. For investigation of the catalytic activity of a range of bis-, tris- and tetrakis(oxyminoalkyl)amines was tested as accelerating ligands in CuAAC. Most of them have shown high performance and the best results were obtained with specially synthesized ligand which contained bis(beta-oximinoalkyl)amine fragment connected to 1,2,3-triazole ring. Its activity approximately 10 times surpassed the most used in CuAAC ligand TBTA [Tris[(1-benzyl-1H-1,2,3-triazol-4-yl)methyl]amine]. According to these results, we claim that the new high-efficient ligand will find applications in click-chemistry, in particular in bioconjugation and organic synthesis.

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