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Abstract

Ionic Derivatives of Insulin-Mimetic Vanadium(V) Complexes with Schiff Base Ligands †

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Abstract: The biological activity of the vanadium Schiff base complexes, which can be potentially used as insulin-mimetic compounds, was extensively studied in the last decade. Pharmacological data showed that these compounds produced a significant decrease in blood glucose level and improved liver and kidney function after two weeks of daily use. The vanadium complexes obtained so far with Schiff bases create problems, most often with cytotoxicity, very low solubility in water, difficulty in studying the crystal structure, instability at pH = 2 and transport to cells. Therefore, it is necessary to search for new organic vanadium compounds to optimize their pharmaceutical activity. Lastly, several hundred vanadium(III–V) complexes with Schiff bases were tested, controlling both the starting vanadium compound for the synthesis of complexes, as well as changing the substituents in the aromatic ring of aldehyde and hydrazide—Schiff base components. The obtained neutral compounds were highly soluble in organic solvents; however, they were insoluble in water. Therefore, the DMSO-H_2O mixture was used to test the stability of the complexes. In the last studies, the synthesis and physicochemical characterization of the vanadium(V) complex with triethylamine as a cation—HTEA[VO_2(L)] (where L = Schiff base formed from 5-bromosalicylaldehyde and 2-hydroxybenzhydrazide)—was described. In the formed ionic complexes, the crystal studies show additional hydrogen interactions between the cation and the complex anion. The ionic structure of such compounds should increase the solubility of the complexes in water, thus maximizing their availability in the biological systems studied.

Keywords: vanadium complexes; insulin-mimetic compounds; structure; stability

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