IMINO SEMICARBAZIDES AND THEIR METAL COMPLEXES: SOLUTION STABILITY, REDOX AND ANTICANCER PROPERTIES

Gerda T. Gátszegi[1], Tatsiana V. Petrasheuskaya[1], Bálint Hajdu[1], Vladimir B. Arion[2], Gabriella Spengler[3], and Éva A. Enyedy[1]

[1]Department of Molecular and Analytical Chemistry, University of Szeged, Dóm tér 7-8, H-6720 Szeged, Hungary
[2]Institute of Inorganic Chemistry, University of Vienna, Währinger Strasse 42, A-1090 Vienna, Austria.
[3]Department of Medical Microbiology, University of Szeged, Semmelweis u. 6, H-6720 Szeged, Hungary

The administration of anticancer drugs in chemotherapy is often limited by the occurrence of serious side effects and resistance. These issues have led to the development of new potential active compounds, including metal complexes. Thiosemicarbazone (TSC) derivatives and their metal complexes have been extensively studied in the literature due to their potential pharmacological activities, such as antimicrobial, antiviral, antitumor, and antioxidant effects [1]. It has been established that both the coordinating donor set and the substituents on the TSC scaffold strongly influence the stability and biological activity of their metal complexes [2]. Previously, salicylidene-imino semicarbazide (IS) Schiff base metal complexes with {O,N,N} coordinating sites were investigated to study the effect of C=S → C=NH isosteric replacement on coordination and biological properties [3].

In this study, various 2-acetylpyridine-imino semicarbazide Schiff base derivatives bearing an {N,N,N} donor set, along with their Cu(II) and Fe(II) complexes, were investigated. To analyze their solution equilibrium and redox properties, pH-potentiometric, UV-visible spectrophotometric and cyclic voltammetric measurements were used. The reactivity of the Cu(II) complexes with physiological reducing agents was also investigated by spectrophotometric methods.

We found that the ligands are predominantly positively charged at physiological pH. The formation constants obtained show that low stability complexes are formed with both Cu(II) and Fe(II/III) ions. In the human cancer cells studied (Colo205, Colo320, MCF7), the ligands were not cytotoxic, but their Cu(II) complexes exhibited moderate activity. In summary, the replacement of the thione sulfur atom by imino nitrogen results in complexes with lower stability and anticancer activity.

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