

Dioxouranium(VI) Complexes of Some Monovalent Bidentate Schiff Base Ligands Derived from Aniline

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ABSTRACT

Several new dioxouranium(VI) complexes of Schiff bases [LH], derived from o-hydroxyaldehyde or ketone, 2-hydroxy-1-naphthaldehyde and aniline have been prepared and characterized on the basis of elemental analyses, IR and electronic absorption spectra and magnetic susceptibility measurements. The results suggest that the Schiff base is a monovalent anion with bidentate ON donor atoms of the phenolic oxygen and the azomethine nitrogen atoms. The formulae were found to be UO_2L_2 for the 1:2 non-electrolytic complexes and six-coordinate structure has been proposed for the complexes.

Key words: Aniline, dioxouranium(VI), o-hydroxyaldehyde or ketone, Schiff base

INTRODUCTION

Transition elements of Group IV, V and VI are known to form mononuclear oxocations of the type MO^{n+} and MO_2^{n+} . The most thoroughly investigated, best characterized and most stable oxometal cations are the dioxouranium(VI), dioxomolybdenum(VI) and oxovanadium(IV) ions. The strongly-bound oxygens of these oxometal cations remain intact during chemical reactions and produce one or more additional absorption bands beyond those normally available in transition metal complexes. The formation of multiple covalent bonds to oxygen by uranium has been explained theoretically. The tendency of oxygen to delocalise its $p\pi$ electrons away from its highly-compact valence shell by forming π bonds with π electron acceptor metals accounts for the formation of metal oxygen bond, at least qualitatively. Complexes of the uranyl ion, UO_2^{2+} , are of interest since they show seven-coordinate, pentagonal-bipyramidal geometry (Gatto et al., 2004). Due to the spectral properties (absorption and luminescence) and excited-state electron-transfer properties of the UO_2^{2+} ion, dioxouranium(VI) complexes have possible applications in solar energy conversion systems (Signorni and Dockal, 1996).

The Schiff base ligands obtained by condensation of various amines with salicylaldehyde/substituted salicylaldehydes are a class of ligands widely studied. Most studies are especially those of the first transition series. The Schiff base complexes with many transition metal ions, focused on complexes of the d-block