Biological activity of palladium(II) and platinum(II) complexes of the acetone Schiff bases of S-methyl- and S-benzyldithiocarbazate and the X-ray crystal structure of the [Pd(asme)2] (asme=anionic form of the acetone Schiff base of S-methyldithiocarbazate) complex

ABSTRACT

Palladium(II) and platinum(II) complexes of general empirical formula, [M(NS)2] (NS=uninegatively charged acetone Schiff bases of S-methyl- and S-benzyldithiocarbazate; M=PtII and PdII) have been prepared and characterized by a variety of physicochemical techniques. Based on conductance, IR and electronic spectral evidence, a square-planar structure is assigned to these complexes. The crystal and molecular structure of the [Pd(asme)2] complex (asme=anionic form of the acetone Schiff base of S-methyldithiocarbazate) has been determined by X-ray diffraction. The complex has a distorted cis-square planar structure with the ligands coordinated to the palladium(II) ions as uninegatively charged bidentate NS chelating agents via the azomethine nitrogen and the mercaptide sulfur atoms. The distortion from a regular square-planar geometry is attributed to the restricted bite angles of the ligands. Antimicrobial tests indicate that the Schiff bases exhibit strong activities against the pathogenic bacteria, Bacillus subtilis (mutant defective DNA repair), methicillin-resistant Staphylococcus aureus, B. subtilis (wild type) and Pseudomonas aeruginosa and the fungi, Candida albicans (CA), Candida lypotica (2075), Saccharomyces cerevisiae (20341) and Aspergillus ochraceous (398)ð the activities exhibited by these compounds being greater than that of the standard antibacterial and antifungal drugs, streptomycin and nystatin, respectively. The palladium(II) and platinum(II) complexes are inactive against most of these organisms but, the microbe, Pseudomonas aeruginosa shows strong sensitivity to the platinum(II) complexes. Screening of the compounds for their cytotoxicities against T-lymphoblastic leukemia cancer cells has shown that the acetone Schiff base of S-methyldithiocarbazate (Hasme) exhibits a very weak activity, whereas the S-benzyl derivative (Hasbz) is inactive. However, the palladium(II) complexes exhibit strong cytotoxicities against this cancer; their activities being more than that of the standard anticancer drug, tamoxifen. The [Pt(asme)2] complex exhibits a very weak cytotoxicity, whereas [Pt(asbz)2] is inactive against leukemic cells.

Keyword: Palladium(II) and platinum(II) complexes; Schiff bases of S-alkyldithiocarbazates; Biological activity