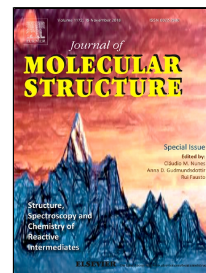


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Synthesis, Characterization, spectral, thermal analysis and Biological Activity studies of metronidazole complexes

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ABSTRACT

Metronidazole metal complexes were synthesized and characterized by elemental analysis, IR, electronic spectra, magnetic susceptibility and ESR spectra of Cu (II) and Co (II) complexes to know their geometries and mode of bonding. with stoichiometries, 1:1, 1:2, 1:3 (M: L). All the manganese, iron, cobalt, nickel, copper, mercury and cadmium complexes were proposed to be with octahedral geometry, while zinc complex is with tetrahedral geometry. Some theoretical studies were carried out to obtain the charges, bond lengths, bond angles and dihedral angles. The thermal properties of the complexes were examined. The kinetic thermodynamic parameters were estimated from the TGA and DTA curves. The thermal decomposition of the complexes ended with the formation of metal oxide as a final product except in case of Hg complex. Metronidazole complexes show higher activity than metronidazole for some strains.

Keywords: Metronidazole, synthesis, complexes, spectral, thermal analysis, Biological activity

INTRODUCTION

Metronidazole (MTN), Figure (1), [1-(2-Hydroxyethyl)-2-methyl-5-nitroimidazole] has molecular formula (C₆H₉N₃O₃) and molar mass of 171.15 g/mol, metronidazole is only one of many drugs that feature imidazole ring⁽¹⁾. It belongs to 5-Nitroimidazoles class of drugs as tinidazole and ornidazole, that are a well-established group of an antibiotic and antiprotozoal medication^(2,3) that have potential to inhibit the growth of anaerobic bacteria and anaerobic protozoa is marketed under trade name (Flagyl), in 1962 French team at Rhone-Poulenc research laboratories succeeded in the synthesis of metronidazole. As the design and synthesis of potential drugs to fight infections is an unending challenge faced by medicinal chemists. MTN is considered as a drug of choice as it is employed in both human and veterinary medicine to treat diseases caused by anaerobic bacteria (*Bacteroides*, *Fusobacterium*, *Campylobacter*, *Clostridium*) and protozoa (*Trichomonas*, *Treponema*, *Histomonas*) and prophylactically in gynaecological and colonic surgery^(4,5). MTN was found to be active against ulcerative gingivitis (bacterial infection of gum) and this led to realization of the broader anti-bacterial activity of it.

Metronidazole (MTN) is white to pale-yellow in color darkens on exposure to light, photostability of metronidazole showed a rearrangement and degradation products upon UV photolysis, found in crystalline powder with a slight odor, bitter and saline taste, pH (saturated aqueous solution) about 6.5, slightly soluble in water (< 0.1 g/100 mL at 20 °C) alcohol, acetone, very slightly soluble in ether, its melting point is 160°C, its optimum storage temp.: (2-8°C). Metronidazole degrades in alkaline condition to ammonia and acetic acid⁽⁶⁾.

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