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New compounds of Ru(II) and of cone metals stabilized with NHC ligands: Synthesis, characterization and antimicrobial activity

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In this work, new Ru(II) complexes and cone metals (Ag and Au) with N-heterocyclic carbene ligands (NHC) were synthesized and characterized with the aim of testing them as potential antibacterial agents. The advantages of using M-NHC complexes as antibacterial agents: Carbenic ligands form strong bonds with the metallic center, making the complex more stable to air, moisture and heat; relatively simple synthesis methods allow to easily modulate the characteristics of the ligand and consequently of the metal complexes; the electronic and steric effects contribute significantly to the formation of the bond between the metal core and the ligand and to the achievement of the biological activity, acting on the dissociation energy of the metallic complex. Silver salts have been used since antiquity as antimicrobial agents. The efficiency of silver compounds is related to bioavailability; to have an efficient action, the release must be slow and continuous. The appropriate release of the Ag cations is closely related to the peculiarities of ancillary ligands. Gold-based compounds such as auranofin have been studied as drugs for the treatment of rheumatoid arthritis and cancer. Recently, gold complexes have also been used as antibacterial, for this reason various ligands have been synthesized to ensure stabilization of the compounds. Ruthenium-based metal complexes, bearing NHC ligands, are known as catalyst for processes such as olefins metathesis and reduction of ketones, aldehydes, imines and alkenes. In recent years, some research groups are investigating the possible antibacterial and anticancer properties of these complexes. Recently, we have synthesized and tested new complexes of Ag and Au having NHC ligands (Figure-1), which have shown significant biological activity and here we report new complexes of ruthenium, silver and gold whose structure can make them possibly more biologically active. These complexes were tested for the antimicrobial activity evaluated against bacterial strains of significant importance for human health and food production, by agar well diffusion assay. A total of 32 Gram-negative and Gram-positive bacteria were employed as screening microorganisms to determine the antimicrobial effect and the action spectrum of each complex.

Biography

Carmela Saturnino is a Professor of Medicinal Chemistry at University of Basilicata. She was the Fellow of the Pharmaceutical Industry-Servier in Paris and later in the University of Caen, France. She is the co-author of 112 publications and 6 Patents. Her research interest is in Carbazoles, Metalocines, Pyrazoles, suzuki reaction, design, synthesis and biological studies and understanding of the mechanisms of action of new therapeutic molecules for cancer, neurodegenerative diseases and antimicrobial agents.

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