International Journal of Drug Development and Research

Heidari A, Int J Drug Dev & Res 2016, 8:3

Editorial

Coplanarity and Collinearity of 4' – Dinonyl – 2,2' – Bithiazole in One Domain of Bleomycin and Pingyangmycin to be Responsible for Binding of Cadmium Oxide (CdO) Nanoparticles to DNA/RNA Bidentate Ligands as Anti-Tumor Nano Drug

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Received June 28, 2016; **Accepted** June 30, 2016; **Published** July 06, 2016

In human bodies the third abundant trace metal is Cadmium; it can be considered as a non–toxic metal [1-12]. In coordination and pharmaceutical biochemistry many studies are on the interaction of Cd (II) cations with biomolecules such as DNA, RNA and other nucleic acids. When there is coordination between the organic ligands such as DNA, RNA and other nucleic acids to Cd (II) cations, this makes biological, medical, pharmaceutical and biochemical properties of them improve or modify. To extend this matter a new complex of Cd (II) cations with ligands nucleic acids was designed and prepared. The complex was obtained from an aqueous–alcoholic solution. Single crystals of the title complex were obtained from a mixture of Cd (II) cations and nucleic acids after slowing evaporation at room temperature. The crystal structure of the complex was determined by Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM), Differential Thermal Analysis–Thermal Gravim Analysis (DTA– TGA), Energy–Dispersive X–Ray Spectroscopy (EDX) and X–Ray Diffraction (XRD) analysis, this showed the structure to be ionic. Cd (II) cations in this complex have approximately Ci symmetry. In complex, the Cadmium atom is four–coordinate in a distorted tetrahedral arrangement. The geometry of the metal coordination shows some deviations from ideal Td symmetry. There are some differences in bond lengths and angles in complex. The Cd (II) cations in complex which symmetrically independent and have some differences in their bond lengths and angles.

On the other hand, the Cadmium Oxide (CdO) nanoparticles, which is taken into consideration as an anti–tumor Nano drug, was noticeably used to treat lymphomas, squamous cell carcinomas, testicular carcinomas, lipoma, liposarcoma, rhabdomyosarcoma, aggressive angiomyxoma, angiomyofibroblastoma–like tumor, myxoma, fibromatosis, fibroma, solitary fibrous tumor and others [10-25]. The 4'–dinonyl–2,2'–bithiazole moiety, one domain of bleomycin and pingyangmycin, was shown to be responsible for binding of Cadmium Oxide (CdO) nanoparticles to DNA/RNA, which has been caused such a great interest. There has been an explosion in the research effort directed toward the design and synthesis of the model anti–tumor Nano drugs that can specifically recognize and cleave DNA/RNA. To extend this matter, a new tris–chelate complex of Cd (II) cations with ligand DNA/RNA was designed and prepared. The complex was obtained by working in 1:2 metal–to–ligand ratios. Single crystals of the title complex were obtained after slow evaporation at room temperature. This complex was characterized by ^{1}HNMR, ^{13}CNMR, ^{31}PNMR, Attenuated Total Reflectance Fourier Transform Infrared (ATR–FTIR), FT–Raman, HR Mass and UV–Vis spectroscopies and also by Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM), Differential Thermal Analysis–Thermal Gravim Analysis (DTA–TGA), Energy–Dispersive X–Ray Spectroscopy (EDX) and X–Ray Diffraction (XRD) analysis and crystallography. Four DNA/RNA ligands are coordinated to Cd (II) cations via 4'–dinonyl–2,2'–bithiazole Nitrogen atoms that lead to four member chelate rings in a distorted octahedral geometry. The complex has a distorted octahedral structure and DNA/RNA acts as a bidentate ligand. The Nitrogen atoms of the ligands are not coordinated. Four DNA/RNA bond lengths in complex are not identical. The short C–C (the bond which connects bithiazole rings) bond length in free DNA/RNA and coplanarity and also collinearity of six bithiazole rings confirm the π–electronic delocalization in this complex.

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