Synthesis and characterization of a new aroylhydrazone ligand and its cobalt(III) complexes: X-ray crystallography and *in vitro* evaluation of antibacterial and antifungal activities

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Abstract

A new aroylhydrazone ligand, 2-benzoylpyridine-4-methoxybenzhydrazone (BPMBH) and its two cobalt(III) complexes, $[Co(BPMB)_2]NO_3 \cdot 1.5H_2O$ (**1**) and $[Co(BPMB)_2]Cl \cdot 2H_2O$ (**2**) have been synthesized and structurally characterized. The synthesized compounds are physico-chemically characterized by CHN analysis, molar conductivity, magnetic susceptibility measurements and spectroscopic techniques like MS, IR, UV and NMR. The high molar conductivity values of the complexes confirmed the presence of counter ions in the lattice of the cationic complexes. The molecular structure of the aroylhydrazone and its complexes have been resolved using single crystal XRD studies. In the solid state, the aroylhydrazone exists in the amido form as evident from the IR and XRD studies. The tridentate nature of the NNO donor aroylhydrazone was also confirmed from the IR spectral studies. XRD studies reveal that in all complexes, the tridentate aroylhydrazone coordinates to the Co(III) center *via* pyridine nitrogen, azomethine nitrogen and iminolate oxygen and found to possess distorted octahedral geometry. The complexes are bis-ligated cationic complexes in which chloride and nitrate ions act as counter ions. The antibacterial and antifungal activities of the aroylhydrazone and its Co(III) complexes have been screened against bacterial

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