Synthesis, Crystal Structure Analyses, and Antibacterial Evaluation of the Cobalt(II) Complex with Sulfadiazine-Pyrazole Prodrug

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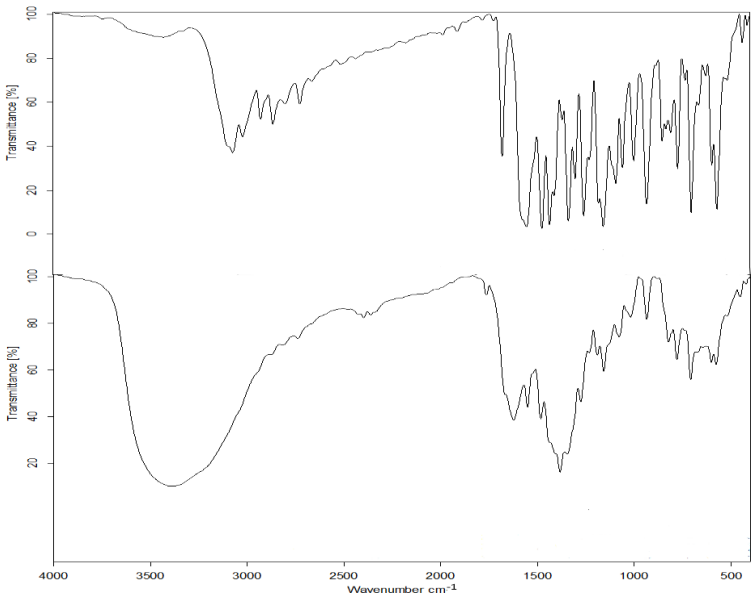

Figure S1. FTIR spectra of the ligand **L** (upper) and $[Co(L)(H_2O)_4](NO_3)_2$ complex (lower).

Method S1

The crystal of $[Co(L)(H_2O)_4](NO_3)_2$ was immersed in cryo-oil, mounted in a loop, and measured at a temperature of 170 K. The X-ray diffraction data were collected using a Bruker Kappa Apex II diffractometer with Mo K-radiation. The Denzo-Scalepack [35] software package was used for cell refinement and data reduction. A multi-scan absorption correction based on equivalent reflections (SADABS [36]) was applied to the intensities before the structure solution. The structure was solved using the intrinsic phasing method with SHELXT [37] software. Structural refinement was carried out using SHELXL [38] software with the SHELXLE [39] graphical user interface. All hydrogen atoms involved in hydrogen bonding were refined to avoid any geometric restrictions. Therefore, H_2O and NH hydrogen atoms were located from the difference Fourier map and refined isotropically. Other hydrogen atoms were positioned geometrically and constrained to ride on their parent atoms, with C-H = 0.95-0.98 Å and Uiso = 1.2–1.5 Ueq (parent atom).

Method S2

1. Antibacterial assessment

The two chemical substances were evaluated for antibacterial efficacy against gram-positive bacteria; *Staphylococcus aureus* (ATCC 25923) and MRSA (1) clinical isolates as well against gram-negative bacteria including; *Klebsiella pneumonia* (ATCC 700603), *Escherichia coli* (ATCC 25922), *Proteus mirabilis* and *Acinetobacter baumannii* (8). Based on the CLSI reference [42], their minimum inhibitory concentrations (MIC) are determined.

2. Determination of minimum inhibitory concentration

Investigation of antibacterial activity of chemical compounds was performed by micro-broth dilution assay for determination of MIC. In summary, 100 μL of Muller-Hinton broth (MHB) (Oxoid® Limited, Basingstoke, UK) were disseminated in 96 multi-well microtiter plates, followed by the addition of 100 μL chemical compound into the first row of the microtiter plate. Then, from the first to the twelfth well, serial dilution was performed. Each well received 6 μL of freshly prepared bacterial suspension (1.5×10^8 cfu/mL). For each bacterial strain, positive and negative controls were carried out. Plates were incubated for 18-24 hours at 37°C, with Amoxicillin 1000 μg/mL serving as reference standard antibiotic. The MIC was estimated as the minimum concentration that demonstrated no detectable bacterial growth.

References

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