

# Developing an Advanced-Material of 2, 6-bis(Pyrazol-3-yl)Pyridine (3-bpp)Iron(II) and Chromium(III) Complexes for Spin Crossover System (SCO) Devices and Anti-Bacterial Possibilities

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## ABSTRACT

**ABSTRACT.** The two complexes containing (1) chromium(III), 2,6-bis(pyrazol-3-yl)pyridine (3-*bpp*), and  $\text{CF}_3\text{SO}_3^-$  (triflate), and (2) cobalt(II), bipyridine (*bipy*) as ligand with trifluoroacetate (TFA) have been prepared and characterized. The electrical equivalent conductance, metal content, and TGA-DTA analysis suggest the complex (1) to be  $[\text{Cr}(3\text{-}bpp)_2](\text{CF}_3\text{SO}_3)_3 \cdot 2\text{H}_2\text{O}$ , and complex (2) to be  $[\text{Co}(bipy)_3](\text{CF}_3\text{COO})_2 \cdot 5,5\text{H}_2\text{O}$ . The magnetic moment was a normal high-spin paramagnet for three unpaired electrons in the electronic configuration of chromium (III) and cobalt(II). The electronic spectral bands indicate the three possible spin-allowed transitions of quartet ground state to quartet excited states for both complex (1) and complex (2). The IR spectral data signify the mode of vibrations typical for 3-*bpp* and the triflate for complex (1), and typical for *bipy* and TFA for complex (2). The images of SEM photographs confirm the crystalline particle size, the EDX signifies the existence of the corresponding elemental content in both complexes. The analysis of powder XRD refined by the Le Bail method of the Rietica program suggests being a structurally orthorhombic of *Pbca* space group for complex (1) and monoclinic of *C2/c* for complex (2). The two complexes show a weak inhibition of bacterial activity against *S. aureus* and *E. coli*.

**Keywords:** synthesis, characterization, 2,6-bis(pyrazol-3-yl)pyridine, triflate, Chromium (III), bipyridine, trifluoroacetate, cobalt(II), antibacteria, P-XRD.

**Note:** The original title was preparing iron(II) and Cr(II) complexes, but were unsuccessful, and then changed to Cr(III) and Co(II) which were successful.

The first complex is in submission to the Malaysian Journal of Fundamental and Applied Sciences (Q4) and being reviewed, and the second complex has been accepted to be published in the Malaysian Journal of Science (Q3)

### Complex (1)

Letter of submission to MJFAS (Q4)

### Complex (2)

Accepted status to be published in MJS (Q3)

Kata Kunci: *Keywords: synthesis, characterization, 2,6-bis(pyrazol-3-yl)pyridine, triflate, Chromium (III), bipyridine, trifluoroacetate, cobalt(II), antibacteria, P-XRD.*