

*Cobalt(III) amine complexes as amide bond cleavage agents*Charmaine Arderne¹, Alfred Muller¹, Siphamandla Emmanuel Nyathi¹¹Department Of Chemistry, University Of Johannesburg, Johannesburg, South Africa

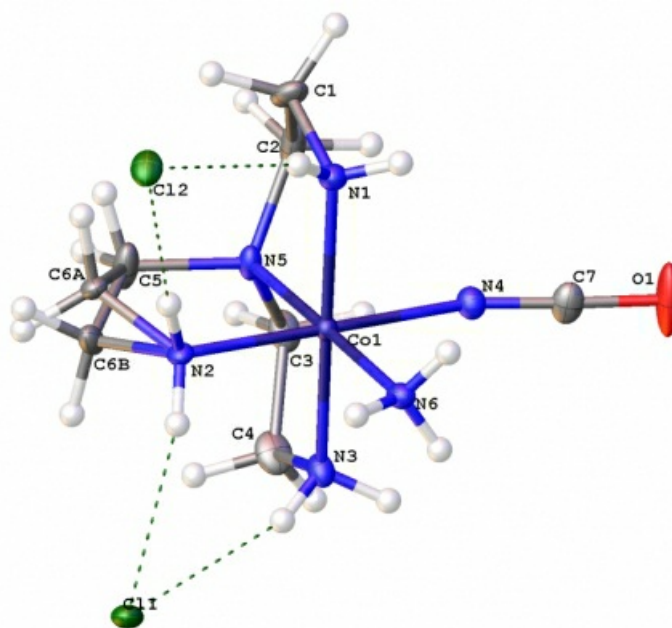
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Urea is a catabolic end-product for nitrogen-containing compounds [1] which is predominantly used as a solid nitrogen fertilizer. [2] Urease, first isolated and crystallized by James Sumner in 1926 from jack beans (*canavalia ensiformis*), catalyzes the hydrolysis reaction of urea allowing plants to metabolize the nitrogen. [3] Divalent transition metal ions have been shown to promote the hydrolysis of α -amino acid ester bonds and peptide bonds under mild conditions and thereby mimic the function of ureases. The aim of our current study is to synthesize Co(III) complexes with specific nitrogen based ligands (ligands used in this study were tris(2-aminoethyl)amine (tren) and triethylenetetramine (trien)) and react them with urea and other urea-based compounds. If urea is able to initiate and catalyze amide bond cleavage, we then aim to establish whether they can function effectively as urease mimics. Presented will be the analyses of compounds that formed from the successful reactions with [Co(tren)Cl₂]Cl and urea and thiourea by single crystal X-ray diffraction (SCXRD; Figure 1), NMR and FT-IR. Interestingly, we established that cleavage of the amide bond of the urea had occurred, but not by the pathway of the natural enzyme that we expected the cleavage to follow. Additionally, attempted cleavage of the thio-amide bond of thiourea yielded a coordinated thiourea moiety only. From the results we obtained, we have proposed reaction mechanisms for the formation of products from reactions of both urea and thiourea.

[1] Benini S; Rypniewski WR; Wilson KS; Mangani S; Ciurli S. *J. Am. Chem. Soc.* (2004) 126, 3714-3715.

[2] Sumner JB. *J. Biol. Chem.* (1926) 69, 435-441.

[3] Adewoyin OM; Egwim EC. *Sci. J. Biochem.* (2011) 1, 1-7.



Keywords: [amide bond cleavage](#), [urease](#), [intermolecular interactions](#)