

# Synthesis and Infrared Characterization of Copper(II) Terpyridine Complexes

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## Background

Platinum-based drugs, like cisplatin and carboplatin, are effective therapeutic agents in the treatment of testicular and ovarian cancers<sup>1,2</sup> but their use is becoming increasingly limited due to the prevalence of serious side-effects associated with the effective doses of these drugs.

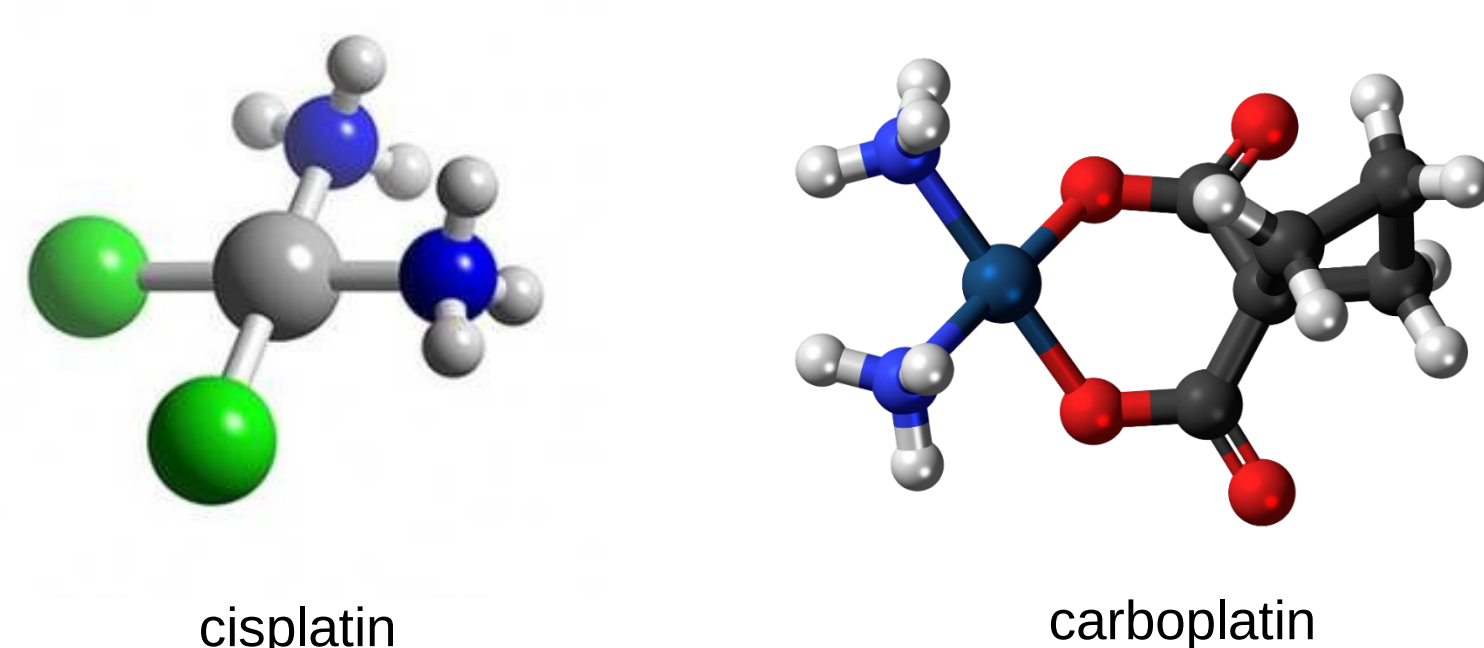


Figure 1 – Platinum based antitumor drugs

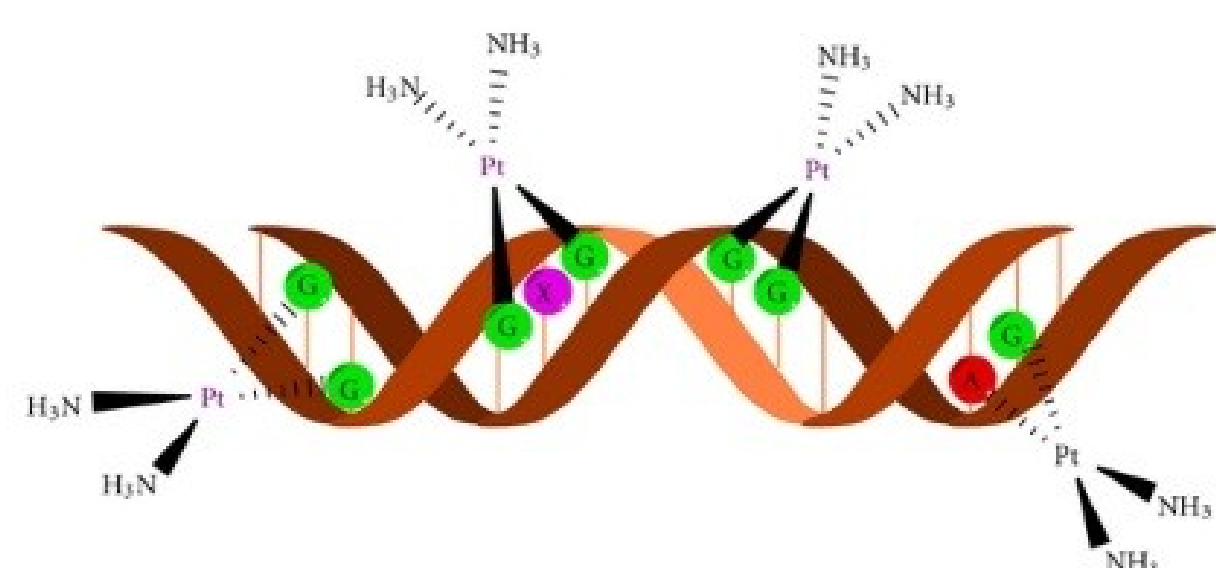


Figure 2 – Cisplatin binding to DNA

Efforts to circumvent these issues with metal-based agents have primarily focus on the development of new molecules with lower toxicity.

Isonicotinamide and molecules with similar functional groups are known for their biological importance. Isonicotinamide has a notable ability to enhance Sirt 1 deacetylase activity and was found to suppress cancer and tumor growth.<sup>3</sup>

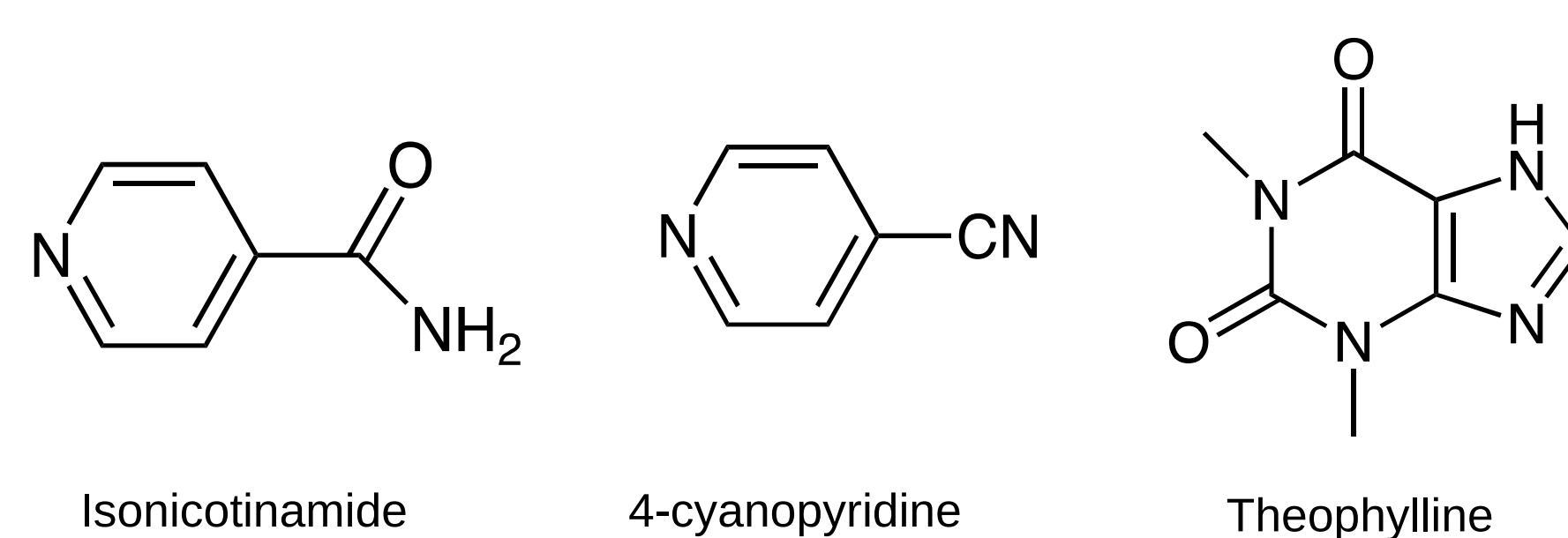


Figure 3 – Ligands used

The goal of the experiment is to produce a copper(II) terpyridine complex that has on it structure a ligand that is metabolically active and have normal physiological impacts on the body.

## Experimental Methods and Results

### Synthetic scheme

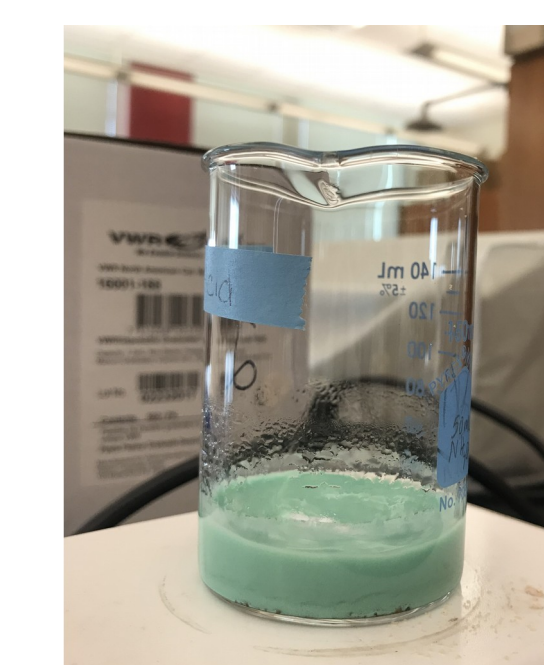
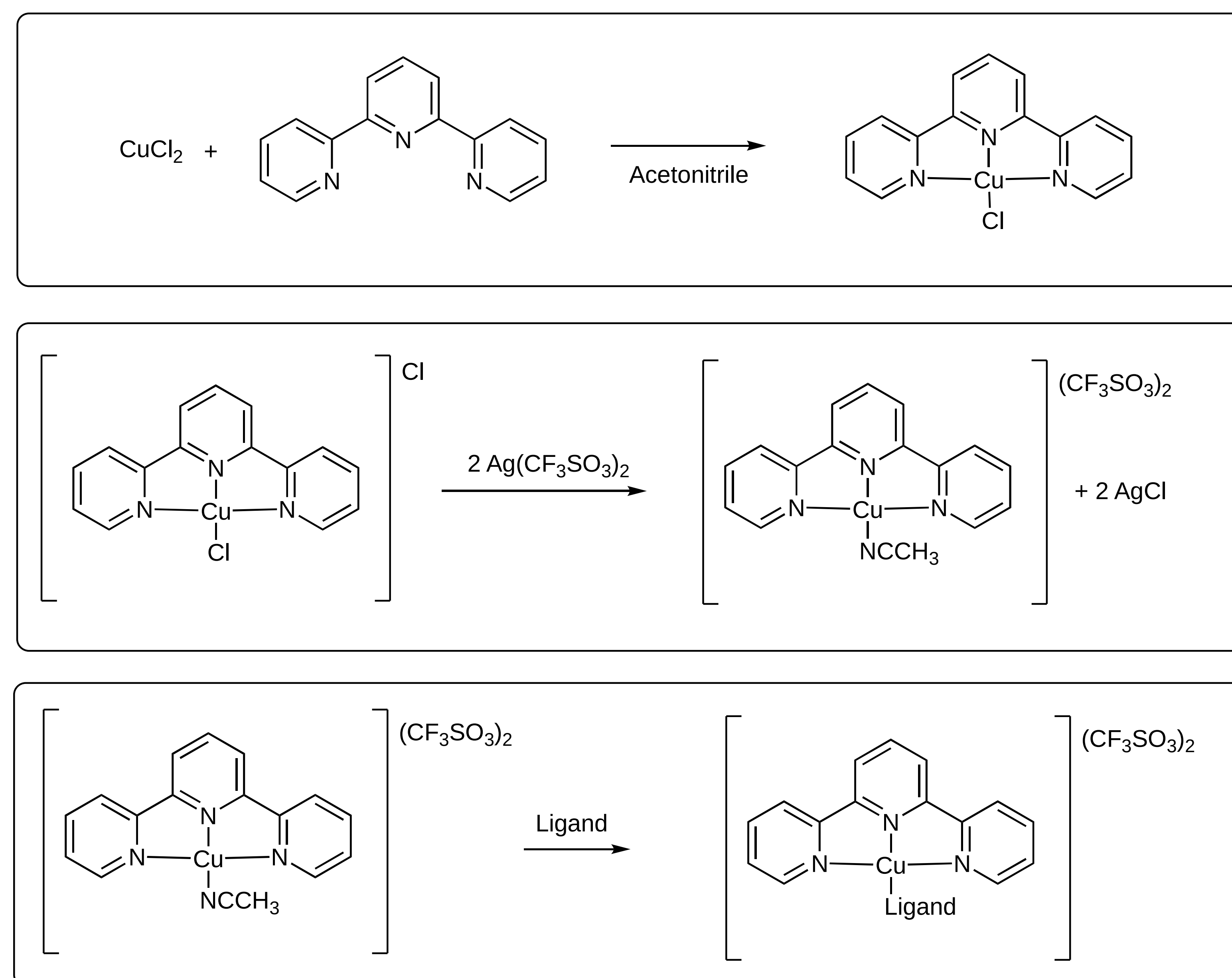


Figure 4 – Starting materials

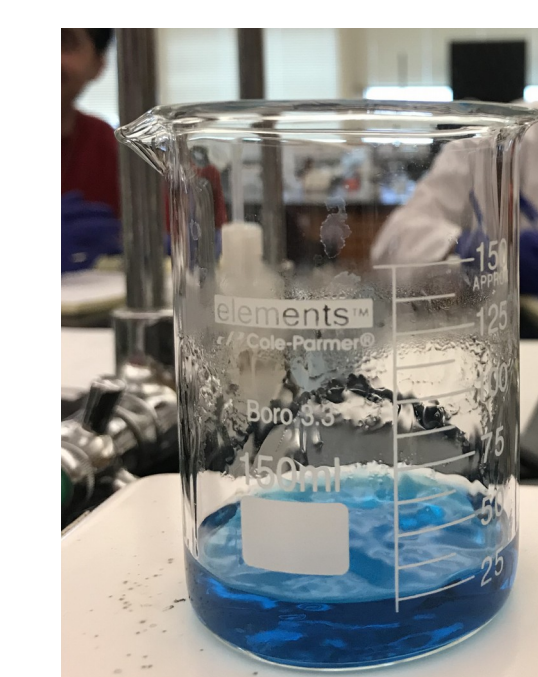


Figure 5 – Final product

### Characterization

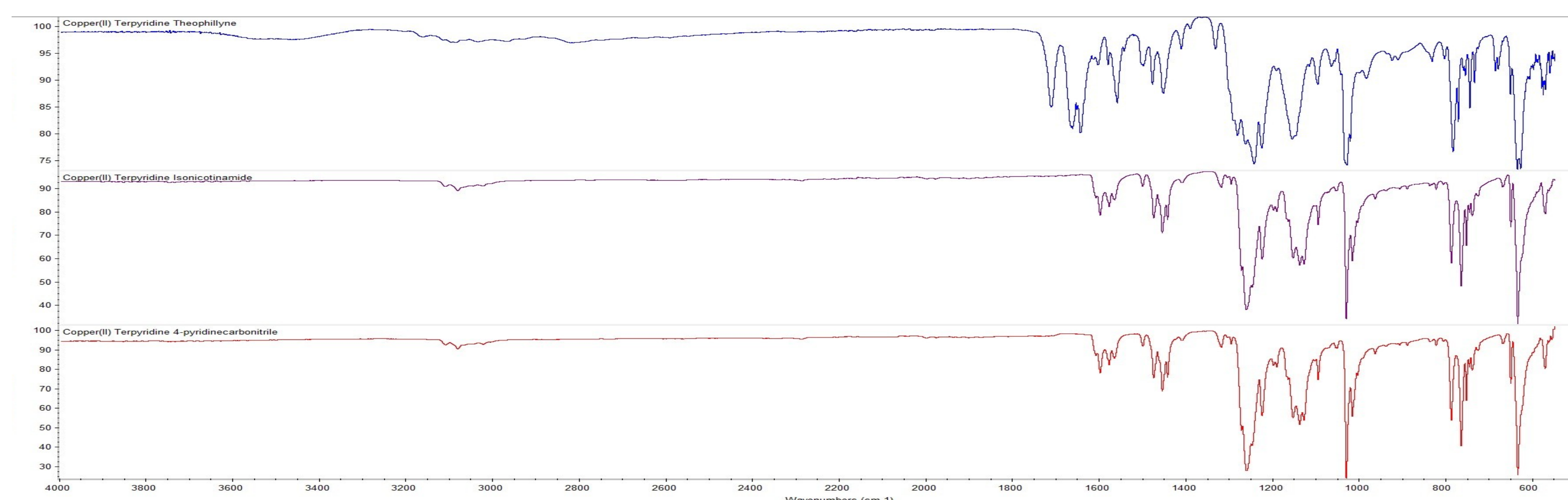


Figure 6 – Infrared analysis of products

## Conclusions

- Copper bipyridine complexes can be synthesized by the reaction of the copper(II) bipyridine compound with isonicotinamide.
- Although the reaction to synthesize metal complexes can be done without removing the chlorides (second step), doing so increases the product solubility in water and provides a higher yield of product.
- Infrared spectroscopy is an effective tool for characterization of new complexes where the ligands contain important organic functionality.

## References

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2. F. Meng, G. Sun, M. Zhong, Y. Yu and M. A. Brewer (2013) *British Journal of Cancer* 108, 579-586.
3. M. Ganeshpandian, R. Loganathan, R. Ramakrishnan, A. Riyasdeen, M. Anvarbatcha, M. Akbarsha, M. Palaniadavar: *Polyhedron, Inorg. Chem* 52 (2013) 924-938.

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