



# NOVEL LIGAND DESIGN, SYNTHESIS, AND CHARACTERIZATION FOR BIOLOGICAL IRON REMOVAL

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## Introduction

## Schemes and Figures

Iron is a well-known necessity in sustained human biology and health. Despite its requirement in cellular homeostasis, an overabundance of iron is associated with various health defects, such as Alzheimer's, and certain cancers. With these conditions in mind and to better understand the biochemistry of such diseases, a chelator resembling a claw was favored for its iron-binding properties. The molecule TAME-pyr ([N,N',N''-tris(2-pyridylmethyl)-1,1,1-tris(aminomethyl)ethane]) was assessed for iron chelation and synthesized with appropriate characterization. Once synthesized, it is intended to be attached to a peptide for direct cell delivery.

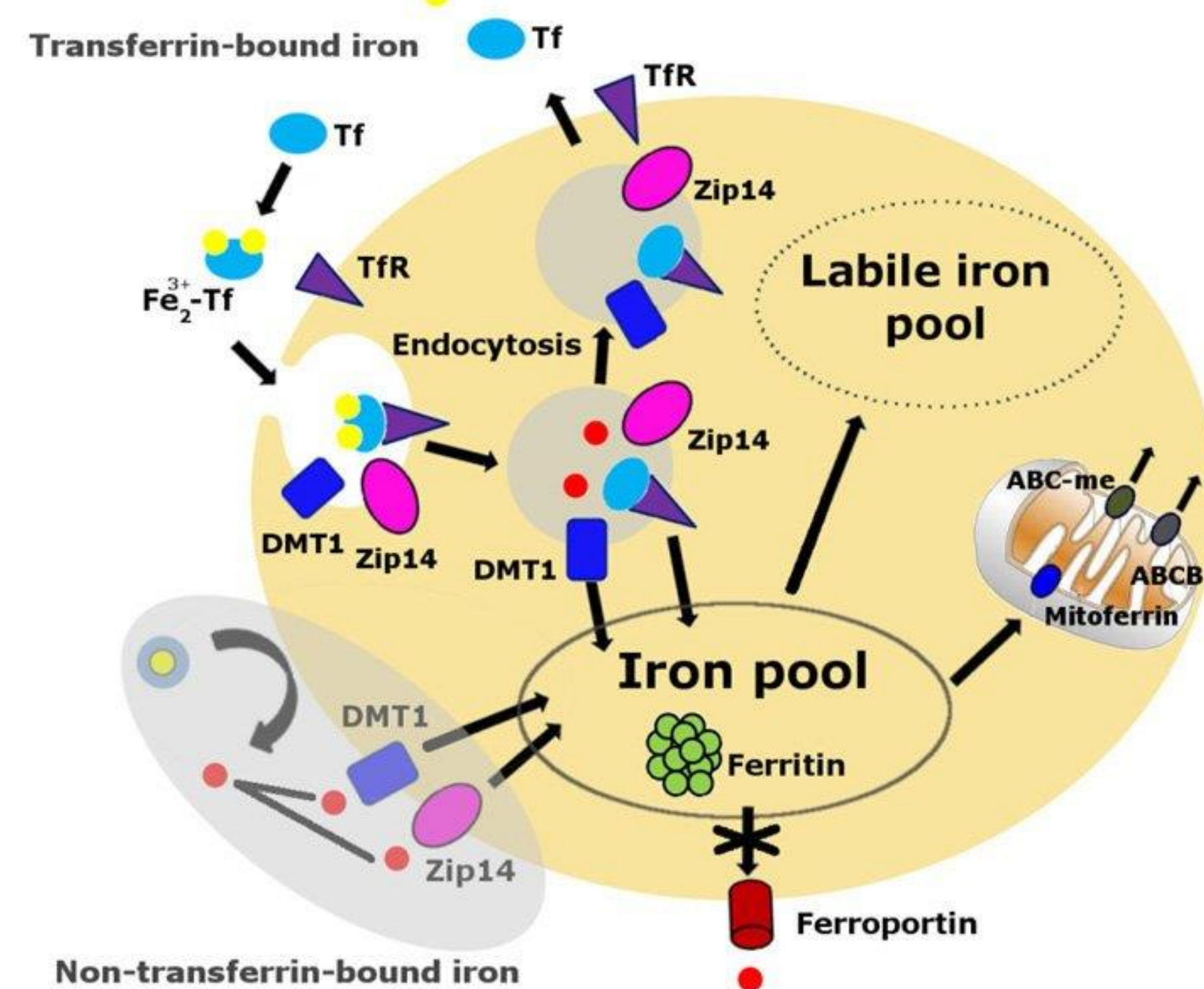
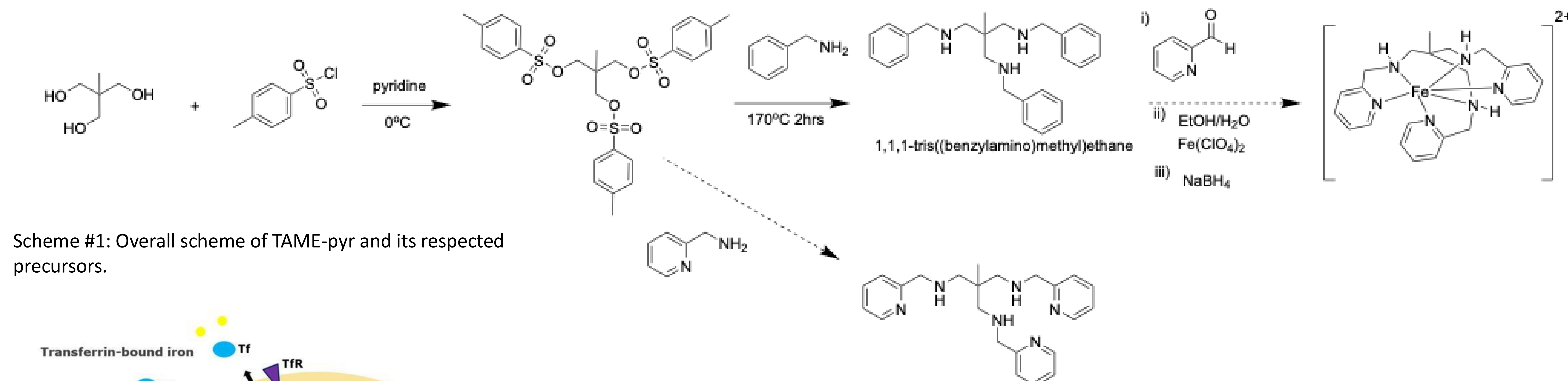


Figure #3: Location of the Iron Labile Pool that holds redox-ready iron and its respected biological pathways.

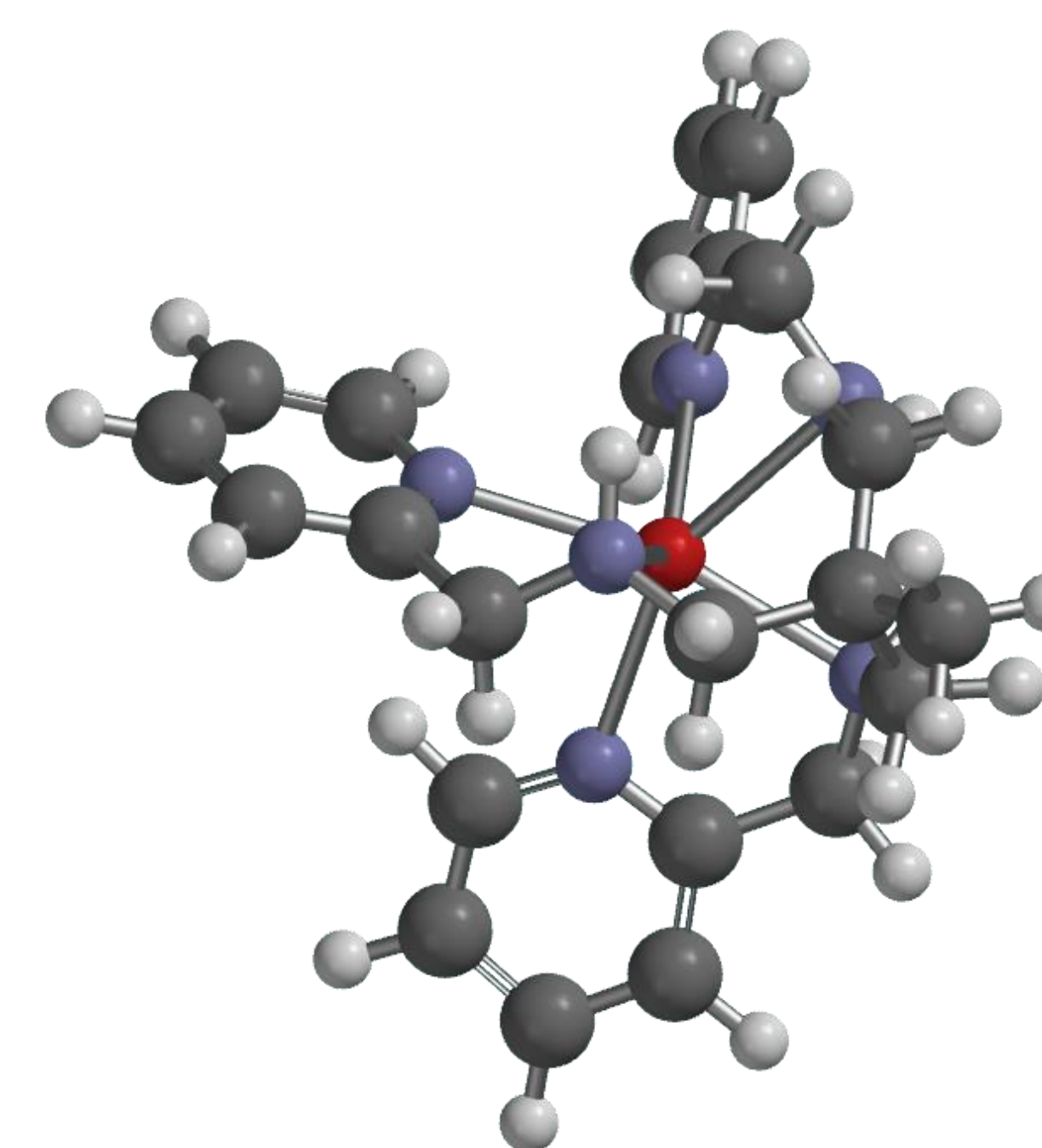


Figure #4: Predicted structure of TAME-pyr complexed to Fe(II). Image derived from Spartan 3D modeling program.

## Methodology

## Results & Future Work

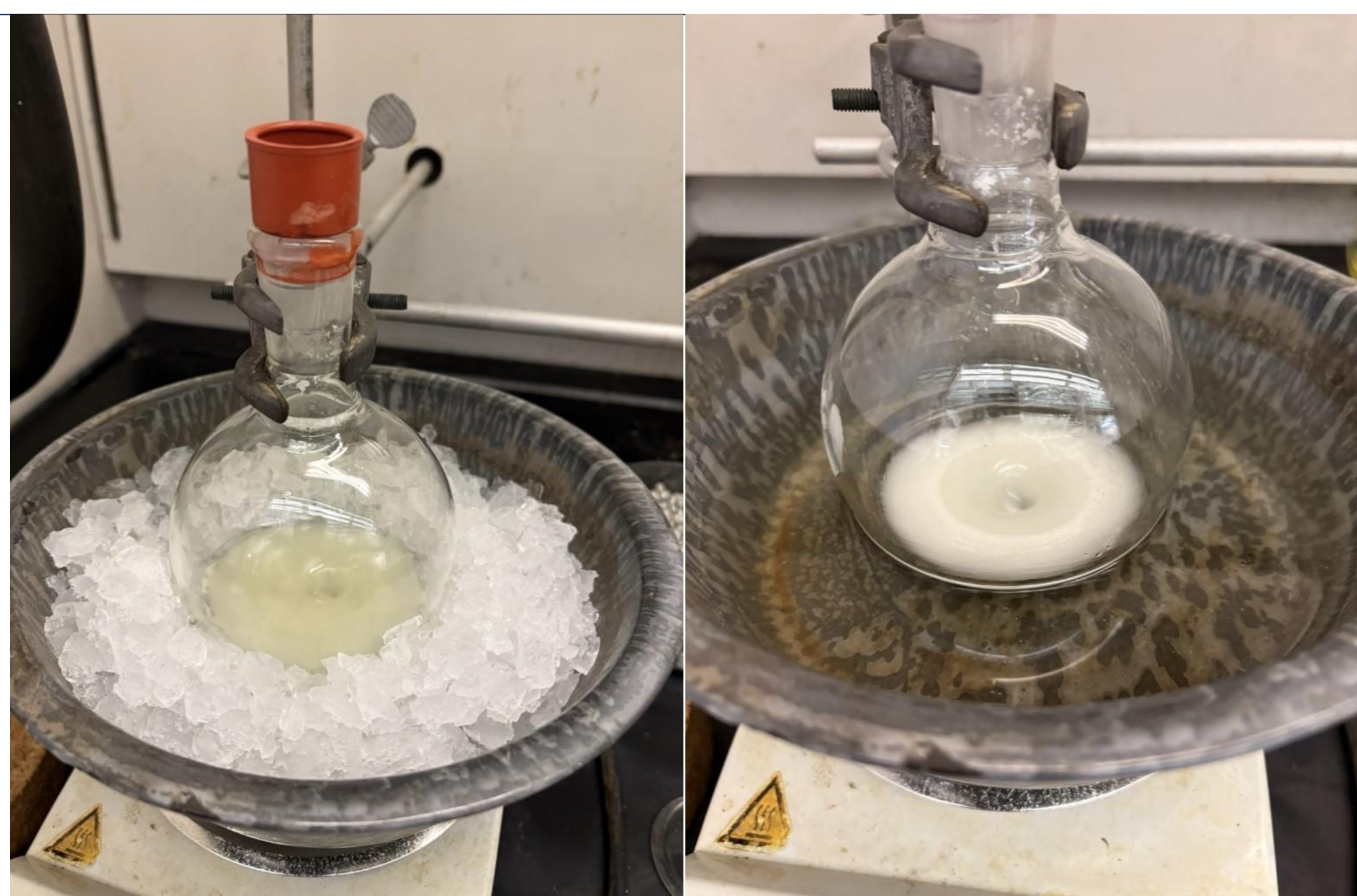


Figure #1: Preparation of tosyl-TAME with 1,1,1-tris(hydroxymethyl)ethane and p-toluenesulfonyl chloride.

Figure #2: Tosylation reaction of precursor shown with precipitant in suspension.

- Successful preparation of TAME precursors and improvement of purification practices.
- We are pursuing the preparation of TAME-pyr via new and old synthetic methods
- Computational work completed to gauge the capabilities of ligands for metal bonding
- Steps have been taken towards chelation/complex formation with Zn and Fe
- We plan to attach chelator to a peptide so it can be directed towards cellular targets

## Spectral Analysis

## Acknowledgements

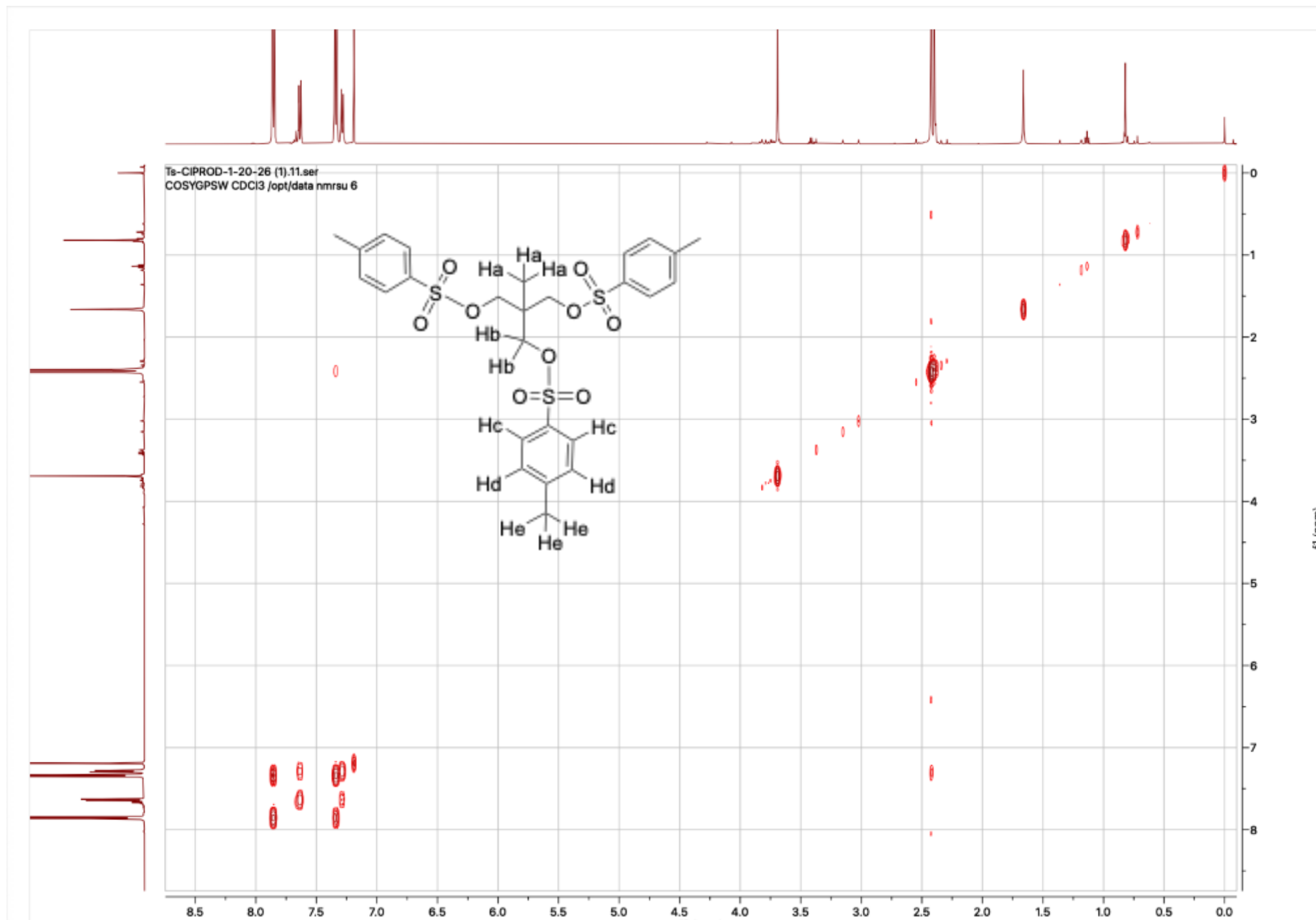


Figure #5: COSY spectrum of 1,1,1-tris((p-toluenesulfonyloxy)methyl)ethane before purification.

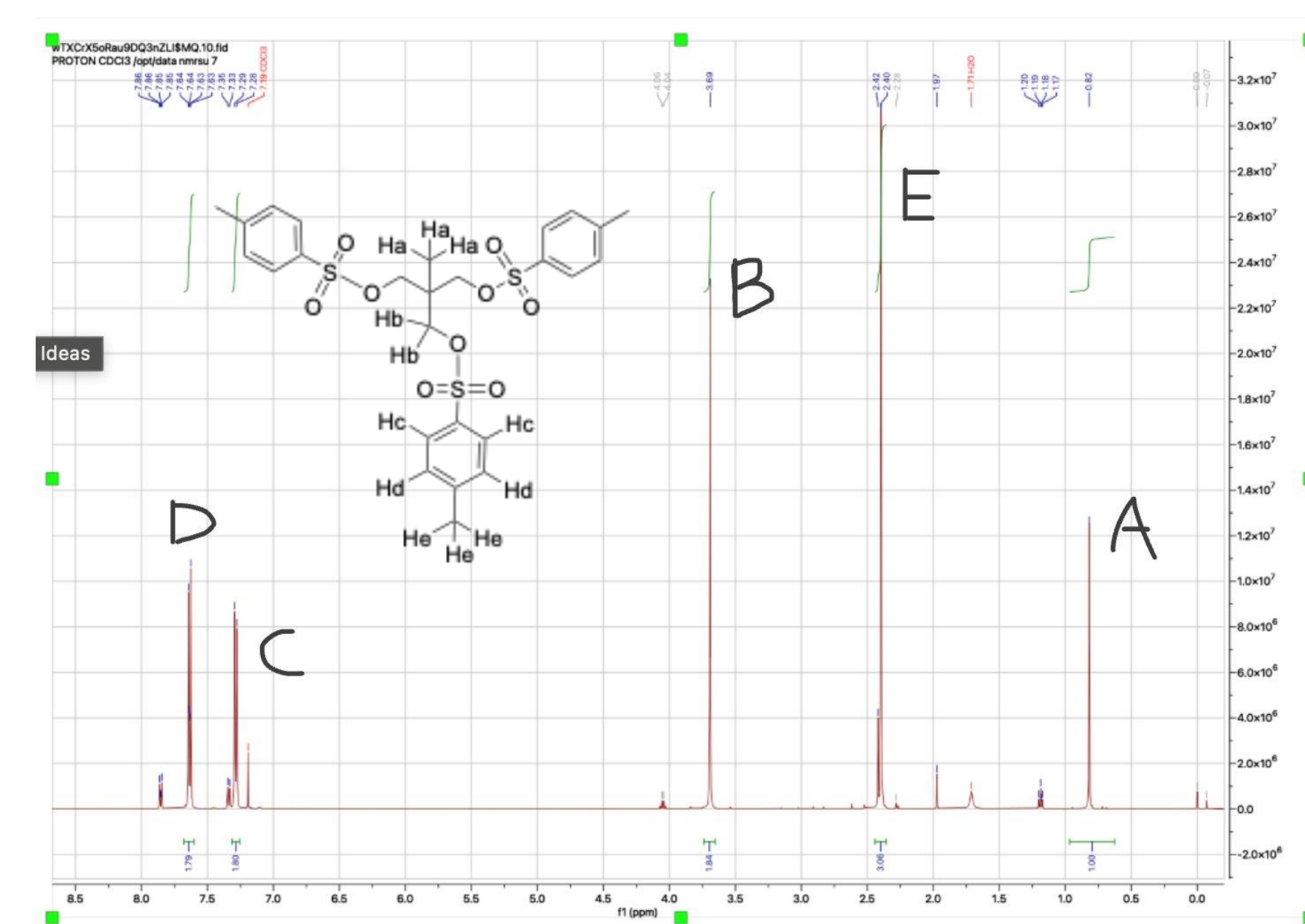


Figure #6: Labeled Proton NMR spectrum of 1,1,1-tris((p-toluenesulfonyloxy)methyl)ethane after purification.

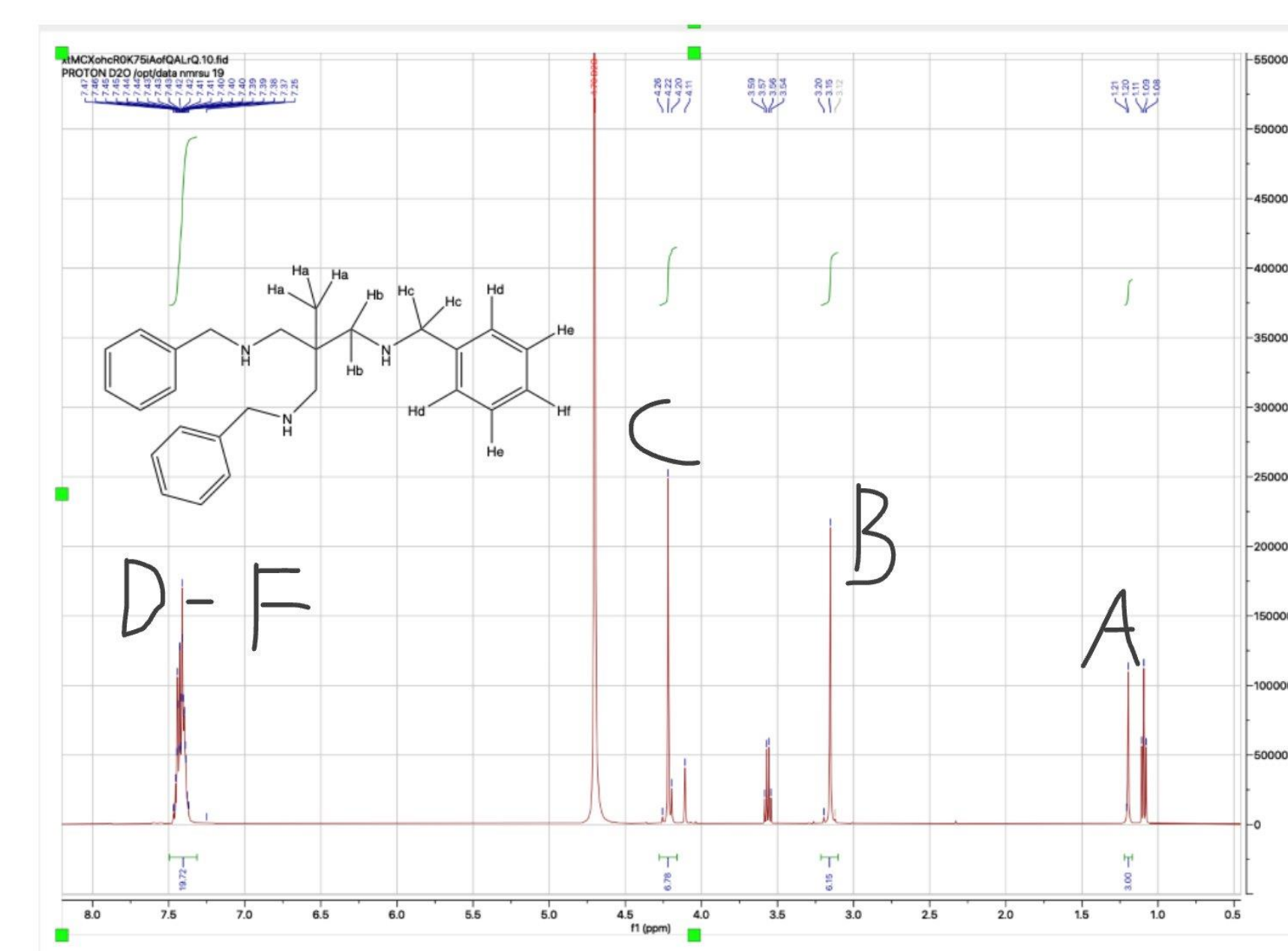


Figure #7: Labeled Proton NMR spectrum of 1,1,1-tris((benzylamino)methyl)ethane after purification.

I would like to give a big thank you to all that helped me through this project. My Professor, Roy P. Planalp, and grad student, Tristan O'Harte, and my friends and family for always encouraging me to do my best.

## References

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