



N,N - DIMETHYLGLYCINE METAL-ORGANIC COMPOUNDS IN THE DEVELOPMENT OF THERAPEUTIC METALLODRUGS

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Abstract: This project focuses on binding physiological ligands to Zn(II) ions into a structurally characterizable family of novel metal-organic compounds. By combining the antioxidant profile of L-carnitine and/or N,N-dimethylglycine (DMG) in a single molecule may enhance the antidiabetic benefits of zinc. The new metal-organic hybrid compounds are designed so as to reduce oxidative stress and further mimic insulin activity in human patients suffering from Diabetes mellitus type II.

• Introduction

Diabetes mellitus (DM) is a chronic endocrine and metabolic disorder, characterized by hyperglycaemia and resulting from deficient or ineffective insulin production. Type 1 and type 2 diabetes are the predominant forms of this disease. Type 1 is caused by the lack of insulin production and requires lifelong insulin administration, whereas type 2 diabetes is primarily associated with insulin resistance and is commonly managed through lifestyle modifications. In this context, recent advances in the pharmaceutical sciences have highlighted the growing importance of synthetic metal-organic chemistry, pertaining to the synthesis of new hybrid compounds that encompass complex transition metals with biogenic ligands [1].

• Materials and methods

N,N-Dimethylglycine (DMG) reacted with zinc sulphate heptahydrate by dissolving them in water under continuous stirring. The resulting solution was heated, and the product was allowed to evaporate slowly (**Fig. 1**). After several days, colourless crystals formed at the bottom of the vial.

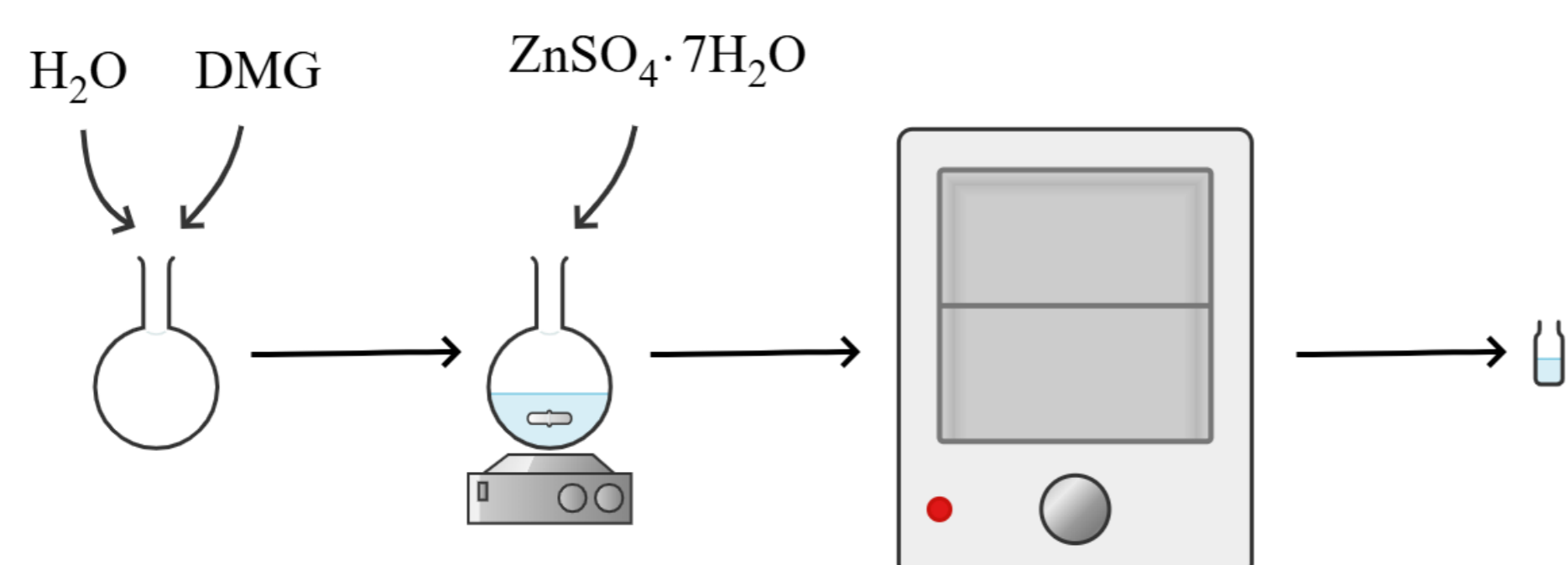
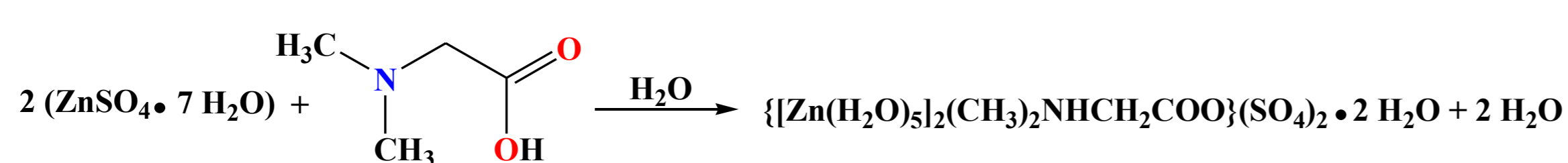


Fig. 1: Experimental procedure for the synthesis of metal-organic compounds

References:

[1]. Adeva-Andany M.M., Calvo-Castro I., Fernández-Fernández C., Donapetry-García C., Pedre-Piñeiro A.M. IUBMB Life 69(8) (2017) 578-594.

• Results and Discussion

The newly synthesized compounds have been further characterized through elemental analysis, FT-IR and ^1H -, ^{13}C -NMR as shown in **Fig. 1**, verifying the complexation of the ligand to Zn(II).

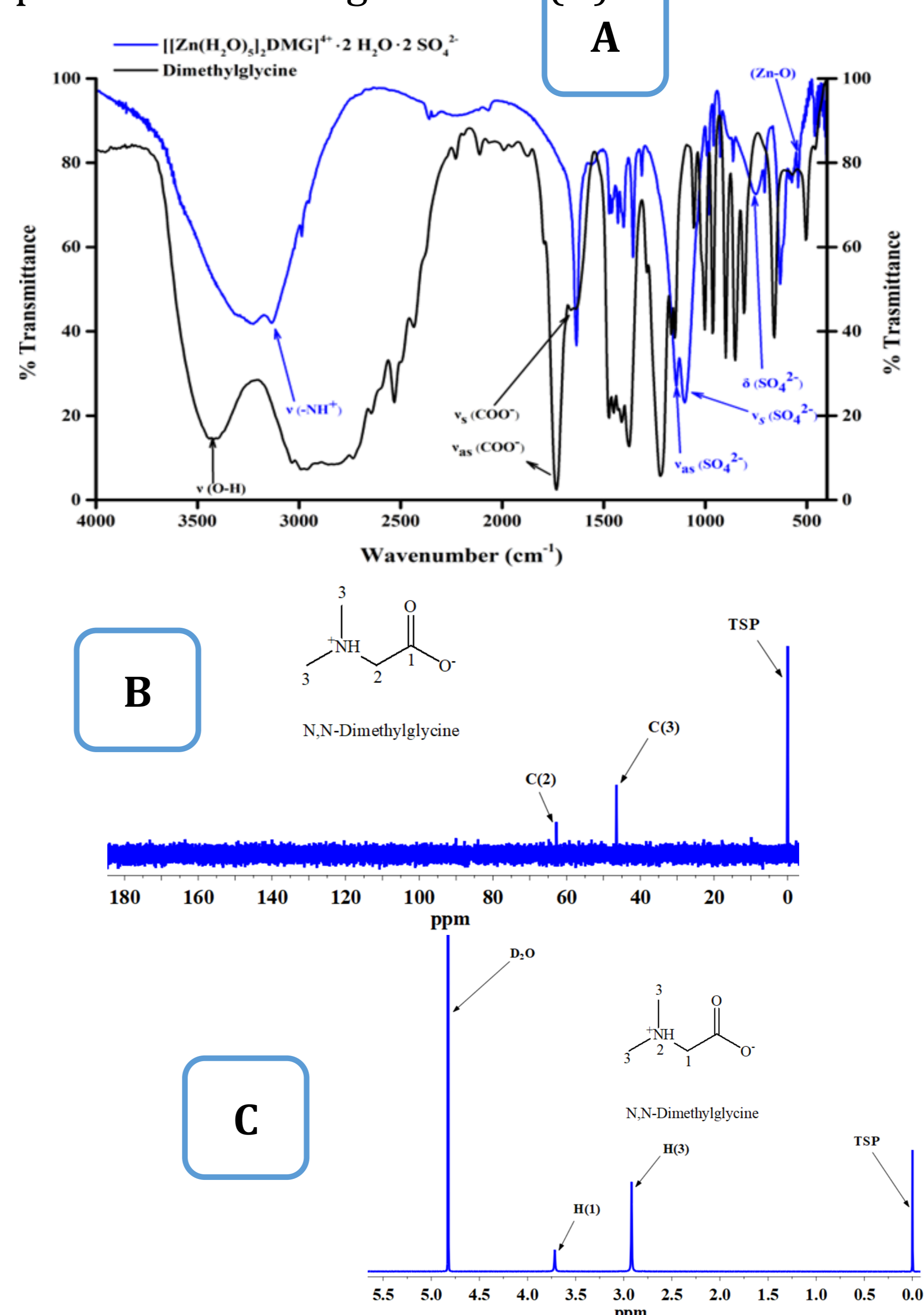


Fig. 1: A. FT-IR, B. ^1H -NMR, and C. ^{13}C -NMR

• Conclusions

The zinc metal ion was able to form complexes with physiological ligands (DMG), that are well-characterized in the solid state and in solution. L-carnitine with Zn(II) binary and ternary systems are also being investigated in concentration-dependent studies, showing promising results in Diabetes type 2.