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Dinuclear zinc(II) complex with a new symmetric ligand with N_4S_2O donor set: a promising artificial nuclease

Giovanna Vulcão Colares[1], Rafaella Marinho[1], Daniele Cocco Durigon[1] and Rosely A. Peralta[1]

[1]Department of Chemistry, University Federal of Santa Catarina, Florianópolis, Brazil
E-mail: giovanna.vulcao@grad.ufsc.br

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The important role of dinuclear zinc enzymes in mediating hydrolysis reactions is quite well-known in biological processes, some examples of these enzymes are metallo-β-lactamases, alkaline phosphatase, aminopeptidases such as bovine lens leucine aminopeptidase and aminopeptidase A.[1] Considering the presence of Zn(II)-containing hydrolytic enzymes and the literature reports on Zn(II)-mediated hydrolysis.[2] Herein, we describe a novel zinc complex (Figure 1) capable of promoting hydrolysis of the substrate bovine serum albumin (BSA). The ligand was characterized by ^{1}H and ^{13}C NMR and FTIR. The complex was characterized by elemental analysis, potentiometric titration, mass spectrometry, FTIR and X ray analysis. Protein cleavage assays were performed using BSA (66,432.96 Da) as substrate. Solutions containing BSA (5 µmol.L^{-1}) were incubated at different complex concentrations (500 – 25 µM) and different time increments 1, 4 and 24 h at 70 °C. Each reaction was quenched by adding a sample buffer solution (100 mmol.L^{-1} Tris-HCl, pH 7.5, 7% SDS, 40% glycerol, 2% β-mercapthoethanol, and 0.01% bromophenol blue). The samples were then subjected to 15% SDS-PAGE. The percentage of the fragment bands compared to the total amount of protein in each lane was determined using ImageJ software. It is possible to observe significant cleavage of the protein (Figure 1, B), since within 24 h, no more protein is observed at concentrations higher than 250 µM of complex. So, the protease activity of complex 1 is evident. More experiments are underway to understand the mechanism of BSA cleavage catalyzed by complex 1.

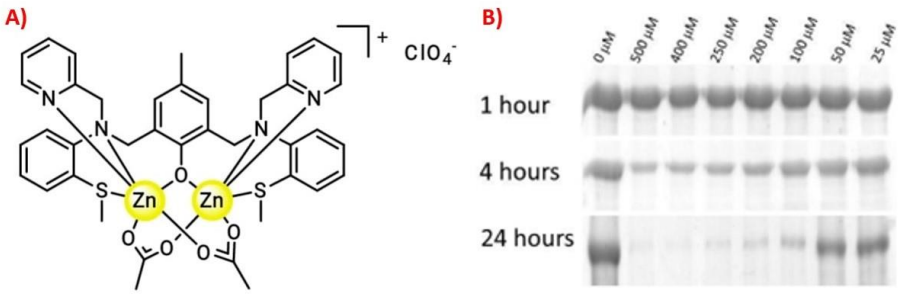

Figure 1. Proposed structure of zinc(II) complex (A). Time effect in BSA cleavage (A). Conditions: 5-500 µM BSA and 25 µM of complex 1; pH 7.5; 70 °C for 1,4 and 24 h (B).

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References

[1] J. Weston *et al.*, Chem. Rev. **105** 2151–2174 (2005).
[2] G. Parkin *et al.*, Chem. Rev. **104** 699–768 (2004).