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Chelation of zirconium by the DOTA ligand, a multiparametric study

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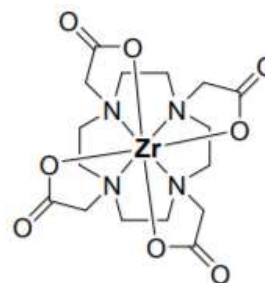
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Whether for diagnostic purposes or for therapeutic purposes, radioisotopes are increasingly used in nuclear medicine. To be introduced into the living environment, these elements are attached to a vector via a chelating molecule to allow the entirety to reach the target cells. The complexes formed between the chelating molecules and the radioisotopes must be very stable in order to avoid the release of the metal in the body.

In this work we will focus on the complexation of zirconium by the DOTA ligand (1,4,7,10-tetraazacyclododecane-1,4,7,10-tetraacetic acid). The zirconium 89 being a positron emitter it is a subject of interest for PET imaging.¹ The DOTA is a polyaminocarboxylic ligand that can form very stable complexes due to the macrocyclic effect. However, the synthesis of Zr-DOTA complexes is difficult due to the oxophilic properties of zirconium, leading to its hydrolysis, and because of its difficulty to fit into the cage of the DOTA. It is therefore necessary to achieve the complexation and to have a good understanding of the complexation properties.

Different routes have been used to synthesize the Zr-DOTA complexes by changing the experimental conditions (pH, precursor, etc.). These syntheses were carried out in different solvents (water, methanol and DMSO). These complexes were then characterized using several tools (NMR and ESI-MS).

1. D. N. Pandya, N. Bhatt, H. Yuan, C. S. Day, B. M. Ehrmann, M. Wright, U. Bierbach and T. J. Wadas, *Royal society of chemistry*, **2017**, *8*, 2309-2314



Zr-DOTA