

Abstract

Macrocyclic ligands have been used in radiomedicine for a long time. These ligands have been studied mainly in terms of complexation of heavy metal ions and possible use of these complexes in diagnostics and radiotherapy. Recent studies have highlighted the potential use of actinium-225 as an alpha-emitting radionuclide. This isotope is suitable for a precise treatment of micrometastases as it emits a cascade of high-energy but short-range alpha radiation. Due to the high linear energy transfer of the emitted particles, the tumor cells at a given location in the patient's body are completely destroyed. This work deals with the preparation and characterization of 18-membered polyazamacrocyclic ligands that can be used for complexation of this radioisotope. The prepared substances were characterized by potentiometry, NMR, MS and EA. Thermodynamic data of the complexes of these ligands with "model" heavy metal ions (Ca^{2+} , Sr^{2+} and Ba^{2+}) were obtained using potentiometry. For cerium(III) complexes with prepared ligands, the pH-dependent kinetics of their formation were studied, and the results of these measurements indicate the possibility of using these ligands in radiomedicine.

Keywords: macrocyclic ligands, heavy metal complexes, radiotherapy