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A size comparison of the lanthanoid(III) and actinoid(III) ionic radii

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Using lanthanoid(III) ions as non-radioactive substitutes for the actinoid(III) ions in model compounds is commonplace in many nuclear research areas. For instance, highly radioactive americium(III) ions are often replaced by europium(III) ions, found at the same position in the lanthanoid series. There is, however, no structural evidence to support this replacement, a fact that proponents in many fields do not consider. By carefully comparing the available data sets, it becomes obvious that the visual overlap in the periodic table does not reflect the true ionic radii of these elements at all. Here, using structural data from both solution and solid state, we present a comparative study of the ionic radii of the two inner transition metal series.

Keywords: ionic radii, inner transition metal ions, structural chemistry