

Accepted Manuscript

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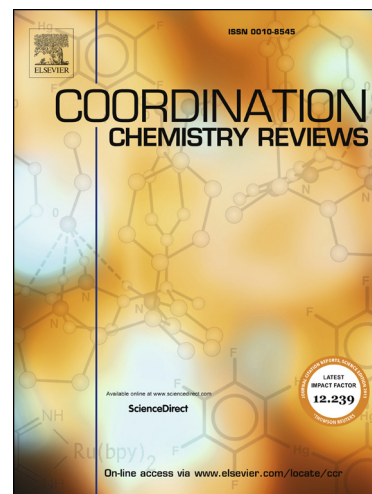
PII: S0010-8545(16)30125-4
DOI: <http://dx.doi.org/10.1016/j.ccr.2016.07.004>
Reference: CCR 112287

To appear in: *Coordination Chemistry Reviews*

Received Date: 18 March 2016
Revised Date: 8 July 2016
Accepted Date: 8 July 2016

Please cite this article as: M. Remelli, V.M. Nurchi, J.I. Lachowicz, S. Medici, M. Antonietta Zoroddu, M. Peana, Competition between Cd(II) and other divalent transition metal ions during complex formation with amino acids, peptides, and chelating agents, *Coordination Chemistry Reviews* (2016), doi: <http://dx.doi.org/10.1016/j.ccr.2016.07.004>

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Competition between Cd(II) and other divalent transition metal ions during complex formation with amino acids, peptides, and chelating agents

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Summary

Cadmium is not an essential element for humans, but instead its compounds are known for their toxicity. In addition to the risks for workers in industries that use cadmium, this metal can enter the food chain at different levels to be absorbed by the body, where it replaces other metals with similar chemical activity. This also applies to the cadmium inhaled via cigarette smoking. Thus, understanding the interactions between cadmium and biologically relevant molecules, such as amino acids, peptides, and proteins, is important, but it is also useful to study the chelating methods that can cure or alleviate acute or chronic cadmium poisoning cases. ^{111/113}Cd isotopes are used as NMR probes to determine the complex formation sites and geometry of metals in metalloproteins and metalloenzymes. This review provides a general introduction to the general properties of cadmium as well as the main uses of this metal, its compounds, and artifacts. The toxicity of cadmium in humans is also discussed and the most significant results regarding the interactions between cadmium and other potentially competing divalent metal ions with biological relevance, i.e. Fe(II), Zn(II), Mn(II), Ni(II), and Cu(II), and amino acids and peptides, particularly those containing histidine and/or thiolic groups, are collected. To the best of our knowledge, this is the most comprehensive summary reported for the speciation models of these systems. Distribution and competition diagrams were constructed to facilitate comparisons of the binding abilities of different metals with the same ligand (or vice versa) over a wide pH range and with different reagent concentrations and/or concentration ratios, thereby providing insights into the in vivo behavior both inside and outside cells where the pH and concentration can be very different. The vast topic of

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