Desalination and Water Treatment
www.deswater.com

26 (2011) 72–78
February

1944-3994/1944-3986
doi: 10/5004/dwt.2011.2112

Removal of heavy metal ions from aqueous solution by azocalix[4]arene

Özlem Özen Karakuş[a,*], Serkan Elçin[a], Mustafa Yilmaz[b], Hasalettin Deligöz[a]

[a]*Faculty of Science-Arts, Department of Chemistry, Pamukkale University, Denizli, Turkey*
Tel. +90 258 296 3613; email: oozen@pau.edu.tr.
[b]*Faculty of Science, Department of Chemistry, Selçuk University, Konya, Turkey*

Received 25 November 2009; Accepted 7 May 2010

ABSTRACT

This study presents the preparation, characterization, and sorption properties of new chromogenic azocalix[4]arene based oligomers (1a, 2a and 3a) towards some selected heavy metal (Ag^{+}, Hg^{+}, Hg^{2+}, Co^{2+}, Ni^{2+}, Cu^{2+}, Cd^{2+} and Cr^{3+}) cations. These compounds have been synthesized via polycondensation reactions involving 25,27-diethylacetoxy-26,28-dihydroxy-5,17-bis(4-nitrophenylazo)calix[4]arene (1), 25,27-diethyl acetoxy-26,28-dihydroxy-5,17-bis(4-ethylphenylazo)calix[4]arene (2), or 25,27-diethyl acetoxy-26,28-dihydroxy-5,17-bis(4-bromophenylazo)calix[4]arene (3) with 1,4-bisamino methyl benzene. Two-phase sorption properties of azocalixarene oligomers (1a, 2a and 3a) towards the selected metal cations are reported. The binding properties of these oligomers towards the selected metal cations were observed to be higher than those of monomeric analogs. It is suggested that this increased binding ability arises from highly rigid azo (–N=N–) group moiety at the upper rim of calix[4]arene in the oligomeric skeleton.

Keywords: Azocalixarene; Batch sorption; Calix[4]arene; Heavy metals; Oligomer; Polyamide

*Corresponding author.

Presented at the International workshop on urbanisation, land use, land degradation and environment (ULE 2009), 28 September – 1 October 2009, Denizli, Turkey