Amberlite XAD–1180 Modified with Thiosalicylic Acid: A New Chelating Resin for Separation and Preconcentration of Trace Metal Ions

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An AXAD–1180–TSA chelating resin was prepared by covalently linking thiosalicylic acid with Amberlite XAD–1180 and applied for preconcentration and separation of Ni(II), Cr(III), Co(II), Cd(II), Mn(II), Cu(II), Pb(II), and Fe(III) ions prior to their analysis by flame atomic absorption spectrometry. Various parameters such as pH, amount of a resin, eluent's type, volume and concentration, volume of sample solution, and matrix effects on retention of metal ions were examined. Adsorption capacity of the modified resin for Ni(II), Co(II), Cd(II), and Cu(II) was 305, 248, 143, and 258 μmol g^{-1}, respectively. Preconcentration factor was 18, exceptionally for Ni it equaled 15. Detection limit values (3s/b, n = 20) were 1.24, 1.60, 1.16, 0.22, 0.76, 0.91, 3.18, and 2.76 μg L^{-1} for Ni(II), Cr(III), Co(II), Cd(II), Mn(II) Cu(II), Pb(II), and Fe(III), respectively. Relative standard deviation and recovery values for ten replicate determinations under optimum conditions were in the range 1.0–2.9% and 96.7–98.8%, respectively. The proposed method was applied to determination of metal ions in well and lake water samples. To estimate accuracy of the method, analysis of certified enriched lake water (TMDA–62) and recovery experiments with spiked water samples were performed.