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## Microfluidic reactor for Pb(II) ion extraction and removal with amide derivative of calix[4]arene supported by spectroscopic studies

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### ABSTRACT

Removal of Pb(II) ion over several other metal ions with 25,26,27,28-tetrakis(*N,N*-diethylamino carbonylmethoxy)-5,11,17,23-tetrakis(1,1,3,3-tetramethylbutyl)calix[4]arene (EATOC) from nitric acid media was investigated in a solvent extraction system. Pb(II) ion was selectively extracted over Fe(III), Co(II), Zn(II), Cu(II) and Ni(II) in the competitive model system. Further, Pb(II) ion was easily stripped from the metal-laden EATOC complex with distilled water as stripping agent. However, Pb(II) extraction and stripping in the batch system took 90 min, 24 h, respectively, to reach an equilibrium in a batch system, but it was only 2.00 s with using droplet microfluidic reactor system, which is remarkable. A rapid and selective removal of Pb(II) from a simulated wastewater effluent was also achieved. Pb(II) complexation mechanism with EATOC was investigated by using ultraviolet, Fourier transform-infrared and proton nuclear magnetic resonance spectroscopies. It was found that the complexation between Pb(II) and EATOC takes

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