

Abstract



Novel Schiff-base ligands for the selective extraction and transport of transition and post-transition metal ions

Waheed Saban

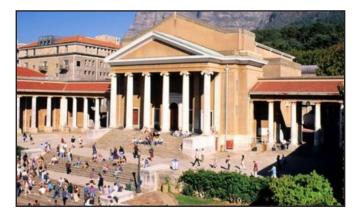
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Abstract:

The synthesis of a new series of Schiff base ligands is reported. The ligands are fully characterized using 1H and 13C NMR, FT-IR, mass spectrometry and elemental analysis. The extraction and bulk liquid membrane transport abilities of the ligands were evaluated by monitoring the extraction and transport of the metal ions Co(II), Ni(II), Cu(II), Zn(II), Cd(II) and Pb(II) over a 24-hour period. Palmitic acid was included in the organic phase. All ligands showed extraction of Cu(II) and Pb(II) ions, with 2 ligands being more selective towards the extraction of Cu(II) whereas the other 2 ligands extracted more Pb(II). The extraction of Pb(II) is most likely due to a synergistic effect, since palmitic acid was added throughout the organic phase. In the transport studies, only Cu(II) ions were transported. pH-isotherms for both Cu(II) and Pb(II) were also carried out for all ligands. Interestingly Pb(II) is extracted better at lower pH's compared to Cu(II) in two cases. This study shows how these salen-type ligands, when used together with palmitic acid, show transport selectivity for Cu(II), and in the extraction studies, extraction selectivity for Cu(II) and Pb(II). Crystal structures of Ligands L1 and L4 respectively and two Cu(II)-complexes with Ligands L2 and L4 were obtained. The free ligand L1 crystallizes in the C 2/c space group. The final R-factor was 6.2%. The free ligand crystal structure L4 shows a structure similar to that shown with L1 with a final R-factor of 6.1%. The O atoms in this particular structure are in tris conformation to each other. In the crystal structure of the Cu(II) complex with ligand L2, the space group was Pbca and the final R-factor was 8.6%. The Cu(II) complexes with L4 is a distorted tetrahedral arrangement to the hydroxyl and the azomethine group of an adjacent ligand molecule to form a metallocycle bridged by the linkers. A new crystal structure showing how Pb(II) is coordinated to the Cu(II) complexes of L4 is reported

Biography:

Waheed Saban, a PhD student in Chemistry presented his research work at the XXIV IUPAC ... method for the synthesis and development of core-shell modified magnetic nanostruc-



turesThe Postgraduate programme in the department offers Honours, MSc and PhD degrees in: ... to be one of the most fundamental problems facing development in South and Southern Africanext generation of interdisciplinary faculty and development of the field of biomedical ... parts: Short Courses, MSc and PhD Traineeships.

Recent Publications:

- 1. Synthesis and Characterization of Schiff-base ligands for the selective extraction of transition metal ions
- Design, synthesis and spectroscopic characterization of mixed N- and O-donor Schiff base ligands (N2O3): Crystal structures of free ligands
- 3. Synthesis and characterization of 5- and 7-donor Schiff base ligands and spectroscopic evidence for tautomerism: A crystal structure showing tautomeric forms within one ligand
- 4. Synthesis, characterization and use of imidazole and methyl-pyrazole based pyridine ligands as extractants for nickel(II) and copper(II)
- This work consists of the synthesis of seven pyridine based ligands, 2-(3-butyl-1H-pyrazol-5-yl)-pyridine (1), 2-[3-(tert-butyl)-1H-pyrazol-5-yl]-pyridine

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