

THE INTERPLAY OF COORDINATION CHEMISTRY AND SOLVATION IN DESIGNING SELECTIVE SENSORS FOR TOXIC METALS AND OTHER IONIC TARGETS.

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Despite their environmental health effects, efforts to design selective and practical sensors for larger and relatively “softer” targets, with lower charge density, such as the toxic metal species Pb(II) and Cd(II) and the anions ClO₄⁻ and NO₃⁻ still present significant challenges. Solvent extraction from water into a less polar organic phase via the formation of complexes with distinct optical or electrochemical properties presents an opportunity for addressing selectivity issues, by combining the unique coordination properties for each species (via ligand design), while taking advantage of more favorable dehydration-resolvation energetics for these targets, compared to harder more charge-dense ions (such as Ca²⁺) which are naturally present in high concentrations and often compete for the ligand binding sites. Sulfonamides with incorporated fluorophores have been shown previously to be effective ion-exchange extractants. Herein we are expanding this approach with a variety of ligands and targets and demonstrate the combined effects of coordination and solvent extraction principles in sensor design.