Design and application of chelating sulfur-based ligands for selective extraction of gold using a simultaneous leaching and solvent extraction system

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For more than a century most of the world’s gold has been recovered using the cyanide process. More effective extractants with higher selectivities are highly desirable for both environmental and economic concerns. We are interested in developing processes for the selective recovery of gold from both primary and secondary sources. In this regard, we have developed a family of chelating sulfur-based ligands which can be used in a simultaneous leaching and solvent extraction system resulting in a gold extraction process that is fast and efficient. The ligand system was found to be highly selective for gold even in the presence of huge excesses of transition metal impurities; so much so that further purification steps are not necessary to recover the gold. The key step in this process is the application of a simultaneous leaching and solvent extraction system which allows for very low acid concentrations. The process and metal-ligand coordination chemistry will be discussed in detail along with some interesting catalytic activities observed along the way.

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