

# Enhancing the leaching rate of gold in alkaline glycine solutions

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## **ABSTRACT**

Glycine in particular, and amino acids in general have shown much promise as an environmentally benign alternative lixiviant to cyanide, or a synergistic lixiviant to cyanide for gold leaching. The research presented in this paper relates to oxide ores of gold. Initial research on the leaching of gold in glycine-only solutions showed very slow leaching compared with the conventional cyanidation process. In this research study, different options were tested to enhance the gold extraction from different gold oxide ores. The effects of adding different strong oxidants to glycine solutions on the gold leach rate and over all gold recovery was studied. Glycine-permanganate leach solutions have been tested using different gold oxide ores and the results showed that more than 87% of gold can be extracted at 1.5 kg/t glycine and 3 kg/t permanganate in 48 hours leaching. Alternatively, in the absence of permanganate, a 7.5 g/L glycine, 10 ppm NaCN solution can improve the gold extraction from 11% to 70% in a 96 hour time horizon at room temperature. Leaching at high pH ( $\text{pH} \geq 12$ ) and 55°C temperature was also tested. The results show that permanganate is the most effective oxidant for alkaline glycine leaching of gold, giving leach rates that are feasible for tank leaching at room temperature, but which leads to partial glycine destruction. High pH can make a significant difference and it was found that more than 85% of gold can be extracted a cyanide-free environment by solutions containing 15 g/L glycine at pH 12.5 in 336 hours which is suitable for heap and in-situ leaching approaches.