

Cyanide Mining

For over 100 years, cyanide has been the leach reagent of choice in gold mining because of its high gold recoveries, robustness and relatively low costs. The cyanide solution still remains the most widely used hydrometallurgical process for the extraction of gold from ores and concentrates. According to the International Cyanide Management Institute, approximately 1.4 million metric tons of hydrogen cyanide is produced annually worldwide, with approximately 190,000 metric tonnes used to produce cyanide reagents for gold processing, representing a global market of over US \$400 million.

Both the use and disposal of cyanide present significant safety and environmental risks. Cyanide and cyanide gas are both extremely toxic and great care has to be taken during ore processing to avoid exposure for workers. Solutions containing cyanide have to be carefully managed to prevent the formation of cyanide gas. In addition, there are significant problems with the disposal of cyanide-containing waste.

A series of recent environmental accidents at various gold mines around the world, however, has precipitated widespread concern over the use of cyanide as a leach reagent. It is against the background of these environmental impacts that indigenous groups and representatives of the NGO community in particular have lobbied for the mining industry to develop alternative, less toxic, leach reagents. Internationally, Argentina, Costa Rica, the Czech Republic, Germany, Hungary and Turkey have legislated a ban on cyanide mining. In the United States, cyanide mining is banned in a number of states including Montana and Wisconsin.

Growing environmental and health concerns about the use of cyanide have also resulted in legislation of stringent rules or prohibitions, as well as public pressure against cyanide use in gold processing worldwide. The primary challenge in devising a suitable substitute for cyanide in gold processing lies in developing an equally effective and degradable leach reagent, which is not a persistent environmental toxin. As gold cyanidation rates are relatively slow, the industry has been searching for faster gold leaching reactions capable of facilitating high metal recovery rates. Alternative lixiviants or leaching agents should also be inexpensive and recyclable, selective, non-toxic and compatible with downstream recovery processes.

There has also been a lot of experimentation with various biological media for recovering gold from ores, but no one has come up with a more cost effective and productive method than leaching with cyanide until now.