The Extraction of Gold Through Chemical Methods

By: Giovanni R. Budi

Quantitative Methods of Rocks and Minerals

Steve Teeters and Christian Brundin

Summer Ventures in Science and Mathematics

The University of North Carolina at Charlotte

Abstract

As one of the most coveted minerals in the world, gold has a crucial impact on our society. Many know the role that gold has in jewelry; however, many are unaware that gold also has a much larger role in our world. Gold is used not only in jewelry, but also in electronics, medicine, engineering, finance and many other industries. Though demand for gold is high, many issues in its extraction process still exist. The gold extraction process consists of the usage of chemicals like mercury, cyanide, and aqua regia. Though fundamental in the extraction process, these chemicals can be detrimental to the workers and the environment. Many questions arise from this dilemma: Which chemical method is the safest? The most environmentally friendly? The most cost effective? In order to determine the answers to these questions, each method was heavily researched. Main factors when determining the safest chemical method were the knowledge of the worker, proper equipment, hazards, and recorded incidents. The safest chemical method determined was the sodium cyanide solution followed by the aqua regia and mercury solutions, respectively. Main factors when determining the most environmentally friendly method were the environmental impact of the chemical, the amount of chemical released from the mines, and recorded incidents. The most environmentally friendly method was the aqua regia solution, followed by the sodium cyanide and mercury solutions, respectively. Main factors when determining the most cost effective included the ratio of solution to gold and the cost of the chemicals. The most cost efficient method was the mercury solution followed by aqua regia and cyanide solutions, respectively. Overall, each method had its own advantages and disadvantages. However, other questions still remain. Should we value environment over the other factors? The safety of the workers? The profit?