

# INCO cyanide destruction insights from plant reviews and laboratory evaluations

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## ABSTRACT

The INCO cyanide destruction process is commonly used in the gold industry to destroy residual cyanide in the tailings to meet regulatory requirements before discharge into the tailings storage facility. The process was developed utilising sulfur dioxide which dissolves in alkaline solution to form sulfite, but today sodium metabisulfite (SMBS) is more commonly used.

This paper provides insights from a number of INCO cyanide destruction process reviews and studies. In particular the performance of several plants are discussed in terms of reagent (sulfite and oxygen) stoichiometry and utilisation, and the impact of reactor design, reagent addition points and slurry properties. Discussed also is the effectiveness of hydrogen peroxide used as a supplementary source of oxygen in a number of the processes reviewed. A process control strategy producing optimum process performance will be outlined along with discussion of some observed procedures and control strategies adopted by operators that achieve process control targets but don't control to the optimum process conditions.

The paper also explores the challenges in conducting laboratory evaluations and scaling these results to predict or understand plant performance. Outlined is the requirement that any testwork must be conducted using a continuously stirred tank reactor as batch testwork is not representative of the continuous process. The impact of the ore on the process is established by conducting separately cyanide destruction testwork on slurry and filtrate. It has been found that for some ores the mineral surfaces can catalyse the undesirable direct oxidation of sulfite by oxygen. Discussed also is the oxygen mass transfer coefficient, which is a key design parameter that is often estimated due to the difficulty in determining this in the laboratory.