Study of Gold Leaching with Bromine and Bromide and the Influence of Sulphide Minerals on this Reaction

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This paper presents experimental evidence that supports the use of bromine/bromide as a potential alternative to conventional cyanidation for gold leaching. It is well known that bromide ions stabilize gold in aqueous solution by forming a complex in acidic to neutral pH conditions. The oxidizing agent normally used in this process is bromine. This is, however, a corrosive liquid with high vapor pressure, which can lead to high reagent losses and/or difficulty in handling. This study evaluated several bromine-based lixiviant with considerably lower vapour pressure than liquid bromine. Using a rotating devise, the rate of gold dissolution was determined at various concentrations of these reagents and pHs. The reactivity of pure pyrite, arsenopyrite and chalcopyrite minerals was also evaluated in stabilized bromine reagent. Furthermore, bromine leaching of a number of gold bearing ores and mixtures of ores was undertaken. Results showed that significantly higher gold recovery can be achieved with bromine than with cyanide when leaching gold encapsulated in sulphides, but bromine consumption was very high owing to oxidation of the sulphides. The greatest promise for the bromine leach process was with oxidized gold ores. The recovery of gold from oxide ores with bromine was comparable to that achievable with cyanide and bromine consumption was reasonable when leaching was conducted at a near neutral pH of ~6. In the case of oxidized gold ores containing copper mineralization, it is possible that bromine consumption may be significantly lower than cyanide consumption, since there is evidence to suggest that bromine is less reactive than cyanide with copper minerals.