The technology described in the HyperLeach® patent has the potential application for converting sulphide concentrates, the source of the majority of the world's base metals production and resources, through to metal at the mine site. This would eliminate associated expensive concentrate transport costs and replace smelting and roasting, which would in turn remove the associated environmental problems. It also opens up the possibility of heap leaching some sulphide ores, notably chalcopyrite, the main copper ore.

MetaLeach's HyperLeach® process, although less advanced in its commercialisation than AmmLeach®, has very significant potential for application. HyperLeach® is a hydrometallurgical process which has been developed by MetaLeach for the extraction of metals, especially copper, zinc, nickel, cobalt, molybdenum and rhenium from sulphide ore deposits and concentrates. The process utilises chlorine based chemistry to solubilise metals from ores under ambient temperature and pressure conditions. The HyperLeach® process can be operated as either heap leach or tank leach.

Currently nearly all base metal sulphide ores are processed and concentrated on-site using froth flotation before being shipped off site to a smelter and refinery for further processing. The costs involved in selling an ore concentrate include road transport, shipping, smelter and refinery charges and can include penalty costs imposed by the smelter, which are deducted from the payable metal in the concentrate supplied. In addition, in many situations mine owners may not be paid for valuable metal by-products contained in the concentrate. Taken altogether, these charges and costs can amount to up to 40% of value of the metal produced from a mine.

There is considerable scope to do more on-site processing to value add using hydrometallurgy to generate higher returns for mine owners and to make uneconomic ore bodies economic. Although the HyperLeach® process was initially developed to treat directly low grade ores to produce high value metal products on-site at competitive operating costs and relatively low capital costs, the process could also be successfully applied to a wide range of concentrates and mattes.

One of the key benefits of the HyperLeach® process is that, unlike some new technologies, it requires no special purpose built equipment, only the addition of an appropriate leaching circuit or leach pads and collection ponds. Unlike previous chlorine based processes, HyperLeach® does not require chlorine gas to operate, the oxidant can be generated on-site via industry standard chlor-alkali technology. If a low-cost source of chlorine gas is available, then the oxidant can be generated from this. A key feature of the HyperLeach® process is that it operates at ambient temperatures and pressure and is eminently suitable for heap leaching.

The HyperLeach® process is extremely rapid, with flotation concentrates being leached within minutes. The resultant solution is readily processed using conventional solution techniques, including solvent extraction. The rapidity of reaction and selectivity for sulphides makes HyperLeach® an excellent technology for heap leaching of base metal sulphide ores which are too low grade to treat using the conventional grind, float and smelt processes.

The current copper commodity market is primarily supplied by treating chalcopyrite ores typically grading >0.8% copper by the conventional process. There are few unexploited world class ore bodies with >0.8% copper head grades and the next generation of mines will be closer to 0.6%. This head grade is likely to be uneconomic using the conventional process due to increasing power costs, unless the price of copper increases significantly. Over the past twenty years all major companies have tried to develop low cost hydrometallurgical processes for such chalcopyrite ores, notably for heap leaching. Thus far, none seem to have been put into production. HyperLeach® has excellent prospects for being a breakthrough technology in chalcopyrite heap leaching.

In addition to chalcopyrite, HyperLeach® has been shown to be effective for treating nickel ores, concentrate and mattes; treating molybdenite ores, concentrates and flotation tailings; removing zinc from lead concentrates; reducing arsenic in copper flotation concentrates and removing impurities from copper concentrates.

HyperLeach® can also be used as a pre-treatment for MetaLeach's AmmLeach® technology to provide synergism between the processes. HyperLeach® solubilises and mobilises target metals from sulphides with AmmLeach® leaching the target metals selectively. This combination allows processing of a whole ore body from the oxide cap through the transition zone to the sulphide basement using the same plant by moving from AmmLeach® to HyperLeach® as the ore body is mined.

Appendix

HyperLeach® Patent Description

Method of Oxidative Leaching of Sulfide Ores and/or Concentrates patents pending and granted in Australia. This is a core patent for MetaLeach's HyperLeach® technology.

The patent describes a method for leaching one or more target metals from a sulphide ore and/or concentrate containing such, the method comprising the steps of:

(a) Exposing the ore and/or concentrate to an aqueous solution of chlorine-based oxidising species in which the hypochlorous acid comprises at least 10 mol% of the chlorine-based oxidising species;

(b) Allowing and/or facilitating the oxidation of the target metals by the hypochlorous acid, thereby decreasing the pH such that the predominant chlorine-based oxidising species becomes chlorine;

(c) Allowing and/or facilitating the oxidation of the target metals by the chlorine;

(d) Allowing and/or facilitating the dissolution of the target metals by the solution species formed during the oxidation by hypochlorous acid and / or chlorine; and

(e) Passing the pregnant solution produced thereby to a means for metal recovery.

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