A number of test programs have been undertaken for unnamed Australian clients into the amenability of leaching copper ore samples using the two processes. They were invented as an environmentally friendly process to leach copper from ores.

**WHY GLYCINE?**

- Environmentally benign lixiviants
- Precious metal extraction without cyanide
- Higher heap leach recoveries - finer crush sizes
- Low operating costs - glycine is reusable
- Selective leaching - simpler metal extraction

**GLYLEACH™ & GLYCATTM BENEFITS**

- Environmental safety: Glycine is non-toxic to humans as well as wildlife
- Selectivity: Glycine will solubilise copper, nickel, cobalt and zinc, while iron, manganese, silicates and carbonates remain in the leach residue
- Alkalinity: Leach conditions are alkaline pH, allowing simple and inexpensive materials of construction
- Mild conditions: Leaching is typically at ambient temperature with no heating cost or pressure vessels
- Low consumption: Glycine is non-volatile (unlike cyanide, ammonia, hydrochloric acid) and stable under process conditions
- Recycle: Glycine is not chemically consumed in the overall process. It is easily recovered and recycled
Case Studies

CASE STUDY 1:
CARBONATE HOSTED COPPER OXIDES

A comparative test between sulphuric acid and GlyLeach™ on a carbonate hosted copper oxide. Acid consumption of 98 kg/t had to be used to achieve the same recovery of glycine system with usage of 0.2 kg/t glycine and 0.05 kg/t lime.

CASE STUDY 2:
SLUMP TESTS

Slump and percolation tests were carried out on two copper oxides measured side by side for slump and percolation rates. Slumping for acid leaching shown to be as high as 20% slumping for glycine leaching this figure is less than 2%.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Acid Slump</th>
<th>GlyLeach Slump</th>
<th>Percolation Rate Acid</th>
<th>Percolation Rate Glycine</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19%</td>
<td>2%</td>
<td>1L in 26mins</td>
<td>1L in 2mins</td>
</tr>
<tr>
<td>2</td>
<td>4%</td>
<td>1%</td>
<td>1L in 2mins</td>
<td>1L in 1min</td>
</tr>
</tbody>
</table>

GlyLeach™ can continually extract the copper to completion with minimal slumping

CASE STUDY 3:
GOLD/COPPER TAILINGS

Glycine has the potential to leach precious metals as well as copper oxide. The graph shows how gold and copper can be leached simultaneously from a tailings.

OUTCOMES

- Alternative to uneconomic high acid consuming ores
- Negligible slump and greater percolation in high clay ores when compared to acid leaching
- Recovers additional revenue from copper oxides with precious metal credits