

67: iGoli chlorine leaching – 2000s research in South Africa

The 'iGoli Mercury-free Gold Extraction Process' was invented during the last few years by the Small Scale Mining and Beneficiation Division (SSMB) of Mintek in South Africa (www.mintek.co.za).

The iGoli process is designed to leach gold from >0.1% gold concentrate to produce 99.9% gold product.

The iGoli process is a modern version of chlorination, and uses a mixture of pool acid (dilute hydrochloric acid), bleach (sodium hypochlorite) and sodium metabisulphate to leach and recover metallic gold [38,39,187].

Assessment of concentrate

Tests by Mintek show that concentrates from different areas require slightly different recipes for the iGoli process. Mintek SSMB requires a 2-kilo sample of concentrate containing at least 1gram/ton to determine the optimum recipe [187]. In some placers and a few hardrock ores, carbonates are present in such abundance that they interfere with leaching gold and have to be first removed [35].

Operation

1st stage – leaching gold into solution

The process equipment is made of PVC and other plastics, as chlorine in the leach would attack mild steel and other metals. Use of plastics allows transparent vessels allowing the operator to witness the progress.

The feed is of finely screened concentrate with a grade of >0.1% gold. A batch is added to the reaction vessel where the gold is dissolved (leached) by a mixture of pool acid (dilute hydrochloric acid) and bleach (sodium hypochlorite). Gold is leached by attack by nascent chlorine to form gold chloride (AuCl₂) in solution:



Leaching the gold usually takes a number of hours.

Any fumes that may form are scrubbed in the attached vessel using sodium hydroxide solution.

2nd stage – precipitating gold from solution

Once the gold has dissolved, the contents of the reaction chamber are filtered to remove the solids.

The pregnant solution is mixed with sodium metabisulphite in the precipitation vessel and manually stirred. If properly done, a gold powder of up to 99% purity is obtained that may be turned into a gold disc just by hitting it with a hammer [38,39,187].

3rd stage – waste treatment

The solid waste from the iGoli process is neutralised using lime or limestone with apatite added if necessary to destroy or precipitate base metals and ferrometals.

Adoption by placer gold miners

The iGoli process is new, but is gaining interest in South Africa and elsewhere among artisanal and small-scale miners as an alternative to mercury amalgamation.

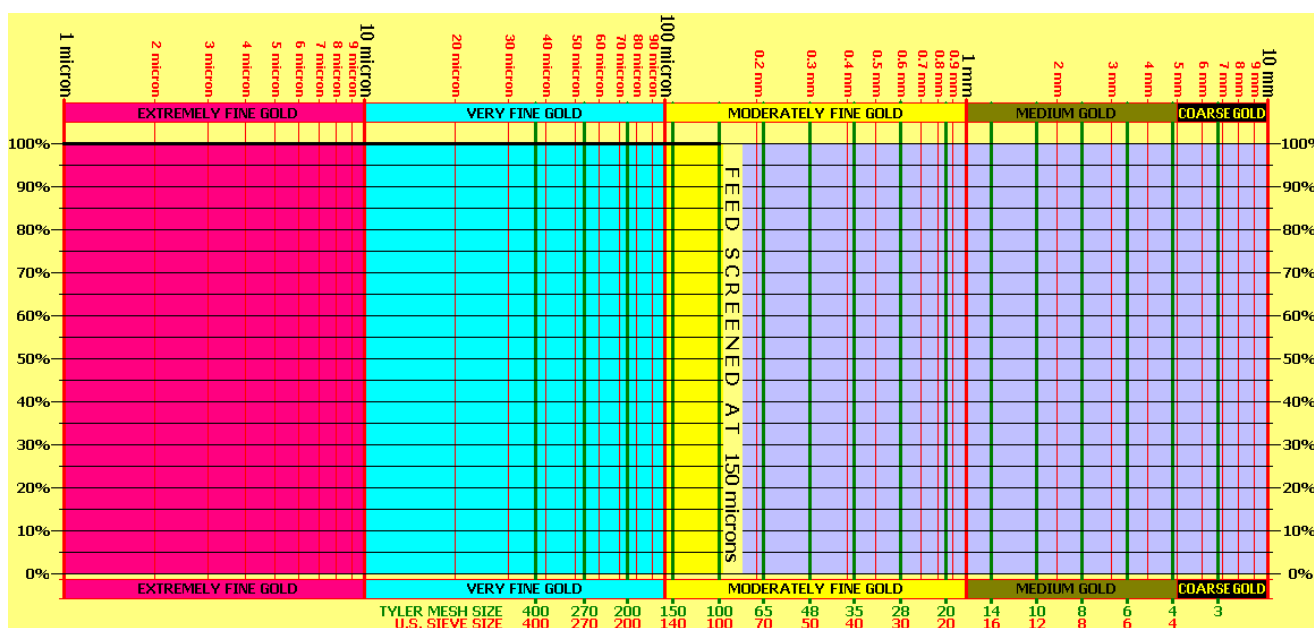


Figure 140. GOLD RECOVERY BY IGOLI CHORINE LEACHING Recovery of placer gold by the iGoli mercury-free gold extraction process [38,39,187]. (compiler: Robin Grayson)