

56: Gold-paraffin wax floatation – 1990s research in Brazil

The gold-paraffin wax process was developed in Brazil as a clean non-polluting method for recovering gold as an alternative to mercury amalgamation [167], and is currently being assessed by Eco-Minex in Mongolia.

The gold-paraffin wax process as developed by Christina Hamelmann and Fernando Lins of CETEM, Brazil, exploits the preference for gold particles to adhere to hydrophobic materials and thereby can be separated from slurry. The selected hydrophobic material is paraffin-wax which is non-toxic, low-cost and widely available. The concentrate used in the tests was from Minas Gerais with a gold grade of 11 grams/ton.

The CETEM researchers found that the greater the volume of paraffin wax compared to the volume of the sample then the greater the gold recovery by the gold-paraffin wax method. Attempts were made to obtain an electrostatic attraction between the gold particles and the paraffin globules by controlling the acidity at pH 3, as the isoelectric point for gold is pH 2 and pH 3-5 for paraffin [168]. In theory at pH 3 the gold particles should be negative and paraffin globules positive, and some improvement in gold recovery was achieved at pH 3 suggesting that this mechanism was occurring. The researchers also found xanthate as a gold collector enhanced gold recovery.

The CETEM researchers succeeded in achieving gold recoveries of 40-50% by the gold-paraffin wax method [167]. These results are encouraging considering the number of untried variables that await investigation that may be capable of greatly improving the gold recovery sufficient to challenge mercury amalgamation.

The gold-paraffin wax method is described at [www.e-goldprospecting.com/html/gold-paraffin\\_process.html](http://www.e-goldprospecting.com/html/gold-paraffin_process.html).

Operation

This account is based on the bench experiments of Hamelmann and Lins in Brazil [167].

The concentrate is finely divided and made into aqueous slurry of 25-30% solids.

The slurry is heated in a container to 70°C, just 2 degrees centigrade above the melting point of the paraffin-wax used (about 68°C).

The temperature of the slurry is maintained at 70°C, and pieces of paraffin wax are added and allowed to melt. A mechanical stirrer disperses the melted paraffin to encourage it to contact the particles in the slurry. By this simple means, the gold particles being hydrophobic adhere to the globules (droplets) of paraffin wax whereas black sand and quartz do not.

When the stirring ceases, the paraffin globules rise to the surface to form a low-density paraffin phase above the water phase. The gold is locked in the paraffin when it solidifies as a floating solid. The solidified gold-containing paraffin is removed from the surface of the aqueous phase and further processed to remove the gold.

Adoption by placer gold miners

The gold-paraffin wax method requires further experimentation to improve % gold recovery sufficient to justify interest by placer gold miners.

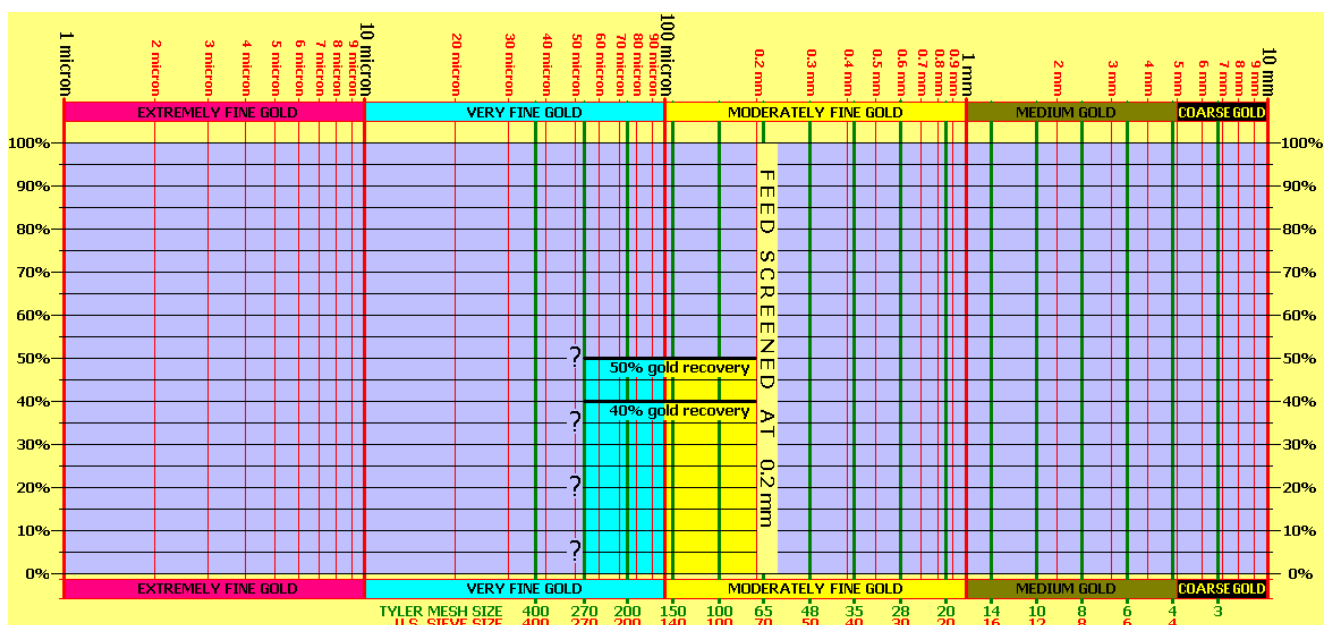


Figure 119. GOLD RECOVERY BY GOLD-PARAFFIN WAX FLOATATION – results of CETEM experiments Recovery by the experimental gold-paraffin wax method that merits further investigation. (compiler: Robin Grayson)