

SOLUTION RATE TECHNIQUES FOR COLUMN COPPER ORE LEACHING TESTING

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ABSTRACT

To run a laboratory column leaching testwork of a copper ore, the most recommendable method would be to use columns with similar or equal height of operating or designed heap lift. The main reason why it is always not possible is because full height columns demand more ore and during the project study stages it could be a restriction because the representative samples come from drill cores mainly, which are used to other project purposes also.

In the other hand, the most common solution rate used for columns leaching testing, independently of a column height, is a single rate equal to solution rate considered for industrial heap operation. When applied a full and unique solution rate for all columns size without considering the mass of ore loaded in each column, then final kinetic results will be different, hence, will be needed to use equivalence factors to standardize and analyze the testwork results, and finally use the data for heap design.

With the necessity to start a variability column leaching testwork using samples by mine bench height to support the FS of Trapiche project, in Buenaventura was run a laboratory test with three different column heights (1 m, 3 m and 6 m), using the same composite crushed and agglomerated copper ore and the same leaching conditions, but equivalent irrigation solution rates. Solution rates were based on full scale eight meters lift height (around 5 L/m²-h) and reduced proportionally in function of ore mass loaded to each column. Ore mass is proportional to each column height. All test leaching columns have the same diameter, six inches.

Considering a leaching cycle of 184 days, it was obtained an average copper recovery of 72% and similar kinetic curves for all three leaching columns as is shown in Figure 1. This indicates that the application of reduced solution rate or equivalent solution rate technique could be applied to short leaching columns and the copper recovery behavior will be the same as if full size columns had been used. This technique will be utilized in the Trapiche project variability metallurgical leaching campaign (120 columns) with one meter columns height, it is aligned with the little availability of core drilling samples. Variability metallurgical testwork results will be used to develop the copper recovery and acid consumption geometallurgical project models.





Figure 1. Copper recovery kinetics using three different height leaching columns.

Keywords: column leaching, solution rate, leaching kinetics, copper leaching