

ACID PRE-TREATMENT EFFECT ON ARSENIC BIOLEACHING IN Pb-Ag CONCENTRATE.

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Introduction: Acid bioleaching has shown decrease on metal efficiency removal due the effect of reactive mineral. The main negative effect is an increase on the time to achieve high oxidation-removal potential (ORP) values (≈ 400 mV). Reactive mineral consumes acid, which causes negative variations on oxidation-reduction potential (Eh) and a pH increase. Consequently, it decreases metal solubility in the leaching solution and the metal removal efficiency⁽¹⁾.

The aim of this work was to present the effect of acid pre-treatment on arsenic bioleaching in Lead-Silver concentrates, as well as to evaluate the decrease in achieving high ORP values.

Methodology: Acid pre-treatment consisted in 500 mL baffled Erlenmeyer flasks with Lead-Silver ore (15 gr) and water (50 mL). pH was set with H₂SO₄ to 0.2, 0.5, 0.8 and 1.1 and was incubated at different time periods (1, 1.5 and 2 h.) After that, the mineral ore was dried at room temperature and used for arsenic bioleaching tests. Bioleaching tests were carried out in 500 mL baffled flasks with 100 ml 9K media ⁽²⁾, 10% inoculum, 30 °C, 160 rpm and incubated for 22 days. Oxidation-reduction potential (Eh) and pH were monitored every 24 h. Arsenic content was evaluated in the mineral ore by optical emission spectroscopy with inductively coupled plasma.

Results: Table 1 shows ORP observed in acid pre-treatment samples over the bioleaching process. All the samples presented an ORP range of 309-418 mV; In addition, these samples needed more time to reach similar values compared to identical ones without acid pre-treatment. Pre-treatment seems not to be sufficient to promote high ORP values in less time.

Probably, the acid pre-treatment conditions can't be enough to remove all the reactive minerals, on the contrary, acid addition only increased mineral reactivity. Consequently, arsenic removal after bioleaching process was higher in the samples without pre-treatment, 52%.

Table 1. General Results of the experiment.

Time	pH	Eh obtained (mV)	Was obtained in time (days)	% As in solid after treatment
mineral without bioleaching				2.24
0	Without pretreatment	400.3	5	1.07
2 hr	0.2	343.25	15	1.55
2 hr	0.5	319.65	15	1.34
2 hr	0.7	309.85	15	1.32
2 hr	1	439.1	13	1.23
1 hr	0.2	390.35	14	1.29
1 hr	0.5	353	15	1.37
1 hr	0.7	344.95	15	1.43
1 hr	1	318.95	15	1.29
30 min	0.2	414	13	1.49
30 min	0.5	422	11	1.49
30 min	0.7	417	13	1.62
30 min	1	418	14	1.68

Conclusions: Acid pre-treatment was not enough to promote a decrease on the time to achieve high ORP values. From a financial point of view, this is good, because it is not necessary to add another operation unit in the process.

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