CHEMICAL REFINING PROCESS FOR Pb, Au AND Ag RECOVERY BY TREATMENT OF A BIOLEACH SOLID RESIDUE FROM SEDEX TYPE ORE: PART 2

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Abstract
The biological residue was processed in two phases: 1 - Chloride leaching of lead-sulfate and 2 - Thiosulfate leaching of gold and silver from solid residue. The solid residue obtained after the leaching step, leached in a thiosulfate solution (1 M Na2S2O3), was returned to the electrochemical refining process. The cathodic silver deposit was melted by anode casting and returned to the process. The silver-free electrolyte solution was obtained by the addition of catalytic copper and lead electrodes. The solutions were electrolyzed electrolytically at 55°C in a conventional lab cell (150 ml). The quality of silver obtained by the electrolysis of the silver-bearing electrolyte solution was 99.9% purity. The author thanks the authors for their permission to use their data.

INTRODUCTION
In the IMM Bor, laboratory scale bioleaching testwork was carried out on the polymeric “SEDEX” type of polymetalliferous ore bearing more than 1% copper, non-ferrous and precious metals (1). In addition to copper and zinc, iron which are extracted biologically as well, it also contains other metals, which remain in the solid biological residue (namely lead, gold and silver).

MATERIALS AND METHODS
The biological residue was processed in two phases:
1 - Chloride leaching of lead-sulfate
2 - Thiosulfate leaching of gold and silver from solid residue

RESULTS AND DISCUSSION
The chloride leaching step was carried out in the laboratory, using the following reagents: 50 g/l PbSO4, 150 g/l NaCl, 200 g/l NaOH, and 0.5 M NaOCl. The leaching was performed with the addition of 20 g/l of FeCl3. After leaching, the pH of the solution was adjusted to 2.5 and the solution was electrolyzed at 55°C. The cathode silver deposit was returned to the process. The anode deposit was returned to the process after the addition of 20 g/l of FeCl3. The cathode silver deposit was electrolyzed at 55°C with the addition of 20 g/l of FeCl3.

CONCLUSION
The silver obtained by electrolysis of the silver-bearing electrolyte solution was 99.9% purity. The author thanks the authors for their permission to use their data.

ACKNOWLEDGEMENTS
The authors acknowledge the financial support of the Ministry of Science, Education and Sports of the Republic of Serbia, Project No. 176011, “Innovative Technological System for the Electrochemical Purification of Metals”. The authors also thank the authors for their permission to use their data.

REFERENCES