

FLOTATION CONCENTRATES OF POLYMETALLIC SULFIDES FROM SERBIAN ORE DEPOSITS AS BIOHIDROMETALURGICAL SUBSTRATES: LABORATORY TESTS

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Introduction

There are three ore deposits of polymetallic sulfide ores that are of economic value in Serbia. Only ore deposit "A" (in central part of Serbia) is mine in exploitation (underground and surface), including and flotation plant. Dominant ore minerals at deposit "A" are: galena, sphalerite and chalcocopyrite, with accompanying pyrrhotite, and some arsenopyrite. Lead, zinc and copper concentrates are obtained in particular. Approximately three million tons of reserves have been confirmed at deposit "A" (Rudnik-Rudnik). About one million tons of reserves have been confirmed at ore deposit "B" (Čoka Marin – Bor), which is located in Eastern Serbia. Important ore minerals at this deposit are: pyrite, chalcocopyrite, enargite, sphalerite and galena. Accompanying mineral is pyrite including pyrrhotite. Ore deposit "C" is located in Western Serbia (Bobija-Ljubovija), and has confirmed reserves of more than one million tons. Galena (with some anglesite), sphalerite and tetrahedrite are dominant ore minerals, and pyrite as accompanying mineral. Ore deposit "C" has legitimately exploitative amounts of industrial mineral barite. All three sites have significant amounts of silver, while deposit "B" has gold as well.

Experimental

This paper presents preliminary results of bacterial leaching of flotation concentrates from aforementioned ore deposits obtained by shake flask test technique during four weeks, with pure culture of acidophilic and mezophilic allochthonous strain of the *Acidithiobacillus sp. B2* (the isolate was identified using the EzTaxon server on the basis of 16S rRNA sequence data). Deposit "A" was tested, in this investigation step, only for copper concentrate while other two deposits were examined polymetallic bulk concentrates (obtained in pilot flotation plants).

Table 1. Chemical analyses of ores

	% Cu	% Zn	% S	% Cuox		% Znnox	
				(0,05% of Cu total)	(3,67% of Zn total)		
A	24,01	3,05	31,03	0,0131	0,11		
B	9,12	2,08	29,38	0,5567	0,41	(6,10% of Cu total)	(19,71% of Zn total)
C	1,66	4,86	39,23	0,1232	1,02	(7,42% of Cu total)	(20,98% of Zn total)

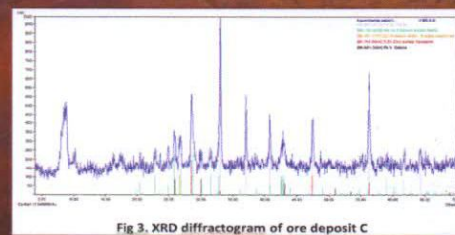
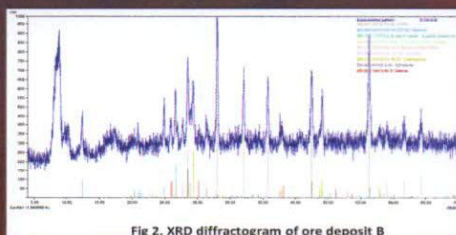
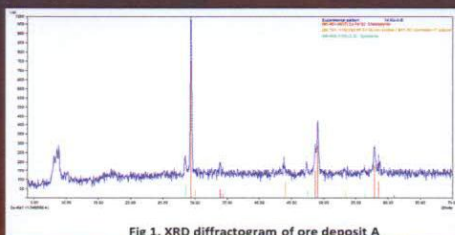
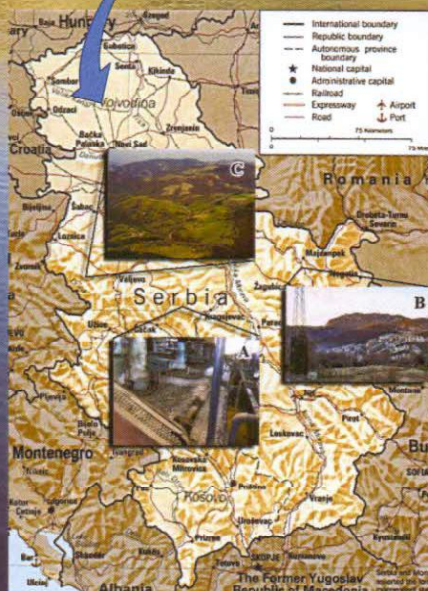


Table 2. Amount of Cu and Zn leached during the incubation process on shaker

	Zn (%)		Cu (%)	
	control	At.f.	control	At.f.
Day 0	1,83	4,89	0,22	1,01
Day 28	8,87	45,14	1,95	15,91

Table 3. Amount of Cu and Zn leached during the incubation process on shaker

	Zn (%)		Cu (%)	
	control	At.f.	control	At.f.
Day 0	2,31	4,25	3,50	3,60
Day 28	17,86	70,5	6,05	37,63

Table 4. Amount of Cu and Zn leached during the incubation process on shaker

	Zn (%)		Cu (%)	
	control	At.f.	control	At.f.
Day 0	7,22	7,19	6,32	6,16
Day 28	20,91	67,11	15,69	65,23

Results and Conclusions

Based on the metal concentration in the solution from "A" chalcocopyrite concentrate bioextraction is about 16 % of copper. Concentration of copper and zinc in solution (lead is insignificant due to deposition of lead sulfate) from "B" and "C" show leaching of copper from approx. 38, i.e. about 65 % and for zinc about 70, and cca. 67 %, respectively.

First results show that all three flotation concentrates of polymetallic sulfides are potential substrates for biohydrometallurgical processes in application, which will be further thoroughly examined in testes that are currently being undertaken.

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