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Development of Technology of Enrichment of Ore Samples Field Cinesi

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Abstract: *The article presents the results of the technological enrichment of ore samples field Cinarca. Flotation experiments were performed with the use of traditional and local reagents-collectors. As a result of the tests performed, flotation enrichment is recommended for ore processing in a combination of traditional and local collector reagent.*

Keywords: material composition, analysis, valuable component, gold, mineral, gravity, concentrate.

I. INTRODUCTION

In [1], we present the results of studying the material composition of ore samples from the Chinarsai Deposit. This paper presents the results of enrichment of the specified ore samples. The technological sample belongs to the pyrite – polymetallic gold-containing type of ore.

The main ore minerals of the sample are pyrite, sphalerite, GA-lenite, pale ore, and rarely chalcopyrite.

The main non-metallic minerals are quartz, feldspar, orthoclase, plagioclase, biotite and products of their changes: sericite, chlorite, carbonates. Accessory minerals provided by zircon, stones, Apatite, magnetite.

Industrially valuable ore components are gold, silver, zinc, lead, and copper. According to the results of rational analysis, the main part of gold is in free form and is well cyanized – 72.9 %. Gold associated with oxides and hydroxides is 11 %, with sulfides – 11% and rock – forming minerals-5.1 %.

II. MATERIAL AND METHODS

Table 1 shows the results of flotation of ore with traditional re-agents at various costs of BCC. The experiments were carried out according to the scheme, including ore grinding to a size of 80-85 % CL. – 0.074 mm, the main and control flotation operations.

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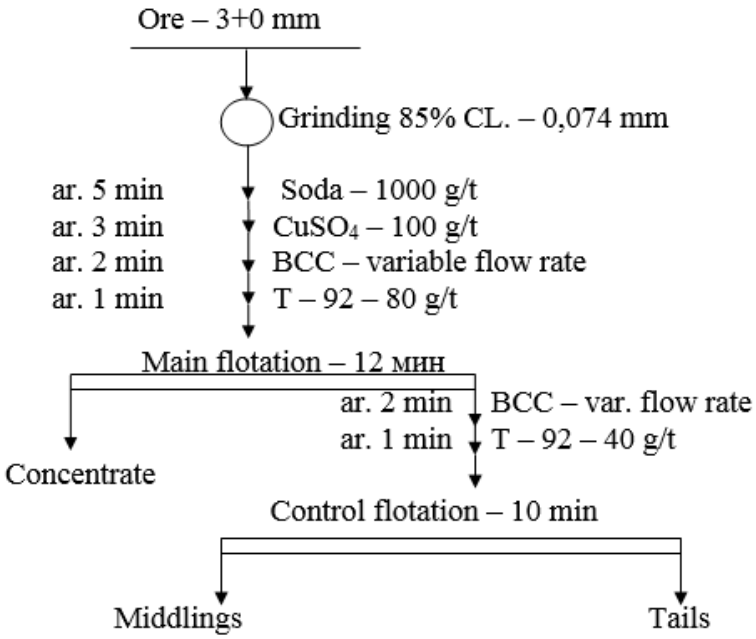

Fig.1. The scheme of ore flotation with conventional reagents.

As follows from table 1, when the BCC consumption is 100+50 g/t, sufficiently high indicators for the extraction of zinc, lead, gold and silver are obtained.

Table 1

Results of ore flotation at different BCC Rates

Products	Exit, %	Content, %				Extraction, %				BCC, g/t
		Zn	Pb	Au g/t	Ag g/t	Zn	Pb	Au	Ag	
Concentrate	5,25	4,83	3,26	15,33	122,7	61,84	63,39	82,11	62,65	50+25
Middlings	9,92	0,6	0,28	0,5	12,5	14,44	10,32	5,05	12,0	
Tailings	84,83	0,11	0,084	0,15	3,12	23,72	26,29	12,84	25,35	
Ore	100	0,41	0,27	0,98	10,28	100	100	100	100	
Concentrate	7,64	5,42	3,15	12,71	124,2	82,88	80,34	88,27	83,72	100+ 50
Middlings	8,96	0,57	0,32	0,62	8,0	10,15	9,31	5,06	6,34	
Tailings	83,4	0,04	0,037	0,088	1,35	6,97	10,35	6,67	9,94	
Ore	100	0,5	0,3	1,1	11,33	100	100	100	100	
Concentrate	8,77	4,38	2,65	11,1	106,1	80,12	83,13	90,18	85,29	120+ 60
Middlings	9,32	0,58	0,29	0,38	6,6	11,24	9,64	3,27	5,63	
Tailings	81,91	0,05	0,025	0,086	1,21	8,64	7,23	6,55	9,08	
Ore	100	0,48	0,28	1,08	10,92	100	100	100	100	

III. RESULTS

As a result of the conducted serial experiments of ore flotation, the optimal reagent mode (in g/t) was determined: soda, calcined in grinding – 1000; copper sulfate - 100;BCC to the main flotation -100; T – 92 to the main flotation – 80; BCC in the control flotation – 50; T – 92 in the control flotation – 40.(Fig. 2).

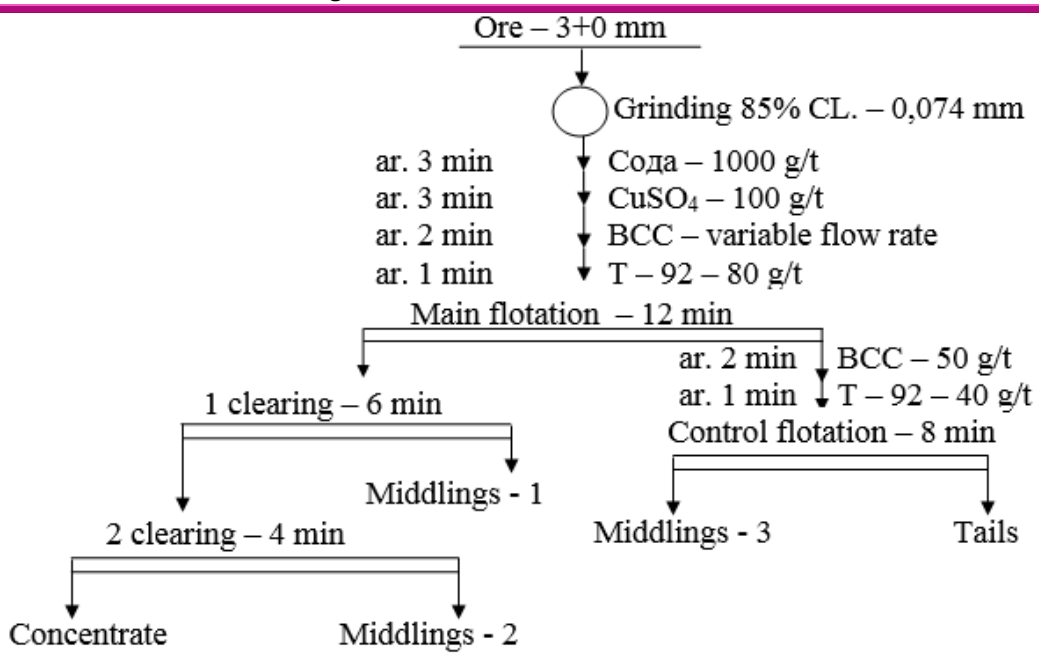

Fig.1. The scheme of ore flotation with conventional reagents.

IV. DISCUSSIONS

The optimal size of ore grinding before flotation is 80-85%, CL – 0.074 mm.

To test the circuit in a closed loop in the optimal mode, experiments were conducted on the principle of a continuous process. In order to improve the quality of the concentrate, the scheme included two re-cleaning of the main flotation concentrate. (Fig. 3)

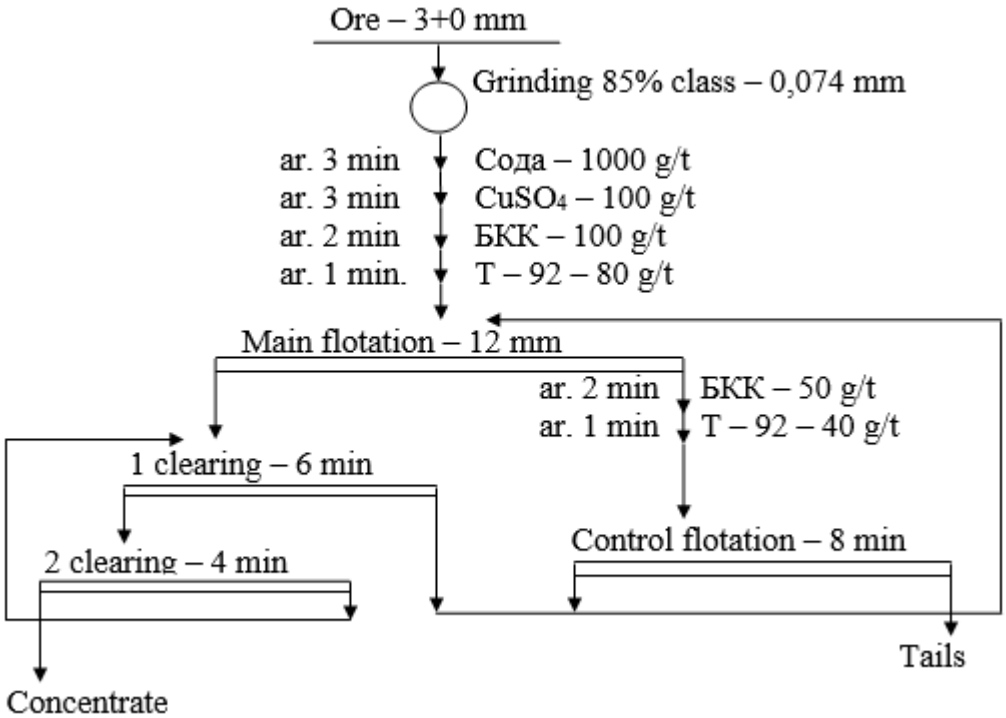

Fig. 3. Diagram of flotation enrichment of ore by principle continuous process

From the data shown in table. 2 it can be seen that the extraction of non-ferrous and non – ferrous metals into the flotation concentrate is 88.73-93.44 %.

Table 2

Results of ore flotation experiments in optimal mode

Products	Exit, %	Content, %				Extraction, %			
		Zn	Pb	Au g/t	Ag g/t	Zn	Pb	Au	Ag
a) в открытом цикле									
Concentrate	4,72	8,33	4,97	23,94	205	80,25	78,26	75,34	77,4
Mid.-1	6,38	0,33	0,27	2,2	11,1	4,28	5,64	9,34	5,67
Mid.-2	2,24	0,69	0,51	4,1	21,3	3,17	3,78	6,14	3,81
Mid.- 3	6,72	0,54	0,3	0,62	11,3	7,41	6,72	2,78	6,09
Tailings	79,94	0,03	0,021	0,12	1,1	4,89	5,6	6,4	7,03
Ore	100	0,49	0,3	1,5	12,5	100	100	100	100
b) on the principle of a continuous process									
Concentrate	9,82	4,76	2,92	14,46	124,5	93,44	92,38	88,73	91,25
Tailings	90,18	0,036	0,026	0,2	1,3	6,56	7,62	11,27	8,75
Ore	100	0,5	0,31	1,6	13,4	100	100	100	100

Flotation experiments were performed at 50% of the optimal flow rate with the addition of a local collector reagent CD – 1. the results of the experiments are shown in table 3 (Fig. 1 with a combination of BCC and CD – 1)

Table 3

Results of flotation experiments with a combination of BCC and CD – 1

Products	Exit, %	Content, %				Extraction, %				Consumption of Birtley, g/t
		Zn	Pb	Au g/t	Ag g/t	Zn	Pb	Au	Ag	
Concentrate	5,25	4,83	3,26	15,33	122,7	61,84	63,39	82,11	62,65	BCC 50+25 CD – 1- 0
Middlings	9,92	0,6	0,28	0,5	12,5	14,44	10,32	5,05	12,0	
Tailings	84,83	0,11	0,084	0,15	3,12	23,72	26,29	12,84	25,35	
Ore	100	0,41	0,27	0,98	10,28	100	100	100	100	
Concentrate	7,64	5,15	2,86	14,56	148,4	85,54	74,22	74,15	73,42	BCC 50+25 CD – 1- 4+2
Middlings	4,12	0,76	0,51	3,0	13,9	6,79	8,45	8,2	3,72	
Tailings	88,24	0,04	0,055	0,3	4,0	7,67	17,33	17,65	22,86	
Ore	100	0,46	0,29	1,5	15,44	100	100	100	100	
Concentrate	9,16	4,57	2,62	11,96	126,2	87,26	80,0	78,24	76,32	BCC50+25 CD – 1- 6+3
Middlings	4,73	0,64	0,5	2,8	12,1	6,28	7,95	9,46	3,79	
Tailings	86,11	0,036	0,042	0,2	3,5	6,46	12,05	12,3	19,89	
Ore	100	0,48	0,3	1,4	15,15	100	100	100	100	
Concentrate	9,37	4,28	2,47	11,89	126,1	89,12	85,61	80,74	78,77	BCC 50+25 CD – 1- 8+4
Middlings	4,81	0,45	0,17	2,0	12,7	4,78	2,95	6,82	4,07	
Tailings	85,82	0,032	0,036	0,2	3,0	6,1	11,44	12,44	17,16	
Ore	100	0,45	0,27	1,38	15,0	100	100	100	100	
Concentrate	9,76	4,55	2,64	11,66	130,3	88,81	86,0	81,12	82,8	BCC 50+25 CD – 1- 10+5
Middlings	5,16	0,56	0,29	2,6	10,0	5,75	4,93	9,76	3,35	
Tailings	85,08	0,032	0,03	0,15	2,5	5,44	9,07	9,12	13,85	
Ore	100	0,5	0,3	1,4	15,36	100	100	100	100	

V. CONCLUSIONS

From the data shown in table 3, it can be seen that the CD – 1 reagent has a positive effect on both the flotation of lead and zinc sulfides and the flotation of precious metals.

In combination with BCC, the CD – 1 reagent gives higher indicators. The best results are obtained at the expense of CD– 1 – 10 + 5 g/t in combination with BCC 50 + 25 g/t.

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