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R. 557

MT REX—TREATMENT OF FLOTATION TABLE SULPHIDES

Introduction

Ore Dressing Investigation R.525 showed that table flotation was a suitable method for up-grading the rougher concentrate produced at the Mt Rex mine. Subsequently table flotation has been introduced into the flow sheet at the mine. A sample of the sulphide product from table flotation of the rougher concentrate was submitted by Messrs Brinckman and Dicker to investigate the possibility of selective flotation of the sulphides in the sample.

Sample

The sample was approximately 3 kg in weight. The coarsest particles present in the sample were approximately 18 mesh. The assay of the sample was as follows:—

ASSAY

% Sn	*% Pb*	*% Cu*	*% Zn*	*% Fe*	*Ag oz/ton*
2.2	17.9	4.0	20.8	18.4*	25.0

* Calculated head assay.

The material carried a strong smell of flotation reagent.

Method

The sample was riffled to provide an assay sample and four samples for testing. Each test sample was screened through a 10 mesh screen to remove extraneous materials. Grinding was carried out in the batch ball mill at 75% solids. Flotation was carried out in the Denver D1 flotation cell.

The aim was to produce a copper-lead concentrate during flotation F1, and a zinc concentrate during flotation F2.

In test N1 0.6 lb/ton of sodium aerofloat was added as collector prior to flotation (F1). No frothing agent was added as flotation commenced immediately air was applied to the cell. In test N2 no collector or frother was added prior to flotation (F1), and yet flotation commenced immediately air was applied to the cell.

Prior to test N3, the sample was heated in an open dish on a hotplate at a temperature not sufficiently high to roast the sulphides. Smoky fumes were given off and when fuming ceased the sample was removed from the hot plate and allowed to cool. The material now proved to be odourless. The sample was then ground in the ball mill.

Reagent additions, grinding and flotation conditions for each of the tests are shown in the following table.

Conditions	*Test No.*		
	N1	*N2*	*N3*
Sodium cyanide during grinding (lb/ton)	....	....	3.6
Zinc sulphite during grinding (lb/ton)	....	....	3.6
Grinding time (minutes)	5	5	5
Sodium sulphite (lb/ton)	3.0	....	10.8
Sodium carbonate (lb/ton)	....	1.5	....
Sodium cyanide (lb/ton)	....	1.5	....
Zinc sulphate (lb/ton)	....	1.5	....
Conditioning time (minutes)	15	5	12
Sodium aerofloat (lb/ton)	0.6	....	1.8
Aeration time (minutes)	....	....	7
Cresylic acid (lb/ton)	....	....	0.18
Flotation time—F1 (minutes)	10	15	6
Aerofloat 25 (lb/ton)	0.3	0.3	1.1
Copper sulphate (lb/ton)	3.0	1.5	3.6
Conditioning time (minutes)	....	2	2
Flotation time—F2 (minutes)	5	5	7
Sodium ethyl xanthate after 5 minutes flotation (lb/ton)	....	....	1.3
Secondary butyl xanthate (lb/ton)	....	....	1.8
Flotation time—F3 (minutes)	....	....	10
Secondary butyl xanthate after 5 minutes flotation (lb/ton)	....	....	2.7

Results

Flotation in tests N1 and N2 was impossible to control and non-selective flotation resulted.

In Test N3, the sample was heated to destroy the flotation reagent adhering to the mineral from the prior table flotation operation. In view of the experience in the first two tests, heavy additions of depressing reagents were made during grinding and prior to flotation. Flotation during this test was easy to control, and it was quite apparent that selective conditions were prevailing.

The results of the tests are in the following table.

Test No.	Product	Per Cent Weight	Assay Per Cent						Distribution Per Cent					
			Sn	Pb	Zn	Cu	Ag oz/ton	Fe	Sn	Pb	Zn	Cu	Ag	Fe
N1	F1C	89.6	1.21	19.25	23.4	4.6	25.45		55.1	96.2	97.3	97.2		
	F2C	2.1	7.61	1.37	0.51	0.19	*		8.1	0.2	0.1	0.0		
	F2T	8.3	8.72	7.67	6.9	1.42	1.79		36.8	3.6	2.6	2.8		
	Calc. F/D	100.0	2.0	17.9	21.6	4.2			100.0	100.0	100.0	100.0		
N2	F1C	75.6	0.62	21.35	22.8	5.1	28.55		22.3	91.2	82.0	91.5	91.5	
	F2C	7.0	2.30	10.82	21.4	2.46	15.01		5.7	4.1	7.1	4.0	4.5	
	F2T	17.4	8.72	5.07	13.10	1.08	5.4		72.0	4.7	10.9	4.5	4.0	
	Calc. F/D	100.0	2.1	18.50	21.0	4.2	23.57		100.0	100.0	100.0	100.0	100.0	
N3	F1C	27.7	0.2	46.2	10.0	6.49	62.7	13.3	2.7	76.9	12.9	44.2	71.7	20.0
	F2C	51.6	1.4	6.8	34.0	3.84	11.9	17.6	32.4	21.1	80.5	48.7	25.3	49.3
	F3C	20.2	7.1	1.65	7.15	1.42	3.6	27.9	64.4	2.0	6.6	7.1	3.0	30.7
	F3T	0.5	2.1				*		0.5					
	Calc. F/D	100.0	2.2	16.6	21.8	4.10	24.2	18.4	100.0	100.0	100.0	100.0	100.0	100.0

* Insufficient sample for assay.

N3 F3T not assayed for Pb, Zn, Cu and Fe because of the very small weight of product, with consequent negligible influence on the distribution.

The results show no selectivity in test N1 and N2, but in test N3, F1C is a Cu/Pb concentrate, F2C is a zinc concentrate, and F3C is a pyrite concentrate.

Conclusions

It is possible to selectively float Cu, Pb and Zn from the table flotation sulphides from the Mt Rex mine. However, it is necessary to destroy the activity of the sulphides first, and this can be done by heating table flotation sulphides.

Further test work will be required if it is desired to establish that economic grades of concentrates can be produced at satisfactory recoveries.