ORMISC8/61-64

Department of Mines Laboratory,

Launceston, December 1942.

INVESTIGATION NO. 458/42.

Pyritic Table Concentrate, North Valley Mine, Mt. Bischoff.

Purpose of Investigation.

Rejection of sulphides by flotation and concentration of the cassiterite in the flotation tailings. Water from city supply was used in tests.

Sample.

The sample was obtained from the North Valley Mine concentration plant. The major sulphide minerals are pyrite, pyrrhotite and arsenopyrite. The low grade concentrate was produced by reduction in stamp batteries fitted with 12 mesh screens and concentrated on shaking tables. A sample of the table concentrate was assayed with the following results:

Tin	3.24 per cent.
Arsenic	5.05 per cent.
Iron	44.96 per cent.
Sulphur	39.8 per cent.
Copper	0.2 per cent.

Screen Analysis.

TABLE 1

Screen Size.	Weight Per Cent.	Tin. Per Cent.	Tin. Per Cent Distribution.
+20	2.05	1.54	0.94
+40	13.42	2.63	10.56
+60	15.84	2.80	13.27
+80	15.30	2.98	13.65
+100	13.04	3.04	11.87
+150	13.45	3.33	13.41
+200	12.30	3.62	13.32
-200	14.60	5.26	22.98
Comp.		3.3	

The sample was acid treated to remove sulphides etc., and the residual cassiterite etc. screened as shown in table 2. This tabulation indicates that 7.7 per cent of the cassiterite exists as composite grains of which 6 per cent occurs in the plus 60 mesh sizes.

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TABLE 2.

Screen Size.	Weight Per Cent.	Tin	
		Per Cent.	Per Cent Distribution
+20	0.0	---	0.0
+40	8.0	58.8	7.6
+60	10.5	66.5	11.2
+80	12.3	61.3	12.1
+100	12.9	57.4	11.9
+150	14.2	58.1	13.3
+200	15.8	60.7	15.4
-200	26.3	67.4	28.5
Composite. (calculated to weight of sample used for test.)		3.2	

Flotation.

The sample was ball-mill ground for short periods and wet screened through an 80 mesh screen to imitate closed circuit grinding. Plus 80 mesh portions of the sample were added to the mill after each grind. The amounts of minus 200 mesh in the minus 80 mesh portions used for flotation tests ranged from 39 to 48 per cent.

TABLE 3.

Reagents / lbs. / short ton.

Test No.	$CuSO_4$	Na_2CO_3	H_2SO_4	Ethyl Xanthate.	p.H. value of pulp.
9	---	---	---	1.2	6.5
11A)	---	2.0	---	1.2	---
11B)	---	---	---	"a"	8
12A	1.0	---	2.0	1.0	
12B	---	---	---	1.0	5
13	1.0	---	2.0	0.8 "b"	5

Frother - Cresylic acid with a minor amount of pine oil towards the conclusion of flotation.

Test 11B extension of test 11A ("a" - 1.2 lb. Amyl Xanthate)

" 12B " " " 12A ("b" - 0.4 Ethyl + 0.4 lbs. Amyl Xanthate.)

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Results.

TABLE 4.

Test No.	Product.	Weight Percent.	Tin. Percent	Tin. Percent Distribution.	Sulphur. Percent	Sulphur. Percent Distribution
9	Conc.	88.4	0.26	7.0	44.26	98.2
	Tailing	11.6	26.28	93.0	6.24	1.8
11A	Conc.	82.0	0.19	3.5	44.77	94.6
	Tailing	18.0	23.74	96.5	11.7	5.4
11B	Conc.	86.3	0.28	5.4	44.1	98.2
	Tailing	13.7	30.54	94.6	5.21	1.8
12A	Conc.	84.0	0.1	2.5	45.0	94.4
	Tailing.	16.0	19.8	97.5	14.2	5.6
12B	Conc.	89.5	0.26	7.0	44.2	99.0
	Tailing	10.5	28.8	93.0	4.7	1.0
13	Conc.	87.95	0.27	6.4	44.7	98.9
	Tailing	12.05	28.73	93.6	3.48	1.1

Concentration.

The flotation tailings from test 13 were concentrated by panning, with the following results :-

Product	Weight Percent	Tin. Percent.	Tin. Percent Distrib-ution.	Sulphur. Percent.	Sulphur. Percent Distrib-ution.
Pan Concentrate.	4.64	70.3	88.16	0.34	0.04
Pan Tailings	7.41	2.71	5.42	5.46	1.01
Flotation Concentrate.	87.95	0.27	6.42	44.7	98.95

Summary.

Flotation of the sulphides resulted in rejection of 82 to 89.5 per cent of the sample containing 2.5 to 7 per cent of the total tin and 94.4 to 98.9 per cent of the sulphur.

Concentration of the flotation tailings resulted in a recovery of 88.16 per cent of the tin.

Tests 11 and 12 show that the highest rejection of sulphides causes additional losses of tin compared with a rejection of 95 per cent or less. The flotation concentrate of test 12A assayed 0.1 per cent tin with a sulphide rejection of 94.4 per cent whereas with a 99 per cent rejection in test 12B the concentrate assayed 0.26 per cent tin.

The table concentrate showed surface oxidation within one hour when exposed wet to the atmosphere and as the flotation tests were performed several months after production re-agent consumptions would be higher than with unaltered sulphides.

Flotation is effective in a slightly acid pulp and it is probable that flotation utilizing water from the Mt. Bischoff' Company's supply would be satisfactory without the addition of acid. The p.H. value of this supply was determined during May 1942 and showed a value of 6 and after addition of the table concentrate a value of between 5 and 6.

(Sgd.) W. St. C. Manson,

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