

R.610. Determination of impurities in a tin middling product

A small sample of some 500 g of a tin middling product was submitted by I.W. Andrews for examination of the diluent minerals. The sample was stated to be from Targett & Bonner's lease at Branhholm.

The sample was too small to take out a head sample for assay and leave sufficient for investigation.

TEST WORK

The sample was screened on 7, 14, 18, 25, 36, 52 and 72 # screens. Each screen fraction was magnetically separated on the Rapid magnetic separator. The magnetic fractions appears to be mainly spinel. The non-magnetic fractions were assayed for tin, zirconium and titanium. Some quartz was noticed in the non-magnetic fraction.

RESULTS

An outline of the results obtained is shown in Table 1.

CONCLUSIONS

The main diluent minerals present in order of abundance are spinel, zircon and quartz.

The middling product can be upgraded by high intensity magnetic separation and screening. Magnetic separation alone raises the tin assay of the feed from 35.5% to 51.4% in the non-magnetics with practically 100% recovery of the tin. However, for efficient magnetic separation close size screening is required, and advantage should be taken of the distribution of the zircon and cassiterite in the size fractions of the non-magnetic product.

By rejecting all non-magnetic material coarser than 25 #, a product assaying 57.9% tin and containing 91.8% of the tin in the feed can be obtained. 99.5% of the zircon in the feed appears in the +25 # size range.

By rejecting all non-magnetic material coarser than 36 #, a product assaying 64.7% tin and containing 72.5% of the tin in the feed can be obtained. Practically 100% of the zircon is then rejected in the +36 # size range.

Without magnetic separation the undersize product from screening the feed on a 36 # screen will assay 50.4% tin and contain 72.5% of the tin in the feed. Again without magnetic separation, the undersize product from screening the feed on a 52 # screen will assay 60.8% tin and contain 45.8% of the tin in the feed.

Close size screening of the feed material should allow a high grade tin concentrate to be produced by gravity concentration of the size fractions.

Table 1

Screen #	Screen Fraction	Per Cent Weight		Non-Magnetic Assays			% Distribution	
		Magnetics	Non-Magnetics	% Sn	% Zr	% TiO ₂	Sn	Zr
+7	0.3	0.2	0.1	15.0	36.2	0.36	Trace	1.1
-7 +14	3.4	1.1	2.3	11.3	41.8	Trace	0.7	30.1
-14 +18	7.3	3.1	4.2	19.9	32.4	0.23	2.4	42.6
-18 +25	11.3	5.2	6.1	29.5	13.5	0.16	5.1	25.7
-25 +36	26.6	10.0	16.6	41.4	0.09	0.16	19.3	0.5
-36 +52	24.3	7.2	17.1	55.4	Trace	0.12	26.7	Trace
-52 +72	17.9	3.3	14.6	69.6	Trace	Trace	28.6	Trace
-72	8.9	0.8	8.1	75.6	Trace	Trace	17.2	Trace
Total	100.0	30.9	69.1	(35.5)	(3.2)	(0.07)	100.0	100.0

Assays in parentheses are calculated head assays and it is assumed that all tin, zirconium and TiO₂ as rutile report in the non-magnetics.

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