TR20_326_328

R.692. Chromite flotation tests on gravity concentrates from the Razorback Mine

K.J. Austin
H.K. Wellington

Minops Pty Ltd requested that an investigation be conducted to determine the feasibility of upgrading their gravity concentrates by means of chromite flotation as an alternative to magnetic separation.

The material used for this series of tests was a sample of a -150 µm fraction of a gravity concentrate, produced by Minops Pty Ltd and used in investigation R.649.

One thousand gram samples of the material were attritioned in a Denver laboratory float cell and deslimed prior to the actual flotation test.

RESULTS

Numerous tests were performed, but due to poor mineral selection and the constant erosion of reagent quantity by slime generation, little was achieved. No difficulty was experienced in floating the bulk of the material, but lack of control on mineral selection was the major problem. Consequently, only four tests were actually analysed and the results, together with their respective reagent additions and conditions are given below. An attempt was also made to float the total cassiterite present, but this was unsuccessful.

TEST N1

Fraction	% Mass	Assay		% Distribution	
		Sn (%)	Cr_2O_3 (%)	Sn	Cr_2O_3
F2C	80.1	21.9	15.1	94.0	96.0
F2T	5.8	7.8	4.2	2.4	1.9
F1C	85.9	(20.9)	(14.4)	96.4	97.9
F1T	9.1	5.1	2.3	2.5	1.7
Slime	5.0	(4.0)	(1.0)	1.1	0.4
Calculated Head	100.0	18.7	12.6	100.0	100.0

Test conditions

(1) 30 minutes attrition with 1.32 kg/t Na_2SiO_3.
(2) deslimed
(3) 0.49 kg/t H_2SO_4 (pH 4.5)
(4) 0.2 kg/t of Cyanamid aeromine 3035
(5) 0.06 kg/t of fuel oil
(6) 5 minutes conditioning time
(7) 5 minutes flotation - slimes and some iron oxides removed
(8) 0.2 kg/t of Cyanamid aeromine 3035
(9) 0.08 kg/t of fuel oil
(10) 5 minutes flotation time
(11) 0.2 kg/t of Cyanamid aeromine 3035
(12) 0.08 kg/t of fuel oil
(13) flotation to extinction
(14) cleaner flotation using two lots of 0.2 kg/t of Cyanamid aeromine 3035

TEST N2

Fraction	% Mass	Assay		% Distribution	
		Sn (%)	Cr_2O_3 (%)	Sn	Cr_2O_3
F2C	80.0	22.4	14.5	97.9	92.1
F2T	0.8	1.3	1.6	0.1	0.1
F1C	80.8	(22.2)	(14.4)	98.0	92.2
F1T	13.3	0.67	1.1	0.5	1.2
Slime	5.9	(4.8)	(14.2)	1.5	6.6
Calculated Head	100.0	18.3	12.6	100.0	100.0

Test conditions

(1) 45 minutes attrition with 5 kg/t of calgon
(2) deslimed
(3) 0.98 kg/t of H_2SO_4 (pH 2.1)
(4) 0.2 kg/t of Cyanamid aeromine 3037
(5) 2 minutes conditioning time
(6) 5 minutes flotation time
(7) 0.2 kg/t of Cyanamid aeromine 3037
(8) 5 minutes flotation time
(9) 0.39 kg/t of H_2SO_4 (pH 2.1)
(10) 0.2 kg/t of Cyanamid aeromine 3037
(11) flotation to extinction
(12) cleaner flotation using three lots of 0.2 kg/t of Cyanamid aeromine 3037

TEST N3

Fraction	% Mass	Assay		% Distribution	
		Sn (%)	Cr_2O_3 (%)	Sn	Cr_2O_3
F1C	5.7	20.0	3.8	6.2	1.7
F2C	8.0	43.9	12.3	19.2	7.8
F3C	52.8	21.6	17.5	62.3	73.3
F4C	24.2	8.1	5.8	10.7	11.2
FT	4.7	4.9	1.8	1.3	0.7
Slime	4.6	(1.15)	(14.6)	0.3	5.3
Calculated Head	100.0	18.3	12.6	100.0	100.0

Test conditions

(1) 30 minutes attrition with 2 kg/t of calgon
(2) deslimed
(3) 0.94 kg/t of H_2SO_4 (pH 2)
(4) 0.6 kg/t of Cyanamid aeropromotor 825
(5) condition time of 2 minutes
(6) flotation time of 5 minutes
(7) 0.3 kg/t of Cyanamid aeropromotor 825
(8) flotation time of 5 minutes
(9) 0.3 kg/t of Cyanamid aeropromotor 825
(10) flotation time of 5 minutes
(11) 0.3 kg/t of Cyanamid aeropromotor 825
(12) flotation to extinction

TEST N4

Fraction	% Mass	Assay		% Distribution	
		Sn (%)	Cr_2O_3 (%)	Sn	Cr_2O_3
FlC	4.4	9.2	2.9	2.2	1.0
FlT	90.2	19.6	12.9	96.6	92.4
Slime	5.4	(4.0)	(15.5)	1.2	6.5
Calculated Head	100.0	18.3	12.5	100.0	100.0

Test conditions

(1) 30 minutes attrition with 1 kg/t Calgon
(2) deslimed
(3) H_2SO_4 addition to pH 3
(4) 0.6 kg/t of Cyanamid aeropromotor 710
(5) 0.2 kg/t of fuel oil
(6) 0.3 kg/t of Cyanamid aeropromotor 710
(7) 5 minutes conditioning time
(8) flotation to extinction

CONCLUSIONS

Although it is possible to float the bulk of the material and also, with certain conditions to make some variation in chromite concentration, the tin content of the gravity concentrate is invariably dispersed throughout the products of flotation.

It should be noted that the low Cr_2O_3 values obtained are due to the fact that the work was mainly directed at producing a tin free flotation concentrate and a chromite free flotation tailing rather than a chromite concentrate as such.

No success was obtained with attempts at cassiterite flotation.

Flotation of chromite should not be considered as an alternative to magnetic separation.

[8 August 1975]