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R. 515

27. GLADSTONE MICA FLOTATION

Sample

Following an enquiry for mica concentrate by Tasmanian Board Mills the Messrs Daw of the Mines Department sampled the material available at the Fly-by-Night Mine, Gladstone. In 1961 some flotation tests were done on this material (Manson, *et al.*, 1962).

Aim

The object of these tests was:—

(*a*) to make a quantity of mica concentrate so that potential users could be given sufficient to conduct tests; and

(*b*) to investigate further reagent usage. (Liddy (in Manson, *et al.*, 1962, pp. 174, 176) remarked on the possibility of not using a frother for flotation.)

Investigation

The separate samples from the lode were mixed, crushed, and then screened on 6 mesh. The plus 6 mesh material was rejected.

The minus 6 mesh material was riffled into 10 kg lots each of which was treated as under:—

(*a*) wet screened on 22 mesh, the oversize being rejected. (In the 20 kg tests where two 10 kg lots were combined a Dillon double deck screen was used with a 10 mesh screen above the 22 mesh screen.);

(*b*) deslimed, the slime being rejected. (In the preliminary flotation tests desliming was by screening on 200 mesh, but in the 20 kg tests it was by agitation with sodium hexa meta-phosphate (Calgon) in the flotation cell, then settling for one minute before siphoning off the slime. Agitation and siphoning were done three times.)

Flotation reagents were added to the cell in the following order:—

(*a*) Sulphuric acid as a 500 gpl solution. One addition only being made in each test.

(*b*) Aerofroth 73 used undiluted, one addition only being made.

(*c*) Arquad 12/50. In the 1 kg flotation cell this was used as a 10 gpl solution, in the 10 kg flotation cell as a 100 gpl solution. In both cases stage additions of reagents were used until no further mica floated.

FLOTATION CONDITIONS

	Test No.					
Rougher Stage	1	2	3	4	5	7
Reagents—						
Sulphuric Acid (lb/ton)	10.8	10.6	10.8	5.3	8.6	8.9
Aerofroth 73 (lb/ton)	....	0.10	0.21	0.15	0.27	0.29
Arquad 12/50 (lb/ton)	2.9	4.2	3.3	3.6	4.1	4.3
pH before flotation	1.9	1.8	1.6	1.6	1.7	1.9
pH after flotation	1.8	1.9	1.9	1.8	2.3	1.9
Flotation time (min)	15	15	10	10	7	8
Machine used	1 kg S.S. Tk on Denver D-1				10 kg Agitair	
Cleaner Stage						
Reagent—						
Arquad 12/50 (lb/ton)	....	3.0	1.6	....	....	....
pH before flotation	....	2.0	1.9	....	....	....
pH after flotation	....	2.6	2.0	....	....	....
Flotation time (min)	....	7	6	....	....	....
Machine used	Same as for rougher stage					

In the 1 kg flotation tests in the Denver D-1 machine flotation in all tests was reluctant, and as Liddy observed (in Manson *et al.*, 1962, p. 174) no flotation occurred until about half the collector Arquad 12/50 had been added. However, with tests in the 10 kg Agitair cell the flow of froth was continuous with the mica floating freely until all had floated.

Results

	Per Cent Weight
Screening on 6 mesh—	
+6 mesh reject	11.3
−6 mesh	88.7
Head	100.0

SCREENING AND DESLIMING

	Weight Per Cent			
	Tests 1-4	*Test* 5	*Test* 6	*Test* 7
+10 mesh reject	35.7	59.8	61.0	21.9
+22 mesh reject				11.0
Slime reject	16.0			28.0
Flotation feed	37.0	28.9	27.7*	27.8
−6 mesh	88.7	88.7	88.7	88.7

* This was the final product

FLOTATION

Description	*Per Cent Weight*					
Test No.	1	2	3	4	5	7
Rougher Conc.	4.6	21.4	16.0	22.4	16.0	15.8
Rougher Tailing	32.4	15.6	21.0	14.6	12.9	12.0
Flotation Feed	37.0	37.0	37.0	37.0	28.9	27.8

No determinations as to the mica content of any fraction have been made. However, the rougher mica concentrates from the tests appear on casual inspection quite high grade. Some confirmation of this is given by cleaner flotation of the rougher concentrates from Tests 2 and 3 where cleaner concentrate weights per cent were 21.1 and 15.8 respectively.

Conclusions

The possibility of flotation without frother is not a proposition as Test 1 shows.

Test 3 shows that excessive frother appears to have a detrimental effect on flotation of mica. Unfortunately in planning the larger scale tests the greater loss of fine material in the desliming stage caused the frother addition to be excessive, and may have adversely affected the mica yield.

Desliming using a 200 mesh screen is a tedious process and would not be used commercially where hydraulic desliming similar to that used in Tests 5 and 7 would be practised. This latter method yielded less flotation feed due possibly to the siphoning off of fine mica. This is not certain in view of the flotation comments made above.

From the methods of treatment used it can be concluded that a yield of 16 per cent by weight of mica can be expected from this ore, and possibly with improved methods this yield could be raised to about 21 per cent. No test work to liberate mica from rejects was done as such was deemed uneconomic.

Reference

MANSON, W. ST C., LIDDY, J. and JAMES, P. L., 1962—Mica, Gladstone. *Tech. Rep. Dep. Min. Tas.*, 6, 173-178