

TR14-205-207

### R.598. Benefication tests on limestone from Railton

#### AIM

The aim of the investigation was to find a method of removing minor amounts of impurities (possible carbonaceous material, feldspar, mica, quartz and zircon) from Railton limestone.

#### PROCEDURE

(1) Sample preparation.—Approximately 800 g of — 5 mesh limestone was ball mill ground for five minutes at 60% solids, dried, then riffled into two equal fractions for tests N1 and N2: this preparation was repeated for tests N3 and N4. The sample preparation for tests N5, N6, N7 and N8 was identical to the above except that the time of grinding was increased to ten minutes.

(2) N1.—The ground sample was wet and then dry screened with the — 200 mesh fraction being cyclosized. Sized fractions were then analysed for acid insoluble material to determine whether preferential grinding of any significance had occurred.

(3) N2, N3 and N4.—In each of these tests, the ground limestone was subjected to froth flotation in an attempt to selectively float firstly the carbonaceous material (using frother only) and then as follows:

N2: To float the limestone leaving the impurities in the flotation tailing.

N3 and N4: to float the impurities leaving the limestone in the flotation tailing.

(4) N5, N6, N7, and N8.—In each of these tests, bulk flotation of all the impurities present was attempted. Test N8 was deslimed prior to flotation.

(5) The following reagents were used:

Test	Reagents (Usage lb/ton)			Purpose of modifier
	Frother	Collector	Modifier	
N2 .. ....	pine oil	oleic acid	sulphuric acid	depress quartz
N3 .. ....	M.I.B.C.	Aeromine 3055 (0.5)	potassium dichromate (0.2)	depress lime-stone
N4 .. ....	M.I.B.C.	Aeromine 3055 (0.5)	potassium dichromate (1.5)	depress lime-stone
N5 .. ....	cresylic acid	kerosene (10 ml)*	—	—
N6 .. ....	cresylic acid	fuel oil (10 ml)*	—	—
N7 .. ....	M.I.B.C	potassium amyl xanthate (0.5)	—	—
N8 .. ....	M.I.B.C.	Aeromine 3055 (0.5)	potassium dichromate (2.5)	depress lime-stone

\* Added to test pulp

(6) Head sample analysis: CaO, 51.4%; insoluble, 5.2%.

(7) Tests N5 to N8 inclusive were conducted with a slightly different head sample, hence the different head value for acid insoluble.

#### RESULT OF TEST N1

The charge was ground for five minutes at 60% solids.

Fraction	Per cent			% Distribution of insoluble	
	Weight	Cum. weight	Insol.		
+ 18 .. ...	1.2	1.2	5.3	1.2	1.2
52 .. ...	6.9	8.1	5.0	6.6	7.8
100 .. ...	20.8	28.9	4.9	19.6	27.4
200 .. ...	22.0	50.9	5.3	22.4	49.8
C.S. 1 .. ...	4.7	55.6	5.8	5.2	55.0
2 .. ...	7.1	62.7	5.4	7.4	62.4
3 .. ...	5.8	68.5	6.6	7.4	69.8
4 .. ...	4.6	73.1	6.8	6.0	75.8
5 .. ...	2.7	75.8	6.3	3.3	79.1
O/F .. ...	24.2	100.0	4.5	20.9	100.0
Composite ..	100.0	—	5.20	100.0	

Head assay = 5.2% acid insoluble

FLOTATION RESULTS

Test	Fraction	% Weight	% Acid insoluble	% Distribution
N2	1 FC	2.2	8.1	3.4
	2 FC	80.9	5.1	78.6
	FT	16.9	5.6	18.0
	Head	100.0	(5.3)	100.0
N3	1 FC	1.8	9.0	2.9
	2 FC	50.3	5.8	51.5
	FT	47.9	5.4	45.6
	Head	100.0	(5.7)	100.0
N4	1 FC	2.8	8.6	4.7
	2 FC	37.2	4.9	35.6
	FT	60.0	5.1	59.7
	Head	100.0	(5.1)	100.0
N5	FC	45.5	7.8	53.8
	FT	54.5	5.6	46.2
	Head	100.0	(6.6)	100.0
N6	FC	40.6	7.7	45.1
	FT	59.4	6.4	54.9
	Head	100.0	(6.9)	100.0
N7	FC	30.2	9.7	40.4
	FT	69.8	6.2	59.6
	Head	100.0	(7.3)	100.0
N8	Slime	32.8	7.0	32.5
	FC	25.8	7.4	27.1
	FT	41.4	6.9	40.0
	Head	100.0	(7.1)	100.0

CONCLUSIONS

(1) The sizing analysis with the 'acid insoluble' assays show no liberation of the insoluble material at any mesh.

(2) Flotation has not produced any product significantly higher or lower in insoluble content.

(3) From the above it is concluded that no separation of limestone from siliceous material is practicable.