

TR14-195-196
R.586. Concentration of pyrite

This report deals with a preliminary assessment of the recovery of sulphur obtainable from a sample of pyrite-bearing material. The sample was submitted by B. A. Farquhar and was stated to have been obtained from near the junction of the Keith and Arthur Rivers. S.P.L. 56, grid reference 368437 (State 1: 500,000 map, 3rd ed.).

Pyrite in such a location could be a potential source of sulphur for the sulphuric acid works at Burnie.

SAMPLE

The sample submitted consisted of three lumps of what appeared to be a pyrite-bearing siltstone. Some pyrite grains were relatively coarse (up to $\frac{1}{8}$ inch) and the mineral was fairly evenly disseminated through the rock, which was quite soft and easily crushed.

Assays: S, 12.1%; Au, trace.

TEST PROCEDURE

As the size of the sample precluded a jigging test, tabling was used to obtain an indication of gravity concentration results. In practice tabling would not be used.

The sample was jaw crushed and samples for assay and metallurgical testing obtained by riffing.

The test sample was roll crushed to minus $\frac{1}{4}$ -inch and stage ball mill ground to minus 44 mesh B.S.S. in a pulp of 65% solids.

The minus 44 mesh material was screened on 100 and 200 mesh and the fractions tabled separately to produce high grade pyrite concentrates.

The middling and coarse tailings were ball mill ground to 75% minus 200 mesh, combined with the minus 200 mesh gravity tailing, and submitted to cleaner froth flotation for pyrite recovery.

Reagents used in flotation were:

Sulphuric acid	2 lb/ton
Copper sulphate	$\frac{1}{2}$ lb/ton
Potassium isopropyl xanthate	$\frac{1}{2}$ lb/ton

RESULTS

Product	Per cent		
	Weight	Sulphur	Sulphur distribution
- 44 + 100 Table concentrate	17.6	41.7	53.2
- 100 + 200 Table concentrate	7.4	39.8	21.4
- 200 Table concentrate	3.5	32.1	8.2
Flotation concentrate	3.7	47.7	12.8
Final tailing	67.8	0.90	4.4
Composite head	100.0	13.8	100.0

Total concentrate: Grade 40.9% sulphur
Sulphur recovery 95.6%

COMMENT

The results obtained show that a high recovery of sulphur can be achieved by a combination of gravity and froth flotation methods. It is probable that much of the pyrite (up to 50%) could be recovered by jigging which could be expected to give a concentrate grade similar to that shown for the - 44 + 100 table concentrate. Jigs have a much greater capacity than tables and would therefore be preferred for the treatment of material in the coarser size ranges.

However, the grades obtained in the gravity concentrates are considerably lower than that of the flotation concentrates. This fact, together with the high loss of sulphur (17%) in the gravity operation suggests that flotation of the whole ore would be a feasible approach to obtain high recoveries at the required grade of concentrate.

A possible application of gravity concentration could be the use of jigs in roughing stages to produce low grade concentrates at high recoveries for subsequent finer grinding and flotation.

The question of the relative economics of various methods of treatment is related to the size of the operation and the test work can be extended and becomes more meaningful when the deposit is properly defined and sampled.