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May 9, 1945.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1862.

Frothing Tests on a Series of Reagents
Submitted by Shawinigan Chemicals Limited,
Shawinigan Falls, Quebec.

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Shipment:

Small samples, approximately 4 ounces each, of the following were submitted to be tested for their respective frothing properties:

<u>Sample No.</u>	<u>Designation.</u>
1.	1-3 Butanediol diacetate.
2.	1-3 Butanediol acetate.
3.	Frothing agent.
4.	Butyl crotonate.
5.	Butyl beta-hydroxybutyrate.

These samples were submitted by A. H. Andersen,
Asst. Director of Plant Research, Shawinigan Chemicals Limited,
Shawinigan Falls, Quebec.

Conclusions from Test Work:

The tests conducted show that all the products submitted have definite frothing properties and the butyl crotonate is perhaps the most potent of them all. Its action seemed to be somewhat delayed when used on the copper ore but this was not the case with the pyrite ore. While the other three constituents of the regular frothing agent are pretty much on a par, the butyl beta-hydroxybutyrate is perhaps a little more potent than the butanediol acetate and diacetate.

DETAILS OF TEST WORK:

Two series of tests were conducted, one on each of two types of ore.

One of the ores was a copper ore in which chalcopyrite was the predominant metallic mineral. This mineral was largely massive but a small amount of it was disseminated. A few grains of covellite and malachite were also noticed. The gangue was quartz.

The other ore was a sample of fine, disseminated gold-bearing pyrite ore that also carried a small amount of scheelite. The gangue consisted of a hard, siliceous, greenish-grey rock containing some finely disseminated carbonate.

In all cases the ore was ground about 60 per cent finer than 200 mesh and floated with a suitable reagent combination, the frother being varied from test to test while the other conditions remained constant.

The weight, in grams per cubic centimeter, of the various frothers has been determined as follows:

<u>Frother</u>	<u>Wt. of 1 cc. in grams</u>
Pine oil	0.93841
1-3 Butanediol diacetate	1.02635
1-3 Butanediol acetate	1.01846
"Frothing agent"	1.00048
Butyl crotonate	0.89525
Butyl beta-hydroxybutyrate	0.96891

(Details of Test Work, cont'd) -

Tests Nos. 1 to 6.

Using 2,000 grams of the copper ore and 1.0 pound of lime per ton and 0.10 pound of potassium ethyl xanthate per ton for each test, this series of tests was conducted using, successively, 0.10 c.c. of each of the frothers mentioned below, in the order named. In round figures this means that, expressed in pounds per ton of ore treated, the amount of the frothers used was:

	<u>Lb./ton ore</u>
Pine oil	0.094
"Frothing agent"	0.100
1-3 Butanediol diacetate	0.103
1-3 Butanediol acetate	0.102
Butyl crotonate	0.090
Butyl beta-hydroxybutyrate	0.097

The results of this series of tests may be summed up as follows:

Test:	Weight,	Assay,	Distribution:	
No.:	Product:	per cent:	Cu, per:	of copper, :
:	:	cent :	cent :	per cent :
1.	Conc. :	7.20	26.22	91.46
	Tailing:	92.80	0.19	8.54
2.	Conc. :	6.97	26.46	92.97
	Tailing:	93.03	0.15	7.03
3.	Conc. :	7.50	26.46	92.26
	Tailing:	92.50	0.18	7.74
4.	Conc. :	7.59	23.76	87.06
	Tailing:	92.41	0.29	12.94
5.	Conc. :	8.39	23.18	93.81
	Tailing:	91.61	0.14	6.19
6.	Conc. :	7.34	25.72	92.69
	Tailing:	92.66	0.15	7.31

(Details of Test Work, cont'd) -

Tests Nos. 7 to 12.

A second series of tests was conducted on the pyrite ore, using a pound of soda ash and 0.10 pound of potassium amyl xanthate per ton and the same quantity of each of the frothers as used in the first series.

The results of this series of tests may be summed up as follows:

Test: Nos.:	Product:	Weight, per cent:	Assays		Distribution,		Remarks
			Au, oz./ton:	S, per cent:	Au per cent	S per cent	
7.	Conc.	9.98	0.52	33.37	79.35	85.06	Good froth.
	Tailing:	90.02	0.015	0.65	20.65	14.94	
8.	Conc.	8.16	0.56	36.53	73.98	77.17	Good froth.
	Tailing:	91.84	0.0175	0.96	26.02	22.83	
9.	Conc.	9.15	0.52	33.93	74.95	80.65	Good froth.
	Tailing:	90.85	0.0175	0.82	25.05	19.35	
10.	Conc.	9.30	0.56	35.12	76.64	84.71	Good froth.
	Tailing:	90.70	0.0175	0.65	23.36	15.29	
11.	Conc.	15.38	0.34	22.25	83.19	88.03	No delay in action; excessive frothing.
	Tailing:	84.62	0.0125	0.55	16.81	11.97	
12.	Conc.	10.45	0.52	31.31	80.18	83.35	Good froth.
	Tailing:	89.55	0.015	0.73	19.82	16.65	

In Test No. 11 the froth was decidedly excessive. To determine whether or not the soda ash had anything to do with this condition, Test No. 5 was repeated on the copper ore, using soda ash in place of lime. No excessive frothing occurred in this test.

Test No. 11 was then repeated, using a greatly reduced quantity of butyl crotonate, 0.013 pound per ton, which gave the following result:

Product	Weight, per cent	Assays		Distribution,	
		Au, oz./ton:	S, per cent	Au per cent	S per cent
Conc.	8.18	0.60	35.67	72.77	74.11
Tailing	91.82	0.02	1.11	27.23	25.89

(Continued on next page)

(Details of Test Work, cont'd) -

While the grade of concentrate is reasonably good, recoveries are somewhat low. A slight increase in the quantity of frother used might correct this.

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