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OTTAWA January 24th, 1942.

REPORT

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1152.

Frothing Properties of the Standard Chemical Company's Oil No. 33.

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BUREAU OF MINES DIVISION OF METALLIC MINERALS ORE DRESSING AND METAILURGICAL LABORATORIES

DEPARTMENT OF MINES AND RESOURCES MINES AND GEOLOGY BRANCH

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Shipment:

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A sample of Oil No. 33 was received from the Standard Chemical Company (Montreal plant) on December 12th, 1941. The sample was submitted by J. S. Godard, of the Canadian Industries Limited.

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### Purpose of the Investigation:

In view of the threatened shortage of pine oil, suitable substitutes or diluents for pine oil may be required to maintain production of essential metals.

This investigation was made to determine the suitability of Oil No. 33, used in conjunction with pine oil, as a frother for flotation.

### Experimental Tests:

Tests were made to determine the frothing characteristics of various mixtures of No. 33 oil with pine oil, also their offect on recoveries and ratio of concentration compared with the results obtained with pure pine oil and with pure No. 33 oil.

The following mixtures were tested:

(1) Pine oil Yarmor F. 90% and No. 33 oil 10%, by weight. (2) Pine oil " " 75% and No. 33 oil 25%, " " (3) Pine oil " " 50% and No. 33 oil 50%, " "

The ore used in the investigation assayed as follows:

Gold (Au)	eiza	0.13	oz./ton.
Silver (Ag)	-	0.16	13
Iron (Fe)	m	9.03	per cent.
Arsenic (As)	ett	0.59	£1
Copper (Cu)	1 112	None	detected.
Pyrite sulphur	-	1.63	per cent.
Pyrrhotite sulphur	10	0.02	11

The following recoveries and ratios of concentration

307	0	20	12	01	PC	1	7.3'	WT0	0	5
WX.	10	100	0	01	100	1	2	4 63	9	- 0

Frother	Recovery, per cent: Ratio of Au S: concentration
. Pine oil, 100% (1) Pine oil 90%, No. 33 10% (2) " " 75%, " 25% (3) " " 50%, " 50% No. 33 oil, 100%	85.6 96.2 12.7:1.   85.4 95.6 12.9:1.   87.4 96.2 12.6:1.   77.3 96.0 10.7:1.   78.0 97.1 19.6:1.

(Continued on next page)

(Experimental Tests, cont'd) -

The additions of the mixed frothers had to be increased by approximately 0.06 pound per ton to obtain a froth equal in appearance and tenacity to that of pine oil.

Increasing the amount of No. 33 cil in the mixture to 50 per cent results in causing some slimed gangue to float into the concentrate. This test gave the lowest grade of concentrate.

Using only No. 33 oil as a frother did not result in a satisfactory froth, as the oil did not appear to dissolve appreciably. A heavily mineralized scum with some large bubbles was scraped off the pulp. The pulp did not froth, nor did it rise to the level of the former tests in which pine oil was used.

#### Details of Tests:

# Test No. 1 (A to E).

Samples of ore were ground in water to 70 per cent minus 200 mesh with 0.4 pound of soda ash and 0.10 pound of potassium butyl xanthate (Z-8) per ton of ore.

To the flotation cell, 0.14 pound of potassium butyl xanthate per ton of ore and a frothing reagent were added.

The froth was removed for 8 minutes.

The amounts of frothing reagents were as follows:

Test	No.	1-A -	Pine oil, O	.18 1b./ton of ore	Э.	,	
11	59	1-B -	Frother No.	1 (90% Pine oil,	10% No.	33),	0.24 lb./ton ore
23	15	1-0 -	Frother No.	2 (75% " ,	25% 11	),	0.24 11 11
11	18	1-D -	Frother No.	3 (50% " .	50% "	),	0.256 " "
86	8.8	1-E -	No. 33 oil,	0.368 lb./ton of	ore.		

The pH of the flotation solution was as follows:

Test	1-A	-	8.8
	1-B	esab	8.8
	1=0	3	8.8
	1-D	-	8.85
	1-E	(m	8.9

## Results of Flotation Tests:

	()	Frother:	Pine of	1, 0.18 11	o./ton d	ore.)	
Test No.	: Product	:Weight, : per : cent	: Assa : Au, :oz./ton	ays : S, :per cent	:Distrit : <u>per</u> : Au	cent : S :	Ratio of concen- tration
1 - A	Feed Concentrate Tailing	:100.00 : 7.88 : 92.12	: 0.16 : 1.74 : 0.025 :	1.67 20.40 0.07	:100.0 : 85.6 : 14.4	100.0 96.2 3.8	12.7:1.
	(Frother: 90	0% Pine (	oil 10% 1	No. 33 of	1, 0.24	lb./ton	ore.)
1-B	Feed Concentrate Tailing	100.00 7.75 92.25	0.16 1.74 0.025	1.69 20.80 0.08	:100.0 : 85.4 : 14.6	100.0 95.6 4.4	12.9:1.
e your our out of the second	(Frother: 7	5% Pine	011 25%	No. 33 oi	1, 0.24	1b./ton	ore.)
<u>1-'C</u>	Feed Concentrate Tailing	100.00 7.94 92.06	: 0.15 : 1.61 : 0.02	: 1.44 : 17.56 : 0.06	:100.0 : 87.4 : 12.6	;100.0 ;96.2 ;3.8	12.6:1.
	(Frother: 5	0% Pine	011 50%	No. 33 oi	1, 0.25	6 10./to	on ore.)
	Feed Concentrate Tailing	:100.00 : 9.36 : 90.64	0.16 1.32 0.04	: 1.36 : 13.96 : 0.06	:100.0 :77.3 :22.7	100.0 96.0 4.0	10.7:1.
engel Roger provinsion and the second		(Frot	her; 100	% No. 33	oil.)		n an
] == F	Feed Concentrate Tailing	:100.00 : 5.09 : 94.91	: 0.13 : 1.98 : 0.03	1.00 18.66 0.03	100.0 78.0 22.0	100.0 97.1 2.9	19.6:1.

## Character of the Froth:

Test No. 1-A. (Pine oil).

Characteristic pine oil froth, small to medium bubbles, well covered with sulphides and rising uniformly through the pulp.

Test No. 1-B. (10% No. 33 oil).

The bubbles were slightly more brittle, well covered with sulphides, no gangue slimes seen, no appreciable difference from pine oil froth.

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(Character of the Froth, cont'd) -

## Test No. 1-C. (25% No. 53 oll).

The bubbles were medium to large, well covered with sulphides, slightly more brittle than the froth in No. 1-S and took approximately one minute longer to go into solution and form the froth. No appreciable amount of gangue seen on the bubbles at first but some gangue appeared near the end of the flotation period. The appearance of the froth was much the same as that make with pine oil.

Test No. 1-D. (50% No. 33 oil).

The bubbles were medium to large, voluminous froth, appearance of gangue in the froth along with sulphides. Froth held up well and appeared tenacious. Evidence of longer period of agitation required to dissolve the oil and form a froth.

Test No. 1-E. (100% No. 33 oil).

This oil was added one drop at a time with a short agitation period to note the results from each drop. First drop produced a soum froth which produced a few small bubbles covered with sulphides. The second drop of the reagent caused gangue to appear on the bubbles. A third and fourth drop did not appear to dissolve sufficiently to form a distinct froth, a few large and brittle bubbles appeared. The sulphides appeared to flocculate and gather in a thick mass without rising to the usual pulp level. This soum was scraped off as clean as possible to determine the grade and recovery of the values. - Page 6 -

### Conclusions:

The investigation indicates that the No. 53 oil has no frothing properties.

Test No. 1-C indicates that the amount of pine oil (in the mixture of 75 per cent pine oil and 25 per cent No. 33 oil) used as a frother in this test is equal to the amount of straight pine oil used in Test No. 1-A.

The recoveries and ratios of concentration of Tests Not. 1-A, 1-B, and 1-C are practically equal when up to 25 per cent No. 33 oil was used in the frother.

Increasing the amount of No. 53 cil to 50 per cent had a detrimental effect on the recovery and grade of the concentrate.

It is apparent that No. 33 oil is of no use as a frother or as a diluent for pine oil.

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