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R.675. Recovery of gold from cyanide pulp with activated carbon.

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In project R.655 and tests of three samples (731001, 731002, 731003) gold was recovered from drill samples from the Middle Arm tailing dumps at Beaconsfield by:

(1) Concentrating the sulphides by flotation.
(2) Calcining the flotation concentrate.
(3) Cyaniding the calcine and the flotation tailing.

Upon learning from the United States Bureau of Mines that gold could be successfully recovered from a cyanide pulp by the addition of activated carbon the following tests were initiated.

The sample used for these tests was made up of equal masses from each of the following:

Reg. No.	*B.M.I. No.*
731001	B.100
731002	B.101
731003	B.102

The calculated head assay was 2.12 g/t of Au.

The averaged results of the three individual tests done of these samples gave the following:

FC 5.2% Mass FT 94.8% Mass

Gold dissolved from the FC was 84%.

TEST WORK

The test work consisted of batch ball mill grinding for 10 minutes at 70% solids, froth flotation of sulphides, calcination of the flotation concentrate, cyanidation of the products and extraction of gold from the pregnant solution by activated carbon. A one kilogram charge was used for each test.

In test N1 both the FT and the calcined FC were cyanided; in test N2 only the calcined FC was so treated.

Test conditions and results

N1 Flotation: 220 g/t copper sulphate
220 g/t sodium ethyl xanthate
110 g/t potassium amyl xanthate
Frother: M.I.B.C.

Cyanidation: 6 g NaCN/l *l* FT pulp
0.5 FC pulp
CaO to pH 11
Bottle rolled 20 hours.

Active carbon extraction: 10 g added.
Further 30 minutes bottle rolling
Carbon recovered by sieving

Results of test N1

Product	% Mass	Act. C	Au (mg) Spent S/N	Au (mg) Total	% Au Recovery in Act. C
Calcined FC	4.4	1.52	0.04	1.56	97.4
FT	95.6	0.25	0.06	0.31	80.6

N2 Flotation: 220 g/t copper sulphate
220 g/t sodium ethyl xanthate
110 g/t potassium amyl xanthate
90 g/t Aerofloat 208 (to assist flotation of possible free gold).

Frother: M.I.B.C.

Cyanidation: 6 g NaCN/0.5 *l* pulp
CaO to pH 11
Bottle rolled 20 hours.

Active carbon extraction: 10 g added
Further 10 minutes bottle rolling
Carbon recovered by sieving

Results of test N2

Product	% Mass	Act. C	Au (mg) Spent S/N	Au (mg) Total	% Au Recovery in Act. C
FC	5.5	1.24	0.46	1.70	72.9
FT	94.5	(not cyanided)		0.29	-

The gold dissolved from the FC was 81% which compares favourably with the averaged results from the original three samples.

SUMMARY

The results show that activated carbon is an effective precipitant and absorbent for gold in cyanide solutions. The form in which the carbon was used, nodules approximately 2 mm x 1 mm, rendered it very simply recovered from the treated solution by sieving.

A distinct economic advantage of this method over the conventional zinc precipitation method of recovery is the removal of the need for clarifying the pregnant solution before precipitation.

Comparison of the two tests indicates that time of contact may have a significant effect on the recoveries obtainable.

The optimum addition of carbon per unit volume of pregnant solution was not investigated but is probably much less than the amount used.

No comparison was made with the recovery obtainable by precipitation with zinc.

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