

APPLICATION NOTE

OREAS-990B

COPPER-GOLD-SILVER CONCENTRATE



SUMMARY

This application note is for the digestion of OREAS-990B, a Copper-Gold-Silver Concentrate.

Instrument: ColdBlock CB15S sample digester technology, chiller, ICP-OES, ICP-MS

Published: by Lorie-Anne Doig, Aug. 2022

Digestion Time: 20 Minutes

Acid Used: Aqua Regia

Average ColdBlock Recovery vs. CRM:

- 95% Copper
- 99% Gold
- 99% Lead

METHODOLOGY

1. Chiller temperature was set to -5°C
2. 0.25g of OREAS 990b was weighed and placed into a ColdBlock Digestion vessel
3. 20mL of Aqua Regia was added (HNO₃ is added first, followed by the HCl) (For elements requiring Hydrofluoric Acid 20mL Aqua Regia + 3mL HF was added)
4. Sample was digested at 80% power for 20 minutes
5. Sample was cooled and bulked to 50mL using 2% HNO₃ v/v

DISCUSSION

- Upon addition of HNO₃, the evolution of reddish brown (NO₂) fumes occurred
- After 20 minutes, the samples are pale yellow in color and a minor amount of material remains
- Hydrofluoric acid can be added for a total digestion to improve recoveries of certain elements (see table 2 for improved Manganese & Magnesium)
- Gold was analyzed by ICP-MS
- For improved silver and gold recoveries bulk up using a solution of 20% HCl v/v



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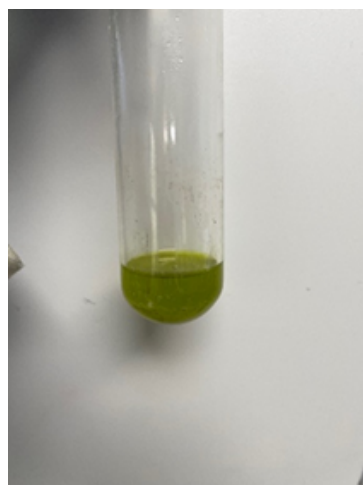
COPPER-GOLD-SILVER CONCENTRATE



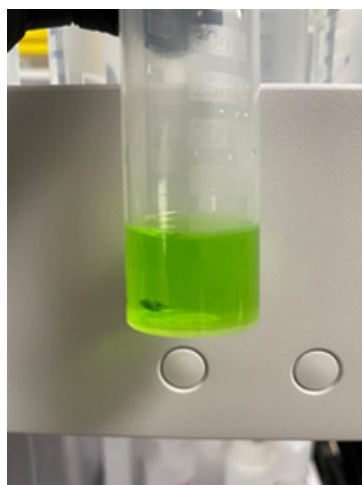
RESULTS

Table 1: ColdBlock™ Digestion CB15S (%)
Recoveries of Large Sample Size (0.25g) OREAS-990b

Elements	Ag (ppm)	Au (ppm)	As (ppm)	Ca (ppm)	Cd (ppm)	Cu (wt.%)	Fe (wt.%)	Mg (ppm)	Mn (ppm)	Pb (wt.%)	S (wt.%)	Sb (wt.%)	Zn (wt.%)
Expected Value	6741	63.67	7663	1650	580	16.71	14.45	1240	2280	8.45	29.11	1.89	19.97
ColdBlock Value 1	6038	63.5	7256	1664	558	15.3	13.5	748	1874	8.11	26.86	1.73	18.63
ColdBlock Value 2	6787	63.1	7901	1578	607	16.5	14.84	730	1974	8.6	27.1	1.84	20.46
Average	6413	63.28	7579	1621	583	15.88	14.17	739	1924	8.36	26.98	1.79	19.55
% Recovery	95%	99%	99%	98%	100%	95%	98%	60%	84%	99%	93%	94%	98%
RSD	5.8%	0.3%	4.3%	2.7%	4.2%	3.9%	4.7%	1.2%	2.6%	2.9%	0.4%	3%	5%



OREAS 990b after 20-min Aqua Regia digestion



OREAS 990b before bulk-up (Aqua Regia + HF digestion)

TABLE 2 – SHOWING IMPROVED RECOVERIES OF MANGANESE & MAGNESIUM

Elements	Mg (ppm)	Mn (ppm)
Expected Value	1240	2280
ColdBlock Value 1	1084	2097
ColdBlock Value 2	1274	2156
Average	1179	2127
% Recovery	95%	93%
RSD	8.1%	1.4%

OREAS 990b is a copper-gold-silver concentrate certified reference material (CRM) sourced from the Rosebery metallurgical plant owned and operated by MMG Ltd. The Rosebery mine and plant are located in the north-west region of Tasmania, Australia approximately 300 kilometres north-west of Hobart and 125 kilometres south of Burnie.