

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:	August 2022
Digestion Time:	20 Minutes
Acid Used:	Reverse 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 Reverse Aqua Regia was added (HNO₃ is added first, followed by the HCl) (For elements requiring Hydrofluoric Acid 20mL Reverse 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

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.

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 near total digestion to improve the recoveries of certain elements (see Table 2) for improved Manganese & Magnesium)
- Boric acid can also be added to re-solubilize any insoluble fluorides and help neutralize any remaining HF.
- Gold was analyzed by ICP-MS
- For improved silver and gold recoveries bulk up using a solution of 20% HCl v/v

OREAS-990B

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Results

Table 1: Results of Reverse Aqua Regia Digestion

Elements	Certified Value	ColdBlock Value 1	ColdBlock Value 2	Average	% RSD	% Recovery
Ag (ppm)	6741	6038	6787	6413	5.8%	95%
Au (ppm)	63.67	63.5	63.1	63.28	0.3%	99%
As (ppm)	7663	7256	7901	7579	4.3%	99%
Ca (ppm)	1650	1664	1578	1621	2.7%	98%
Cd (ppm)	580	558	607	583	4.2%	101%
Cu (wt.%)	16.71	15.3	16.5	15.88	3.9%	95%
Fe (wt.%)	14.45	13.5	14.84	14.17	4.7%	95%
Mg (ppm)	1240	748	730	739	1.2%	60%
Mn (ppm)	2280	1874	1974	1924	2.6%	84%
Pb (wt.%)	8.45	8.11	8.6	8.36	2.9%	99%
S (wt.%)	29.11	26.86	27.1	26.98	0.4%	93%
Sb (wt.%)	1.89	1.73	1.84	1.79	3%	94%
Zn (wt.%)	19.97	18.63	20.46	19.55	5%	98%

Table 2 - Results of Reverse Aqua Regia + HF Direction - Showing Improved Recoveries of Manganese and Magnesium

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