

## APPLICATION NOTE

# OREAS-990B Copper-Gold-Silver Concentrate

## SUMMARY

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

<b>Instrument:</b>	ColdBlock CB15S sample digester technology, chiller, ICP-OES, ICP-MS
<b>Published:</b>	August 2022
<b>Digestion Time:</b>	20 Minutes
<b>Acid Used:</b>	Reverse Aqua Regia
<b>Average ColdBlock Recovery vs. CRM:</b>	■ 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 (HNO<sub>3</sub> 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% HNO<sub>3</sub> 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 HNO<sub>3</sub>, the evolution of reddish brown (NO<sub>2</sub>) 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

## Copper-Gold-Silver Concentrate

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

**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	<b>1179</b>	8.1%	<b>95%</b>
Mn (ppm)	2280	2097	2156	<b>2127</b>	1.4%	<b>93%</b>