

APPLICATION NOTE

OREAS-353

LEAD CONCENTRATE



SUMMARY

This application note is for the digestion of OREAS-353, a Lead 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: Inverse Aqua Regia

Average ColdBlock Recovery vs. CRM:

- 91% Silver
- 97% Lead
- 99% Zinc

METHODOLOGY

1. Chiller temperature was set to -5°C
2. 0.25g of OREAS 353 was weighed and placed into a ColdBlock Digestion vessel
3. 20mL of Inverse Aqua Regia was added (HNO_3 is added first, followed by the HCl)
(For elements requiring Hydrofluoric Acid 20mL Inverse 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_3 v/v

DISCUSSION

- Upon addition of HNO_3 , the evolution of reddish brown (NO_2) fumes occurred
- After 20 minutes, the samples dark yellow in color in color
- Hydrofluoric acid can be added for a “near” total digestion to improve recoveries of certain elements (see table 2 for improved recoveries of Al, Co, Fe, Mg, Mn & Sb)
- For improved silver recoveries bulk up using a solution of 10-20% HCl v/v



info@coldblock.ca



coldblock.ca/contact-us



[linkedin.com/company/coldblock-technologies](https://www.linkedin.com/company/coldblock-technologies)

APPLICATION NOTE

OREAS-353

LEAD CONCENTRATE



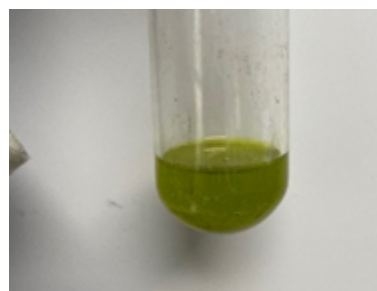
RESULTS

Table 1: ColdBlock™ Digestion CB15S (%)
Recoveries of Large Sample Size (0.25g) OREAS-353

Elements	Ag ppm	Al ppm	Ca ppm	Cd ppm	Co ppm	Cu ppm	Fe wt.%	Mg wt.%	Mn wt.%	Pb wt.%	S wt.%	Sb ppm	Zn wt.%
Expected Value	2184	2040	2360	205	48.8	3120	5.35	0.685	0.184	61.26	15.13	1746	4.14
ColdBlock Value 1	1987	794	2411	198	36.8	2774	4.81	0.205	0.147	57.89	13.66	606	4.12
ColdBlock Value 2	1969	640	2291	206	50.0	2790	4.81	0.206	0.147	60.6	14.33	932	4.07
Average	1978	717	2351	202	43.4	2782	4.81	0.206	0.147	59.25	14.00	769	4.10
% Recovery	91%	35%	100%	99%	89%	89%	90%	30%	80%	97%	92%	44%	99%
RSD	0.5%	10.7%	2.6%	2.0%	15.2%	0.3%	0.0%	0.2%	0.0%	2.3%	2.4%	21.2%	0.6%



OREAS 353 before bulk-up
(Inverse Aqua Regia + HF digestion)



OREAS 353 after 20-min Inverse Aqua Regia digestion

Table 2 – Showing improved recoveries
of Al, Co, Fe, Mg, Mn, Sb

Elements	Al (ppm)	Co (ppm)	Fe (wt.%)	Mg (wt.%)	Mn (wt.%)	Sb (ppm)
Expected Value	2040	48.8	5.35	0.685	0.184	1746
ColdBlock Value 1	2049	49.1	5.26	0.681	0.181	1738
ColdBlock Value 2	1677	51.6	4.87	0.650	0.184	1676
Average	1863	50.4	5.07	0.666	0.183	1707
% Recovery	91%	103%	95%	97%	99%	98%
RSD	0.1%	2.5%	0.3%	2.3%	0.8%	1.8%

OREAS 353 is a certified reference material (CRM) prepared from a Pb-Ag concentrate sample sourced from South32 Ltd's Cannington mine plant. The stratabound, metasediment hosted (Broken Hill Type) deposit is located ~200 kms south-east of Mount Isa in north-west Queensland, Australia.