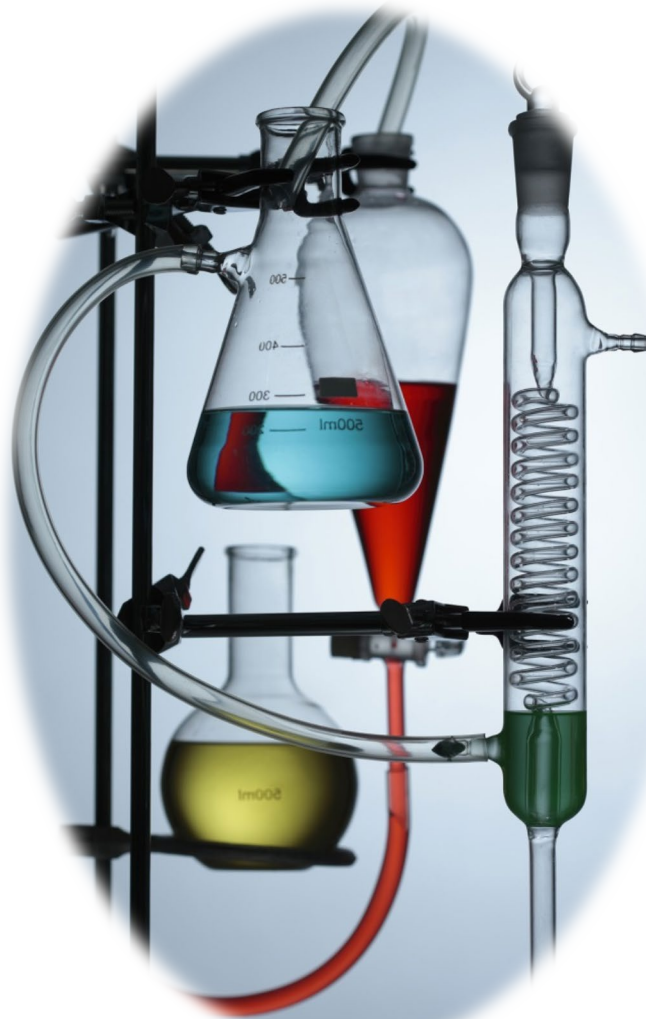


# ENCON LABORATORY

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MINING AND  
ARD TESTS  
ANALYSES  
(2023)



## GEOCHEMISTRY – SAMPLE PREPERATION

Code	Parameter	Method	Sample Amount (Kg)
ENC-01	Crushing	TS EN 15002	10
ENC-02	Grinding		
ENC-03	Drying		
ENC-04	Screening		



## MINING ANALYSES

### GOLD AND SILVER ANALYSES – GEOCHEMISTRY

Code	Parameter	Method		Sample Amount (g)	LOQ
ENC-05-a	Gold (Au)	AR <sup>1</sup> ICP-MS	EPA 6020 B	30	<50 ppb
ENC-05-b	Gold (Au)	CB <sup>2</sup> ICP-MS	EPA 6020 B	30	<50 ppb
ENC-06	Silver (Ag)	MD <sup>3</sup> ICP-OES	EPA 6020 B	0,5	<0,5 ppb

### TRACE ELEMENT ANALYSES – GEOCHEMISTRY

Code	Parameter	Method	Sample Amount (g)	Quantification Limit LOQ
<b>ENC-07 (53 Parameters)</b>	Aluminum (Al)	ICP-MS and ICP-OES	200	<5ppm
	Antimony (Sb)			<0,5ppm
	Arsenic (As)			<0,5ppm
	Barium (Ba)			<5ppm
	Beryllium (Be)			<5ppm
	Bismuth (Bi)			<0,5ppm
	Boron (B)			<5ppm
	Cadmium (Cd)			<5ppm
	Calcium (Ca)			<0,01ppm
	Cerium (Ce)			<5ppm
	Cesium (Cs)			<5ppm
	Chromium (Cr)			<5ppm
	Cobalt (Co)			<0,1ppm
	Copper (Cu)			<0,1ppm
	Gallium (Ga)			<0,1ppm
	Hafnium (Hf)			<0,1ppm
	Indium (In)			<0,5ppm
	Iron (Fe)			<5ppm
	Lanthanum (La)			<50ppm
	Lead (Pb)			<5ppm
	Lithium (Li)			<5ppm
	Magnesium (Mg)			<0,5ppm
	Manganese (Mn)			<0,1ppm
	Mercury (Hg)			<5ppm
	Molybdenum (Mo)			<50ppm
	Nickel (Ni)			<5ppm
	Niobium (Nb)			<5ppm
	Osmium (Os)			<5ppm

<sup>1</sup> AQ: Aqua Regia Digestion

<sup>2</sup> CB: Cold Block Digestion

<sup>3</sup> MD: Microwave Digestion

## TRACE ELEMENT ANALYSES – GEOCHEMISTRY

Code	Parameter	Method	Sample Amount (g)	Quantification Limit LOQ
	Palladium (Pd)			<0,1ppm
	Phosphorus (P)			<0,05ppm
	Platinum (Pt)			<0,05ppm
	Potassium (K)			<0,05ppm
	Rhenium (Re)			<50ppm
	Rhodium (Rh)			<0,1ppm
	Rubidium (Rb)			<0,05ppm
	Ruthenium (Ru)			<0,1ppm
	Scandium (Sc)			<0,05ppm
	Selenium (Se)			<0,5ppm
	Silica (Si)			<0,1ppm
	Sodium (Na)			<0,1ppm
	Strontium (Sr)			<5ppm
	Tantalum (Ta)			<0,1ppm
	Telluric (Te)			<50ppm
	Thallium (Tl )			<5ppm
	Thorium (Th)			<0,5ppm
	Tin (Sn)			<0,1ppm
	Titanium (Ti)			<0,5ppm
	Tungsten (W)			<5ppm
	Uranium (U)			<0,5ppm
	Vanadium (V)			<0,1ppm
	Yttrium (Y)			<0,5ppm
Zinc (Zn)	<5ppm			
Zirconium (Zr)	<5ppm			
<b>ENC-08 (14 Parameters) Rare Elements</b>	Dysprosium (Dy)	ICP-MS	200	<0,1ppm
	Erbium (Er)			<0,1ppm
	Europium (Eu)			<0,1ppm
	Gadolinium (Gd)			<0,1ppm
	Germanium (Ge)			<0,1ppm
	Holmium (Ho)			<0,1ppm
	Iridium (Ir)			<0,1ppm
	Lutetium (Lu)			<0,1ppm
	Neodymium (Nd)			<0,1ppm
	Praseodymium (Pr)			<0,1ppm
	Samarium (Sm)			<0,1ppm
	Terbium (Tb)			<0,1ppm
	Thulium (Tm)			<0,1ppm
	Ytterbium (Yb)			<0,1ppm

## WHOLE ROCK ANALYSES (Lithium Borate Fusion)

Code	Parameter	Method		Sample Amount (g)	LOQ
ENC-12	SiO <sub>2</sub>	ICP-OES	TSISO 14869-2 EPA 3051 A EPA 6010 D	250	<%0,002
	Al <sub>2</sub> O <sub>3</sub>				<%0,002
	Fe <sub>2</sub> O <sub>3</sub>				<%0,001
	Na <sub>2</sub> O				<%0,013
	K <sub>2</sub> O				<%0,012
	CaO				<%0,001
	FeO				<%0,001
	MgO				<%0,002
	MnO				<%0,001
	TiO <sub>2</sub>				<%0,002
	P <sub>2</sub> O <sub>5</sub>				<%0,002
	LOI				-

## ACID ROCK DRAINAGE (ARD)

### STATIC ARD TESTS

Code	Parameter	Method	Sample Amount (g)	LOQ
<b>STATIC TESTS</b>				
ENC-13	Sample Preparation	EPA 600, ASTM E 1915-13		-
	Sulfide-Sulfur (S <sup>-2</sup> )	EPA 600, ASTM E 1915-13	250	<0,013 %
ENC-14	Sample Preparation	SOBEK /MODIFIED SOBEK (EPA 600, ASTM E 1915-13)	2000	-
	Total Inorganic Carbon	SOBEK/MODIFIED SOBEK (EPA 600, ASTM E 1915-13)		<0,133
	Modified Acid-Base Account, Total S, pH (NP, AP, NP/AP, NNP)	SOBEK/MODIFIED SOBEK (EPA 600, ASTM E 1915-13)		-
<b>NAG TEST, LEACH TEST AND WHOLE ROCK ANALYSES</b>				
ENC-15	Net Acid Generation Test (NAG, pH, Acidity)	AMIRA. 2002. ARD Test Handbook	2000	-
	Kinetic NAG Test	AMIRA. 2002. ARD Test Handbook		-
	NAG Leach Test	AMIRA. 2002. ARD Test Handbook BS EN 12457-1:2002		-
	Multi Acid Digestion Metal Analyses (ICP-MS)	EPA 200.7, EPA 6020 B, TS EN ISO 17294-1/2		-
	Whole Rock Analyses	TS ISO 14869-2 (Lithium Borat Fusion) EPA 3051 A, EPA 6010 D		-
	(3:1) Leach Test Parameters, ICP-MS, Cl, F	BS EN 12457-1:2002		-
	Blank Leach Test Whole Analyses (with Cl and F)	BS EN 12457-1:2002		-
	Blank Leach Test Whole Analyses (only pH and EC)	BS EN 12457-1:2002		-

## KINETIC HUMIDITY CELL ARD TESTS

Code	Parameter	Method	Sample Amount (g)	LOQ
<b>Preparatory Works</b>				
ENC-16	Humidity Cell Preparation (for once)	ASTM D 5744-96	2000	-
	Size Analyses (for once)	ASTM C136-06	-	-
<b>Weekly Analyses</b>				
ENC-17	pH	SM 4500 H <sup>+</sup> B	-	
	Conductivity	SM 2510 B	-	
	Redox Potential	SM 2580 B	-	
	Dissolved Oxygen	SM 4500 O-G	-	
	Acidity	SM 2310 B	-	
	Alkalinity	SM 2320 B	-	
	Sulfate	SM 4110 B/SM 4500 SO <sub>4</sub> E	-	
	Chloride	SM 4110 B/SM 4500 Cl- B	-	
	Fluoride	SM 4110 B	-	
		Metals with ICP-OES and ICP-MS (Ag, Al , As, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Se, Sb, Si, Sn, Sr, Te, Th, Tl, Ti, U, V, Zn, Zr, Hg)	EPA 6020 B EPA 200,7 TS EN ISO 17294-1/2	-

## MONOLITHIC DYNAMIC ARD TESTS (TS EN 15863, TS EN 15864, LEAF EPA 1315)

Code	Parameter	Method	Sample Amount (g)	LOQ
ENC-18	<b>Preparatory Works</b>			
	Humidity Cell Preparation (for once)	TS EN 15863 TS EN 15864	3000	-
	Size Analyses (for once)	ASTM C136, ASTM C137	-	-
	Humidity Cell Operation (for once)	TS EN 15863 TS EN 15864	-	-
ENC-19	<b>Analyses (Total for 8 sets of analyses)</b>			
	pH	SM 4500 H+ B	-	
	Conductivity	SM 2510 B	-	
	Redox Potential	SM 2580 B	-	
	Acidity	SM 2310 B	-	
	Alkalinity	SM 2320 B	-	
	Arsenic	EPA 6020 B	-	
	Barium	EPA 6020 B	-	
	Cadmium	EPA 6020 B	-	
	Total Chromium	EPA 6020 B	-	
	Copper	EPA 6020 B	-	
	Mercury	EPA 6020 B	-	
	Molybdenum	TS EN ISO 17294-1/2	-	
	Nickel	EPA 6020 B	-	
	Lead	EPA 6020 B	-	
	Antimony	EPA 6020 B	-	
	Selenium	EPA 6020 B	-	
	Zinc	EPA 6020 B	-	
	Chloride	SM 4110 B/SM 4500 Cl- B	-	
	Fluoride	SM 4110 B	-	
Sulfate	SM 4110 B/SM 4500 SO42- E	-		
Dissolved Organic Carbon	TS 8195 EN 1484	-		
Total Dissolved Solids	SM 2540 C	-		

**Note:**

The required time for the monolithic dynamic tests is 64 for days in accordance with TS EN 15863 or TS EN 15864 Standards



## STANDARD TEST METHOD FOR SEQUENTIAL BATCH EXTRACTION OF WASTE WITH WATER (ASTM 4793-09, 2017)

Code	Parameter	Method	Sample Amount (g)	LOQ
ENC-20	Sequential Batch Extraction of Waste with Water. ICP-MS. Cl. F	ASTM D4793-09	200	-
	Blank Leach Test. Sequential Batch Extraction of Waste with Water. ICP-MS. Cl. F	ASTM D4793-09		-
	Blank Leach Test. Sequential Batch Extraction of Waste with Water. only pH and EC	ASTM D4793-09		-

**CHARACTERIZATION OF WASTE - LEACHING BEHAVIOUR TEST - UP  
FLOW PERCOLATION TEST (UNDER SPECIFIED CONDITIONS)  
(TS EN 14405: 2018-01, LEAF EPA 1314)**

Code	Parameter	Method	Sample Amount (g)	LOQ
<b>Preparatory Works</b>				
ENC-21	Column Preparation (for once)	TS EN 14405,EPA 1314	1000	-
	Size Analyses (for once)	ASTM C136-06	-	-
<b>Set of Analyses (11 Sets)</b>				
ENC-22	pH	SM 4500 H <sup>+</sup> B	-	
	Conductivity	SM 2510 B	-	
	Redox Potential	SM 2580 B	-	
	Dissolved Oxygen	SM 4500 O-G	-	
	DOC/DIC	TS 8195 EN 1484		
	Acidity	SM 2310 B	-	
	Alkalinity	SM 2320 B	-	
	Sulfate	SM 4110 B/SM 4500 SO <sub>4</sub> E	-	
	Chloride	SM 4110 B/SM 4500 Cl <sup>-</sup> B	-	
	Fluoride	SM 4110 B	-	
	Metals with ICP-OES and ICP-MS (Ag, Al , As, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Se, Sb, Si, Sn, Sr, Te, Th, Tl, Ti, U, V, Zn, Zr, Hg)	EPA 6020 B EPA 200,7 TS EN ISO 17294-1/2	-	

## CHARACTERIZATION OF WASTE - LIQUID-SOLID PARTITIONING AS A FUNCTION OF EXTRACT pH USING A PARALLEL BATCH EXTRACTION PROCEDURE (LEAF EPA 1313)

Code	Parameter	Method	Sample Amount (g)	LOQ
ENC-23	<b>Preparatory Works and Operation</b>			
	Column Preparation and Test Operation	USEPA 1313	2000	-
	Size Analyses (for once)	ASTM C136-06	-	-
ENC-24	<b>Set of Analyses (12 Sets)</b>			
	pH	SM 4500 H <sup>+</sup> B	-	
	Conductivity	SM 2510 B	-	
	Redox Potential	SM 2580 B	-	
	Dissolved Oxygen	SM 4500 O-G	-	
	DOC/DIC	TS 8195 EN 1484		
	Acidity	SM 2310 B	-	
	Alkalinity	SM 2320 B	-	
	Sulfate	SM 4110 B/SM 4500 SO42- E	-	
	Chloride	SM 4110 B/SM 4500 Cl- B	-	
	Fluoride	SM 4110 B	-	
	Metals with ICP-OES and ICP-MS (Ag, Al, As, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Se, Sb, Si, Sn, Sr, Te, Th, Tl, Ti, U, V, Zn, Zr, Hg)	EPA 6020 B EPA 200,7 TS EN ISO 17294-1/2	-	

## CHARACTERIZATION OF WASTE - LIQUID-SOLID PARTITIONING AS A FUNCTION OF LIQUID-TO-SOLID RATIO USING A PARALLEL BATCH EXTRACTION PROCEDURE (LEAF EPA 1316)

Code	Parameter	Method	Sample Amount (g)	LOQ
ENC-25	<b>Preparatory Works</b>			
	Column Preparation and Test Operation	USEPA 1316	1000	-
	Size Analyses	ASTM C136-06	-	-
ENC-26	<b>Set of Analyses (6 Sets)</b>			
	pH	SM 4500 H <sup>+</sup> B	-	
	Conductivity	SM 2510 B	-	
	Redox Potential	SM 2580 B	-	
	Dissolved Oxygen	SM 4500 O-G	-	
	DOC/DIC	TS 8195 EN 1484		
	Acidity	SM 2310 B	-	
	Alkalinity	SM 2320 B	-	
	Sulfate	SM 4110 B/SM 4500 SO42- E	-	
	Chloride	SM 4110 B/SM 4500 Cl- B	-	
	Fluoride	SM 4110 B	-	
	Metals with ICP-OES and ICP-MS (Ag, Al, As, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Se, Sb, Si, Sn, Sr, Te, Th, Tl, Ti, U, V, Zn, Zr, Hg)	EPA 6020 B EPA 200,7 TS EN ISO 17294-1/2	-	