

Carbon, Hydrogen, and Nitrogen in Biomass and Biofuel

LECO Corporation; Saint Joseph, Michigan USA

Instrument: TruSpec[®] CHN

Sampling and Sample Preparation

It is essential that a representative and uniform sample be analyzed. Solid samples should be ground to a uniform consistency.

Accessories

502-186 Tin Foil Cup, 501-427 Com-Aid™

Calibration Samples

LECO 502-092 EDTA, 502-642 Phenylalanine, or other suitable reference materials.

Analysis Parameters

Combustion Furnace Temperature 950°C
Afterburner Temperature 850°C

Element Parameters

	Nitrogen	Carbon	Hydrogen
Analyze	Yes	Yes	Yes
Min. Analysis Time	30 sec	NA	NA
Comparator Level	1.00	NA	NA
Endline Time	1 sec	NA	NA
Conversion Factor	1.00	1.00	1.00
Significant Digits	5	5	5

IR Analysis Stabilize Comparator	0.00
IR Baseline Delay Time	5 seconds
IR Baseline Time	2 seconds
IR Pressure Stabilization Comparator	0.00
IR Stop Flow Time	5 seconds
TC Baseline Delay Time	5 seconds
TC Baseline Time	2 seconds

Burn Profile

Burn Steps	Time	Furnace Flow
1	40 seconds	High
2	30 seconds	Medium
3	30 seconds	High

Macro Ballast Parameters

Ballast

Equilibrate Time 30 seconds
Not Filled Timeout 600 seconds

Aliquot Loop

Fill Time 20 seconds
Equilibrate Pressure Time 4 seconds



Procedure

1. Prepare instrument for operation as outlined in the operator's instruction manual.
2. Determine and calibrate systems blank as outlined in the operator's instruction manual.
3. Instrument must be calibrated as outlined in the operator's instruction manual.
4. Perform Drift Correction as outlined in the operator's instruction manual.

Note: Drift should be performed at the start of every day or when the check standard doesn't return the correct result(s).

5. Powder/granular samples.
 - a. Weigh ~0.15 gram biomass sample into 502-186 Tin Foil Cup, seal, enter mass and sample identification into Sample Login (F3).
 - b. Place into the appropriate position of the sample carousel, and proceed with analysis.
6. Liquid samples.
 - a. Weigh ~0.10 gram biofuel sample into a 502-186 Tin Foil Cup, enter mass and sample identification into Sample Login (F3).
 - b. Add ~0.3 gram of 501-427 Com-Aid on top of sample and seal foil cup.
 - c. Place into the appropriate position of the sample carousel, and proceed with analysis.

Organic Application Note

Typical Results

Sample	Mass g	Carbon %	Hydrogen %	Nitrogen %
Wood Chips #1	0.1553	37.82	6.67	0.11
	0.1507	37.86	6.63	0.09
	0.1541	38.04	6.59	0.07
	0.1531	37.90	6.49	0.10
	X =	37.91	6.60	0.09
s =	0.10	0.08	0.02	
Wood Chips #2	0.1511	46.41	6.12	0.63
	0.1541	46.52	6.15	0.64
	0.1518	46.61	6.15	0.64
	0.1515	46.57	6.17	0.66
	X =	46.53	6.15	0.64
s =	0.09	0.02	0.01	
BioOil	0.1026	42.26	7.33	0.04
	0.1032	42.15	7.39	0.05
	0.1079	42.40	7.43	0.08
	0.1023	42.46	7.44	0.07
	X =	42.32	7.40	0.06
s =	0.14	0.05	0.02	