

Instrument: TGA801

Moisture and Ash Determination in Flour

LECO Corporation; Saint Joseph, Michigan USA

Introduction

An accurate determination of moisture and ash content in flour products provides important information related to the food quality and safety (texture, taste, microbial stability). Moisture is also a key variable used to calculate a product's purity, yield, and/or resulting constituent analysis on a dry basis. Ash content is also an indicator of contaminants such as bran in refined flours. The LECO TGA801 is a macro thermogravimetric analyzer that allows up to 19 samples to be analyzed simultaneously.

Sample Preparation

A representative, uniform sample is required

Accessories

621-331 Large Ceramic Crucibles, 621-011-507 Double Ended Scoop

Sample Mass ~1.0 g

Method Reference

AOAC Official Method 925.10 Solids (Total) and Moisture in Flour*; AOAC Official Method 923.03 Ash of Flour*

*Modified sample mass to meet TGA801 specifications.

Analysis Time ~4 h

Method General Parameters

Crucible Type	Ceramic
Minimum Crucible Weight	20.0
Maximum Crucible Weight	30.0
Crucible Density	3.0
Lid Density	3.0
Sample Type	Flour
Sample Density	0.5
Minimum Sample Weight	0.80
Maximum Sample Weight	1.20

Method Step Parameters

Step Type	Preset
Preset Method Step	Moisture
Cooling Option	Active
Crucible Lids	No
Start Temperature	25.0 °C
End Temperature	130.0 °C
Ramp Rate	10.0 °C/min
Hold Time	30 min
Maximum Time	180 min
Atmosphere	Air
Flow Rate	10.0 L/min
Final Weight	At Constancy
Constancy Window	9 min
Constancy Level	0.0005 g

Step Type	Preset
Preset Method Step	Ash
Cooling Option	Active
Crucible Lids	No
Start Temperature	130.0 °C
End Temperature	550.0 °C
Ramp Rate	20.0 °C/min
Hold Time	30 min
Maximum Time	240 min
Atmosphere	Air
Flow Rate	10.0 L/min
Final Weight	At Constancy
Constancy Window	9 min
Constancy Level	0.0005 g

Method Step Calculations

Calculation Type	Preset
Preset Method Step	Moisture
Measurement Type	Mass Ratio
Enable Calibration	Disabled
Calculation Equation	$((\text{Initial Mass} - \text{Moisture Mass}) \div \text{Initial Mass})$

Calculation Type	Preset
Preset Method Step	Ash
Measurement Type	Mass Ratio
Enable Calibration	Disabled
Calculation Equation	$(\text{Ash Mass} \div \text{Initial Mass})$

Calculation Type	Preset
Preset Method Step	Ash Dry
Measurement Type	Mass Ratio
Enable Calibration	Disabled
Calculation Equation	$(\text{Ash} \times ((1 \div ((1 - \text{Moisture}))))))$

Procedure

1. Create and/or select a method using the parameters described above following the procedure in the TGA801 Instruction Manual.
2. Login and load samples following the procedure outlined in the TGA801 Instruction Manual.

Typical Results

Sample	Mass (g)	% Moisture	% Ash	% Ash Dry	Batch**
Corn Flour	1.0633	7.38	0.49	0.53	1
n=10	1.0698	7.40	0.41	0.45	1
	1.0308	7.38	0.48	0.52	1
	1.0175	7.40	0.44	0.47	1
	1.0477	7.42	0.44	0.48	1
	1.0131	7.40	0.44	0.48	2
	1.0720	7.38	0.42	0.46	2
	1.0224	7.41	0.46	0.50	2
	1.0735	7.39	0.40	0.43	2
	1.0401	7.36	0.40	0.43	2
	Avg =	7.39	0.44	0.47	
	s =	0.02	0.03	0.03	

Wheat Flour	1.0306	7.49	1.46	1.58	1
n=10	1.0192	7.55	1.44	1.56	1
	1.0124	7.54	1.50	1.62	1
	1.0209	7.53	1.40	1.51	1
	1.0210	7.53	1.53	1.65	1
	1.0210	7.53	1.57	1.70	2
	1.0185	7.53	1.53	1.65	2
	1.0013	7.55	1.41	1.53	2
	1.0085	7.48	1.61	1.74	2
	1.0136	7.51	1.50	1.63	2
	Avg =	7.52	1.49	1.62	
	s =	0.02	0.07	0.07	

Barley Flour	1.0084	7.92	1.82	1.97	1
n=10	1.0330	7.96	1.83	1.99	1
	1.0350	7.92	1.88	2.05	1
	1.0191	7.94	1.91	2.07	1
	1.0119	7.94	1.90	2.06	1
	1.0160	7.86	1.89	2.05	2
	1.0112	7.92	1.84	2.00	2
	1.0436	7.88	1.84	2.00	2
	1.0150	7.91	1.79	1.94	2
	1.0199	7.91	1.88	2.04	2
	Avg =	7.92	1.86	2.02	
	s =	0.03	0.04	0.04	

**Dual furnace TGA801 units were utilized in obtaining results.



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