Organic Application Note

Moisture, Volatile, Ash, and % Fixed Carbon in Coal and Coke

Sample Weight
~1 g

Analysis Time
3 to 5 hours

General Settings

Crucible Density:	3.00
Cover Density:	3.00
Sample Density:	1.50

Steps Information

	Moisture	Volatile	Ash
Covers:	Off	On	Off
Ramp Rate:	6	43	15
Ramp Time (h:m):	00:13	00:19	00:10
S. Temp (°C):	25	105	600
E. Temp (°C):	105	950	750
Atmosphere:	Nitrogen	Nitrogen	Oxygen
Flow Rate:	High	High	Low
Hold Time (h:m)	00:00	00:07	00:00

Constants

	Moisture	Volatile	Ash
Constant Weight	0.05%	100.00%	0.05%
Weight/Time (h:m)	00:09	00:09	00:09

Equations

Initial Weight:	W[Initial]
Moisture:	((W[Initial]-W[Moisture])/W[Initial])*100
Volatile Matter:	((W[Moisture]-W[Volatile])/W[Initial])*100
Ash	(W[Ash]/W[Initial])*100
Fixed Carbon:	100-(E[Moisture]+E[VolatileMatter]+E[Ash])
Volatile Matter/Dry Basis:	E[VolatileMatter]*(100/(100-E[Moisture]))
Ash/Dry Basis:	E[Ash]*(100/(100-E[Moisture]))
Fixed Carbon/Dry Basis:	100-(E[VolatileMatterDryBasis]+E[AshDryBasis])

Volatile Calibration

1. Define 6 to 8 standards with known dry basis volatile values (for accurate results, the standards must cover the range of the unknowns).
2. Analyze each standard 2 to 3 times with a total of 19 crucibles following the procedure below.
3. When analysis is finished, calibrate and create a calibration curve (refer to the operator's instruction manual for detailed procedure).
4. Save in a file and analyze unknowns using this method.
5. If PC is not used, the Volatile Calibration is done through the DSP.

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Procedure

1. Check furnace balance with 1 g weight in "sequence test".
2. Select method as described above.
3. Enter ID codes if a PC is used, if not, they will be entered later with the DSP.
4. Press Analyze.
5. Load empty crucibles into the furnace carousel making sure a crucible is in the reference position.
6. Press Start for locating and taring of crucibles.
7. The furnace cover opens and each crucible is presented to the operator for sample loading.
8. Put ~1 g sample of coal or coke into the crucible.
9. Press "next" to continue.
10. When all crucibles are loaded, analysis begins.

Typical Results

Sample	% Moisture	% Volatile	% Ash	% Fixed Carbon
Charcoal				
n = 4				
Average	5.28	33.36	0.99	65.65
SD	0.03	0.03	0.01	0.02
Coal #1				
n = 4				
Average	5.63	32.66	8.42	58.92
SD	0.04	0.03	0.02	0.04
Coal #2				
n = 4				
Average	0.84	29.61	3.92	66.47
SD	0.006	0.06	0.02	0.04
Coal #3				
n = 4				
Average	0.64	23.92	6.21	69.86
SD	0.01	0.13	0.04	0.09
Coal #4				
n = 3				
Average	2.38	35.82	4.91	59.27
SD	0.007	0.13	0.03	0.10
Coke #1				
n = 4				
Average	3.70	6.22	19.77	74.02
SD	0.03	0.05	0.03	0.04
Coke #2				
n = 4				
Average	2.83	4.65	19.95	75.39
SD	0.008	0.04	0.01	0.05
Met Coke				
n = 5				
Average	0.03	0.56	7.08	92.35
SD	0.01	0.08	0.03	0.10

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