ELTRA®
ELEMENTAL ANALYZERS

Moisture, volatiles and ash determination in coal & coke

Suitable analyzers

- TGA Thermostep

Used accessories

- Ceramic crucible (26063)
- Spatula (23111)

Application settings

Parameters	Moisture	Volatile	(Wait for cooling)	Ash
Temperature (°C)	105	915	750	750
Speed (°C)	0 (=maximum)	0	0	0
Type	Stop by deviation	Stop by time	Stop by time	Stop by deviation
Time (s)	0	07:00	1	0
Deviation	0.001	NN	NN	0.01
Carrier gas	Nitrogen	Nitrogen	Nitrogen	Oxygen
Purge (s)	05:00	0	0	1:00
Liquid	0	NN	NN	0
Closed lids	Disable	Enable	Enable	Disable

Formula settings

Parameters	Formula I: Parameters as analyzed	Formula II: Parameters calculated on dry base
Moisture (%)	(X[0]-(X[1]- Y[1]))/X[0]*100	NN
Volatile (%)	((X[1]-Y[1])- (X[2]-Y[2]))/X[0]*100	R[2]*(100/(100-R[1]))
Ash (%)	(X[4]-Y[4])/X[0]*100	R[3]*(100/(100-R[1]))
Fixed carbon (%)	NN	100-R[1]-R[2]-R[3]

Procedure

- Prepare and clean the ELTRA analyzer (e.g. remove ash from the crucibles)
- Check pressure of the oxygen and nitrogen bottle
- Prepare the application according to the recommended settings
- Select this application in the TGA software; log in the sample names
- Fill approx. 1 g of sample into the crucibles (use the optional "balance button")
- Start analysis

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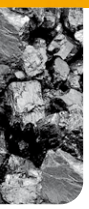

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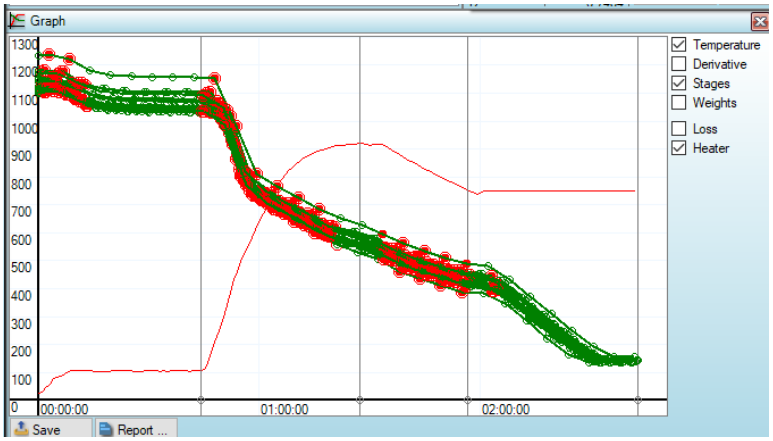
Typical results

The TGA Thermostep can be filled with samples according to customers requirements.

Example 1

All 19 crucibles are filled with the same sample: coal (customer sample) with high volatile content



Typical results					
Example 1: Coal (customer sample)					
TGA Pos. No.	**Sample mass (g)**	**Moisture (%)**	**Volatile (%) dry base**	**Ash (%) dry base**	**Fixed carbon (%) calculated value**
1	1.1798	6.7300	46.9872	12.3394	37.6844
2	1.1261	6.7223	47.1856	12.5004	37.3513
3	1.1084	6.7485	47.2197	12.3371	37.4598
4	1.1798	6.7130	46.7816	12.4098	37.8192
5	1.1037	6.7228	49.7832	11.7872	35.5853
6	1.1017	6.8349	47.2434	12.1507	37.5709
7	1.1232	6.7308	48.7894	12.0015	36.3120
8	1.1178	6.7007	47.3939	12.2470	37.4039
9	1.2352	6.7196	46.4786	12.3118	38.1917
10	1.1142	6.7313	48.7173	12.1177	36.2704
11	1.1515	6.7043	46.6694	12.2967	38.0345
12	1.1472	6.7294	46.7195	12.2899	37.9818
13	1.1174	6.7299	48.6454	12.3312	36.1384
14	1.1037	6.7228	47.0790	12.3287	37.6118
15	1.1056	6.7384	48.0594	12.0486	36.9482
136	1.1424	6.7139	46.8196	12.3024	37.8838
17	1.1129	6.6763	48.0276	12.0010	37.0521
18	1.1691	6.6376	47.0623	12.3229	37.6735
19	1.1048	6.6709	47.6591	12.3394	37.0828
Average (%)					
		6.7199	47.5432	12.2310	37.2661
Deviation / Relative deviation					
		0.0385 (0.57%)	0.8962 (1.88%)	0.1735 (1.41%)	0.7243 (1.94%)

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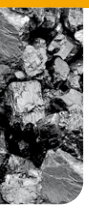

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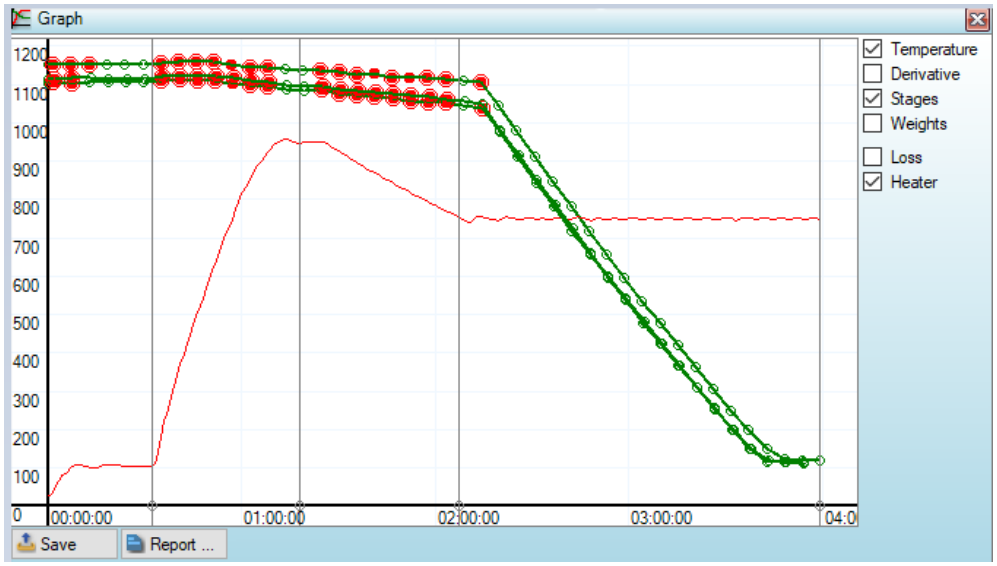
Example 2

Different coal and coke samples are analyzed in the same run:



Typical results					
Example 2: Coke sample, 35 mm (customer sample)					
TGA Pos. No.	**Sample mass (g)**	**Moisture (%)**	**Volatile (%) dry base**	**Ash (%) dry base**	**Fixed carbon (%) calculated value**
2	1.1521	0.0434	1.6528	10.0556	88.2533
3	1.1040	0.0234	2.2609	10.0163	87.8181
4	1.1137	0.0334	2.1277	10.1973	87.7773
Average (%)					
		0.0334	2.0138	10.0959	87.9496
Deviation / Relative deviation					
		0.01 (29.9%)	0.3197 (15.9%)	0.0989 (0.9%)	0.2638 (2.9%)

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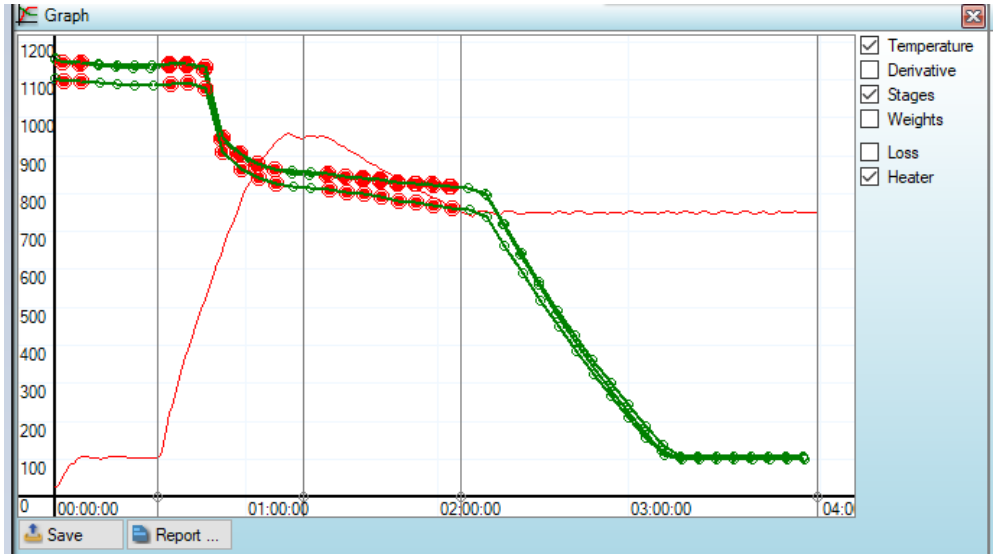

Typical results					
Example 2: Coal sample No. 1 (customer sample)					
TGA Pos. No.	**Sample mass (g)**	**Moisture (%)**	**Volatile (%) dry base**	**Ash (%) dry base**	**Fixed carbon (%) calculated value**
5	1.1537	1.9763	25.2697	8.8479	64.5673
6	1.1581	1.8479	25.0747	9.2429	64.4571
7	1.1051	1.8912	25.0726	9.1095	64.5612
Average (%)					
		1.9051	25.1390	9.0668	64.5285
Deviation / Relative deviation					
		0.0653 (3.4%)	0.1132 (0.45%)	0.2009 (2.2%)	0.0619 (0.09%)

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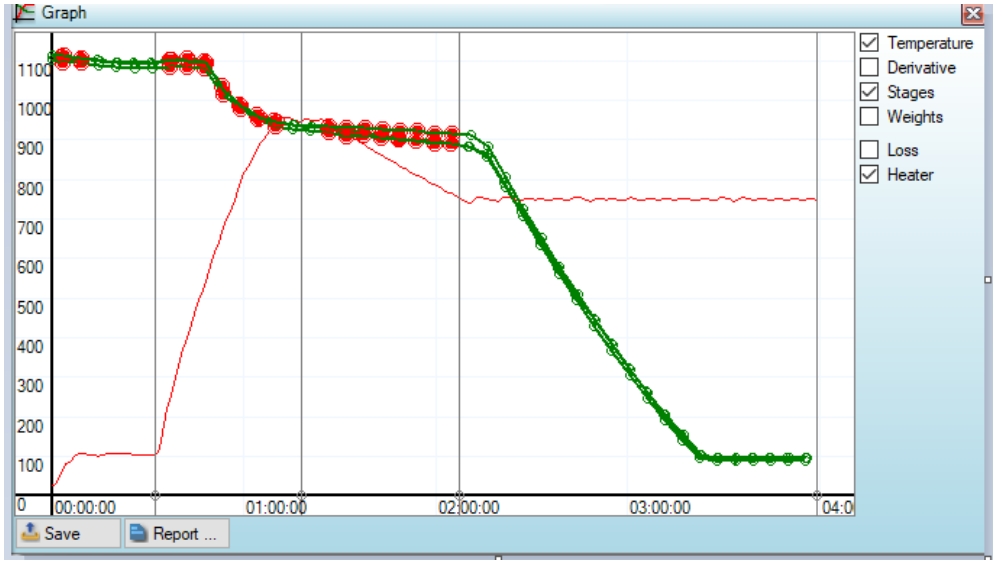

Typical results					
Example 2: Coal sample No. 2 (customer sample)					
TGA Pos. No.	**Sample mass (g)**	**Moisture (%)**	**Volatile (%) dry base**	**Ash (%) dry base**	**Fixed carbon (%) calculated value**
8	1.1145	1.8484	14.9942	8.3891	75.1926
9	1.1022	1.9597	14.9890	8.1035	75.3916
10	1.1128	1.8422	14.6712	8.4930	75.4126
Average (%)					
		1.8834	14.8848	8.3285	75.3323
Deviation / Relative deviation					
		0.0661 (3.5%)	0.1850 (1.2%)	0.2017 (2.4%)	0.1214 (0.16%)

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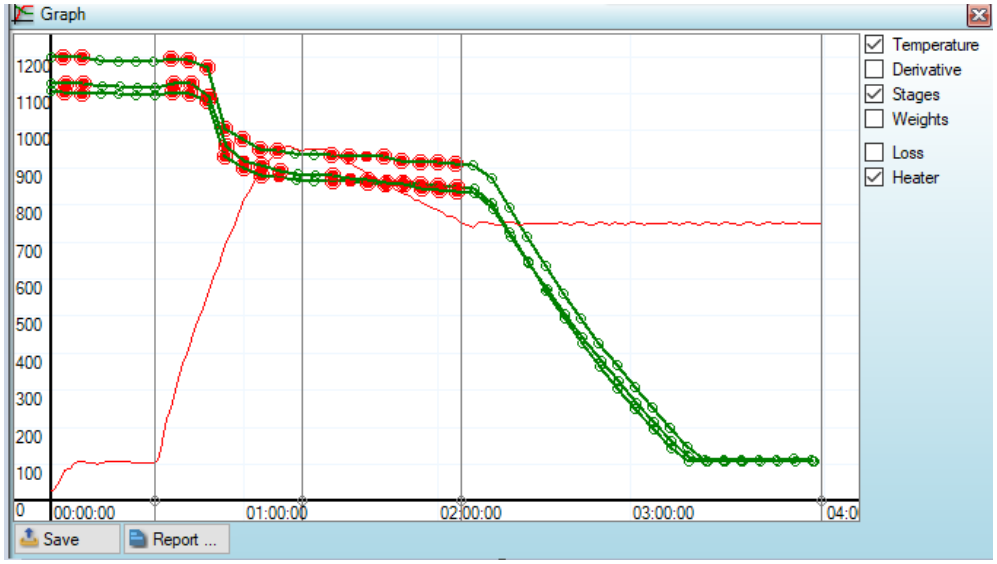

Typical results					
Example 2: Coal sample No. 3 (customer sample)					
TGA Pos. No.	**Sample mass (g)**	**Moisture (%)**	**Volatile (%) dry base**	**Ash (%) dry base**	**Fixed carbon (%) calculated value**
11	1.1997	1.0919	21.3731	9.3196	68.5469
12	1.1008	0.9476	21.5038	9.3833	68.4553
13	1.1281	0.9396	21.3457	9.3862	68.6145
Average (%)					
		0.9930	21.4075	9.3630	68.5389
Deviation / Relative deviation					
		0.0857 (8.6%)	0.0845 (0.39%)	0.0376 (0.40%)	0.0799 (0.11%)

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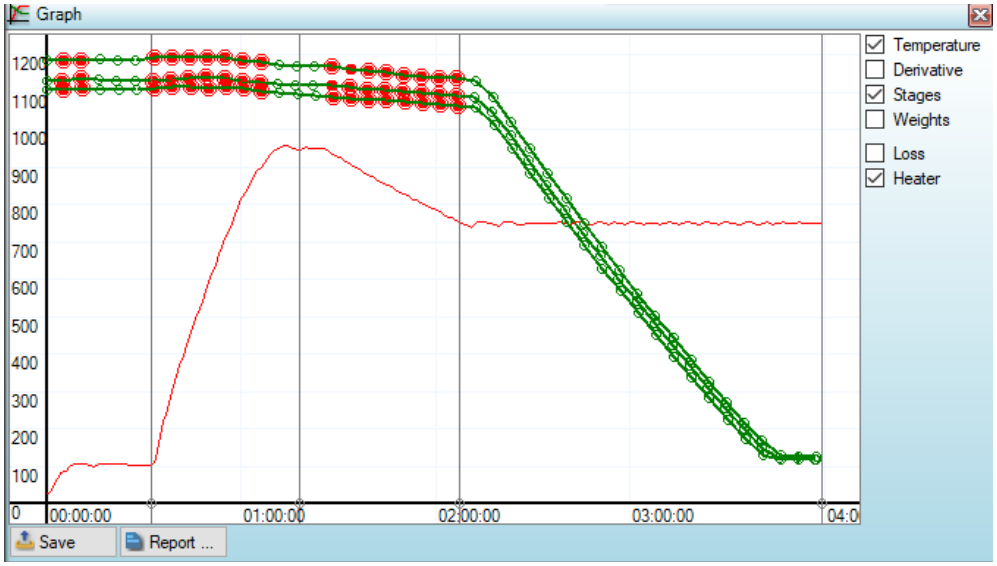

Typical results					
Example 2: Coke sample No. 2 (customer sample)					
TGA Pos. No.	**Sample mass (g)**	**Moisture (%)**	**Volatile (%) dry base**	**Ash (%) dry base**	**Fixed carbon (%) calculated value**
14	1.1301	0.0170	1.5873	10.3747	88.1549
15	1.1862	0.0253	1.7874	10.2960	87.8944
16	1.1065	0.0090	1.6698	10.3670	87.9553
Average (%)					
		0.0171	1.6815	10.3459	88.0015
Deviation / Relative deviation					
		0.0080 (47%)	0.1005 (5.9%)	0.0434 (0.41%)	0.1362 (0.15%)

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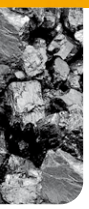

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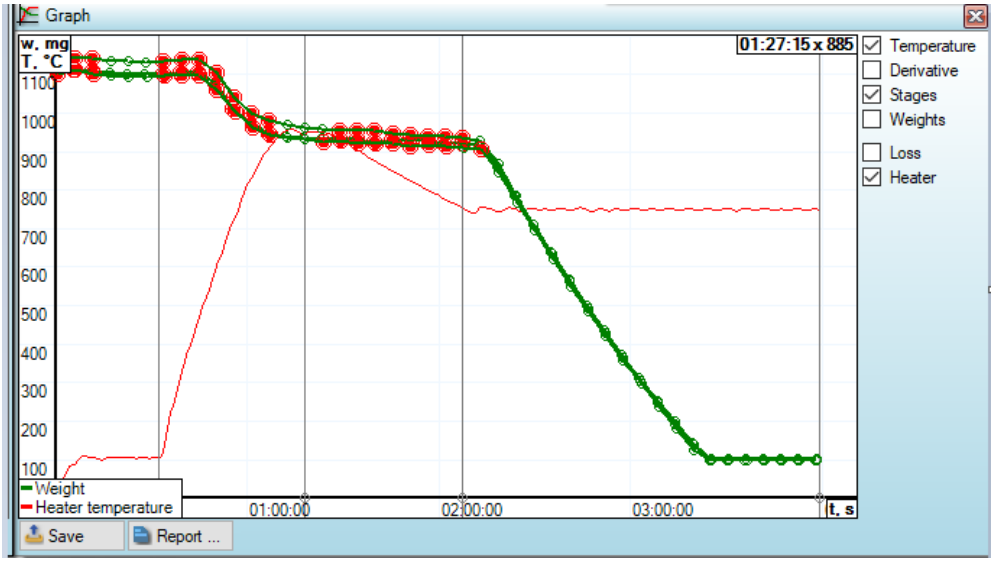

Typical results					
Example 2: Coal sample No. 4 (customer sample)					
TGA Pos. No.	**Sample mass (g)**	**Moisture (%)**	**Volatile (%) dry base**	**Ash (%) dry base**	**Fixed carbon (%) calculated value**
17	1.1104	0.9186	15.4228	8.5614	75.3156
18	1.1435	0.9620	15.3460	8.6791	75.2418
19	1.1027	0.8615	15.2459	8.8358	75.2624
Average (%)					
		0.9140	15.3383	8.6921	75.2733
Deviation / Relative deviation					
		0.0504 (5.5%)	0.0887 (0.57%)	0.1377 (1.5%)	0.0380 (0.05%)