SmartNotes

Which official methods are fulfilled by the Flash*Smart* Elemental Analyzer?

Standardized methods (or official international methods) exist for organic elemental analysis of a range of samples. These methods have been formalized to create standardized approaches to sample analysis between laboratories, allowing laboratories to obtain conclusive answers for consumers, manufactures and governmental bodies. The Thermo Scientific™ Flash*Smart*™ Elemental Analyzer fulfills the requirements of several Official Methods. The tables show a non-comprehensive list of Official Methods divided based on the applications:

- Petrochemistry
- Food, Animal Feed and Beverages
- Agronomy and Marine Science
- Environment

The all-in-one Thermo Scientific™ Flash*Smart*™ Elemental Analyzer allows the quantitative determination of carbon, nitrogen, hydrogen and sulfur by combustion, and the quantitative oxygen determination by pyrolysis. The system copes with all requirements of modern laboratories such as accuracy, reproducibility and low cost per analysis.

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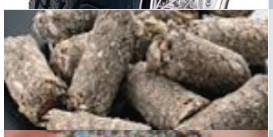
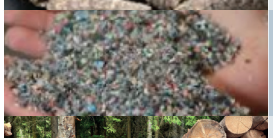
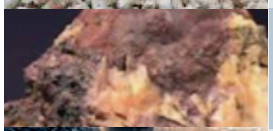
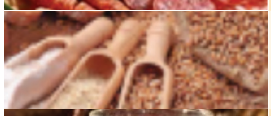
The extensive modularity of the Flash*Smart* EA provides over 20 configurations in one Analyzer and allows you to determine from 1 to 5 elements, in a wide range of concentrations in all type of matrix (solid, viscous, liquid, volatile, gas, organic and inorganic) under the full control of the Thermo Scientific™ Eager*Smart*™ Data Handling Software.

Petrochemical Applications

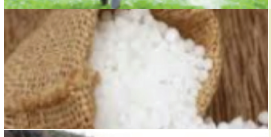
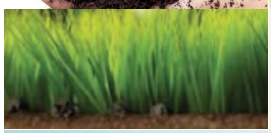
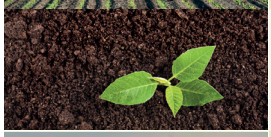
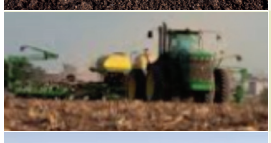
The Analyzer can be used for the differentiation between the Total Carbon and Total Organic Carbon determination after an acid pre-treatment of the sample. The flexibility of the Flash*Smart* allows you to analyze trace sulfur concentrations when it is coupled with the Flame Photometric Detector (FPD Detector). This method combines the advantages of the elemental analyzer with the sensitivity, selectivity and robustness of the FPD Detector.

Application	Official Association	Official Method
	**ASTM (American Society for Testing Materials)**	Method D 5291 – 21 Standard Test Methods for Instrumental Determination of Carbon, Hydrogen and Nitrogen in Petroleum Products and Lubricant
	**ASTM (American Society for Testing Materials)**	Method D 5373 – 02 Standard Test Methods for Instrumental Determination of Carbon, Hydrogen and Nitrogen in Laboratory Samples of Coal and Coke
	**ASTM (American Society for Testing Materials)**	Method D 5622 Standard Test Methods for the Determination of Total Oxygen in Gasoline and Methanol Fuels by Reductive Pyrolisis
	**ASTM (American Society for Testing Materials)**	Method D 7633 – 13 Standard Test Method for Carbon Black – Carbon Content
	**CEN / TC 343**	Solid Recovered Fuels – Methods for the Determination of Carbon, Hydrogen and Nitrogen Content
	**CEN / TS 15407-2006**	Solid Recovered Fuels – Methods for the determination of Carbon (C), Hydrogen (H) and Nitrogen (N) content.
	**EN 15104, 2011**	Solid Biofuels – Determination of Total Content of Carbon, Hydrogen and Nitrogen – Instrumental Methods
	**EN ISO 16948:2015**	Solid Biofuels – Determination of Total Content of Carbon, Hydrogen and Nitrogen
	**EN 15440**	Solid Recovered Fuels – Method for the determination of Biomass content
	**ISO 29541:2010**	Solid Mineral Fuels – Determination of Total Carbon, Hydrogen and Nitrogen – Instrumental Methods
	**MSZ (Hungarian Standards Institution)**	Method 24050 Solid Mineral Fuels. Instrumental Analytical Determination of Carbon, Hydrogen and Nitrogen Content for Coal, Coke, Petroleum Coke
	**ISO/TS 21663, 2020**	Solid recovered fuels — Methods for the determination of carbon (C), hydrogen (H), nitrogen (N) and sulphur (S) by the instrumental method

Food, Animal Feed and Beverages Applications

Application	Official Association	Official Method
	**AACC (American Association of Cereal Chemists)**	Crude Protein in Cereal, 46-30, 1999
	**AOAC (Association of Official Analytical Chemists)**	Official Method Ba 4f-00 Crude Protein in Soy Flour
	**AOAC (Association of Official Analytical Chemists)**	Official Method 990.03. Protein (crude) in Animal Feed 4.2.08
	**AOAC (Association of Official Analytical Chemists)**	Official Method 992.15. Crude Protein in Meat and Meat Products including Pet Foods 39.1.16
	**AOAC (Association of Official Analytical Chemists)**	Official Method 992.23. Crude Protein in Cereals, Grain and Oilseeds 32.2.02
	**AOAC (Association of Official Analytical Chemists)**	Official Method 997.09 Nitrogen in Beer, Wort, and Brewing Grains Protein (Total) by Calculation (Combustion Method)
	**AOAC (Association of Official Analytical Chemists)**	Official Method 972.43 Microchemical Determination of Carbon, Hydrogen and Nitrogen
	**AOCS (American Oil Chemists Society)**	Official Method Ba 4e-93 (revised 1995). Combustion Method for Determination of Crude Protein
	**ASBC (American Society of Brewing Chemists)**	Official Method 1996. Nitrogen Determination in Barley
	**ASBC (American Society of Brewing Chemists)**	Total Nitrogen in Wort and Beer by Combustion Method. Report of Subcommittee, 1994
	**DIN, EN, ISO 16634-1, 2008 (International Organization for Standardization)**	Food Products – Determination of the Total Nitrogen Content by Combustion According to the Dumas Principle and Calculation of the Crude Protein Content. Part 1: Oil Seeds and Animal Feeding Stuffs
	**DIN, EN, ISO 16634 – 2 (International Organization for Standardization)**	Food Products – Determination of the Total Nitrogen Content by Combustion According to the Dumas Principle and Calculation of the Crude Protein Content. Part 2: Cereals, Pulses and Milled Cereal Products
	**IFFO (International Fishmeal and Fish Oil Organization Ltd.)**	Nitrogen Determination in Fish Meal by Combustion Method
	**ISO 14891 (International Organization for Standardization)** **FIL 185 (International Dairy Federation)**	Nitrogen Determination in Dairy Products by Combustion Method
	**Office International de la Vigne et du Vin**	Resolution OENO 13/2002 Quantification of Total Nitrogen by Dumas Method (Must and Wines) Quantification de l'Azote Total Selon la Methode de Dumas (Mouts et Vins)
	**Standard ICC**	Official method N. 167 Crude Protein in Grains and Cereals of Food and Animal Feed by Dumas Combustion Method

Agronomy and Marine Science Applications

Application	Official Association	Official Method
	**AOAC (Association of Official Analytical Chemists)**	Official Method 993.13. Nitrogen (Total) in Fertilizers 2.4.02
	**BS ISO 22241-2:2006**	Annex B Determination of Urea content by Total Nitrogen
	**EPA (Environmental Protection Agency)**	Method 440.0, 1997 Determination of Carbon and Nitrogen in Sediments and Particulates of Estuarine/Coastal Waters using Elemental Analysis
	**ISO 10694, 1995 UNE 77321:2003**	Soil Quality – Determination of Organic and Total Carbon After Dry Combustion (elementary analysis)
	**ISO 13878, 1998 UNE 77325:2003**	Soil Quality – Determination of Total Nitrogen Content by Dry Combustion (elemental analysis)
	**Official Italian Method on Soils Analytical Chemistry (Gazzetta Ufficiale)**	Method 146, 1998 Nuove Norme per la Disciplina Dei Fertilizzanti (New regulations for fertilizer's control)
	**Official Italian Method on Soils Analytical Chemistry (Gazzetta Ufficiale)**	Method 248, 1999. Nitrogen, Carbon and Organic Carbon in Soils
	**UNE 77325:2003**	Soil Quality – Determination of Total Sulfur by Dry Combustion
	**UNI EN 13654-2**	Soil Improvers and Growing Media. Determination of Nitrogen by Combustion Method

Environmental Applications

Application	Official Association	Official Method
	**EN 13137, 2001**	Characterization of Waste – Determination of Total Organic Carbon (TOC) in Waste, Sludges and Sediments

Find out more at **thermofisher.com/OEA**

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