SMART NOTE 000492

SmartNotes

How is Flash*Smart* Elemental Analyzer supporting quantitative elemental analysis in the food cycle?

The food cycle includes a variety of processes and materials that are carefully regulated by federal authorities and various international organizations to ensure product quality and consumer and environment safety.

One of the main tools for quality control of materials in the food cycle is elemental characterization. Elemental analysis utilizes carbon, hydrogen, nitrogen, sulfur and oxygen, which help determine the structure of an unknown compound, as well as to evaluate the structure and purity of a synthesized compound.

The Thermo Scientific™ Flash*Smart*™ Elemental Analyzer (EA) enables quantitative elemental determinations at high and low levels of concentrations for solid and liquid samples in one single system, adapting to your needs and covering wide spectra of analysis in the food cycle. The Flash*Smart* EA copes effortlessly with modern laboratory requirements such as accuracy, day to day reproducibility and high sample throughput.

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Why is elemental analysis important for the food cycle quality control?

1. Elemental characterization of soils, leaves, plants, crops and other materials

for agricultural purposes relies on determination of nitrogen, carbon, Total Organic Carbon (TOC) and sulfur to set agronomy management plans. Nitrogen, carbon and TOC determinations give also information on the deficiency or excess of nutritional elements in soils and plants. Sulfur determination is critical as the lack of sulfur in vegetables effects their growth and the quality of proteins.

2. Food and animal feed

are made up of chemical compounds that determine flavor, color, texture and nutritional value that is regularly analyzed by manufacturers to comply with official regulations. Determination of protein content, through the determination of nitrogen content, in food and animal feed is one of the tests in Official Methods for processed and raw products. Official regulations establish the protein content and labeling requirements of the nutritional features, which enable consumers to perform price and quality comparisons based on % protein declarations.

3. Production of compost

is one of the most efficient ways of recycling waste. Due to the heterogeneity of the material used, accurate control of parameters such as nitrogen, carbon, TOC and sulfur content in the recycled waste is a key factor to ensure the quality of the final product that can be used as fertilizers in agronomy. However, agricultural practices have influence on the environment and potentially on consumer safety, creating the demand for the characterization of environmental samples, including determination of nitrogen, carbon and sulfur in fertilizers and in agricultural water resulting from the use of fertilizer.

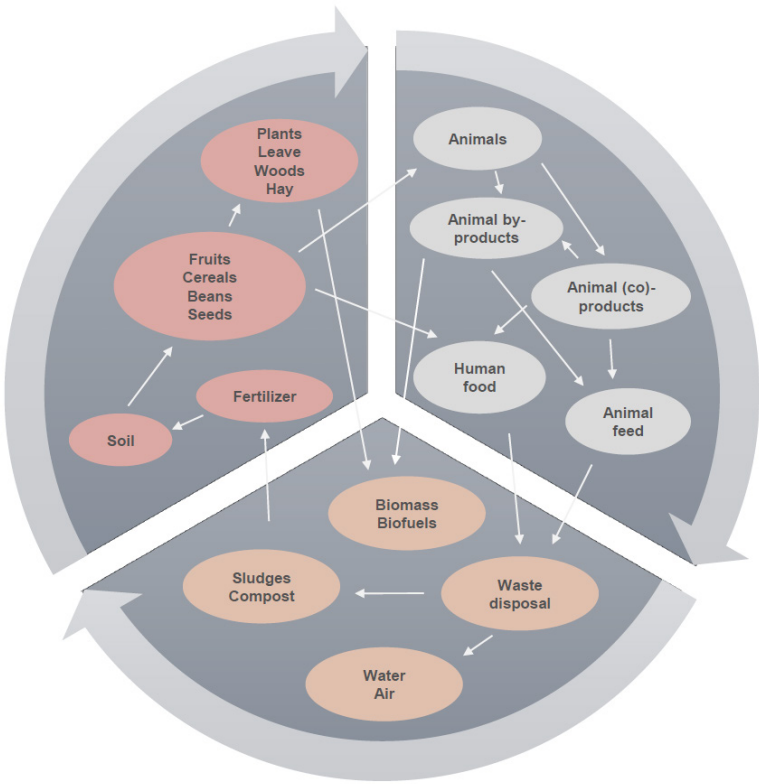

Figure 1. The food cycle schematics

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How is Flash*Smart* EA used for elemental analysis in food cycle?

Table 1 gives an overview of different materials and applications that can be addressed with our extensive portfolio of Flash*Smart* EA configurations.

Application/Sample matrix	Analysis type	Flash*Smart* EA Configuration	Flash*Smart* EA Benefits
Human food Animal feed Raw and final products Co-Products By-Products	N/Protein Sulfur	N/Protein N Brew	• Solids, viscous, liquid and gas samples • From 1 to 5 elements in one EA • High Automatism, Productivity & Modularity • Reduced Helium and Oxygen consumption • Comparable with Kjeldahl Method • Rapid TOC analysis (5 min) • C/N Ratio • Automatic Heat Values and CO_2 E.T in compost, sludges, biomass, biofuels • Fast NC det. in wastewater
Plants, Leaves Vegetal Extracts of soils and plants Fertilizers (organic, inorganic, solids, liquids)	NC NCS TOC Trace sulfur	NC Soil NCS Kit for TOC FPD detector Liquid autosampler	
Sludges Compost Biomass, biofuels Water Particulate matter in water and air	NC CHNS/O TOC Trace sulfur Analysis of filters	NC Soil CHNS/O Kit for TOC Liquid autosampler FPD detector MVC Module	

Table 1. Thermo Scientific Flash*Smart* EA application

The globalization of the food and feed market, and the associated production and recycling processes, demand accurate and reliable control of products characteristic for the protection of commercial value, but mainly to safeguard consumer health and manufacturer reputation. The Thermo Scientific Flash*Smart* EA offers a field proven solution for quantitative elemental determinations of variety of materials associated with the food cycle. The elemental analysis is performed based on the combustion (Dumas) method, allowing easy, fast, cost-effective and environmentally friendly way to analyze your samples. The Dumas method is approved by AACC, AOAC, AOCS, ASBC, IDF, IFFO and ISO.

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

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