SmartNotes

How Can the Oxygen Injection be Optimized in the Thermo Scientific Flash*Smart* Elemental Analyzer?

The Thermo Scientific™ Flash*Smart*™ Elemental Analyzer (Figure 1) operates with the dynamic flash combustion (modified Dumas method) of the sample for CHNS determination. Samples are weighed in tin containers and introduced into the combustion reactor at high temperature from the Thermo Scientific™ MAS *Plus* Autosampler with the proper amount of oxygen. Due to the exothermic reaction, the temperature in the reaction zone reaches about 1800 °C for few seconds assuring the complete combustion of every type of sample matrix. The produced gases are carried by a helium flow over a gas chromatographic column that provides the separation of the gases, before detection by a thermal conductivity detector (TCD).

The Thermo Scientific™ Eager*Smart*™ Data Handling Software controls all analytical parameters of the instrument including the oxygen flow and the timing of oxygen injection. Eager*Smart* Software calculates automatically the amount of oxygen, relative to the sample type and sample weight, through the dedicated Thermo Scientific™ OxyTune® Function ensuring the complete combustion of the sample. Through this optimization also decreases the cost per analysis by not wasting oxygen or consuming the copper unnecessarily.

Thermo Scientific Flash*Smart*: THE Elemental Analyzer

Figure 1. Thermo Scientific Flash*Smart* Elemental Analyzer

ThermoFisher SCIENTIFIC

thermo scientific

For **CHNS**, **CHN**, and **NCS** configurations, the oxygen flows and the oxygen injection time can be defined according to the sample matrix and sample weight.

Figure 1 shows the conditions for 2 – 3 mg of coke sample while Figure 2 shows the conditions for 10 – 20 mg of soil sample.

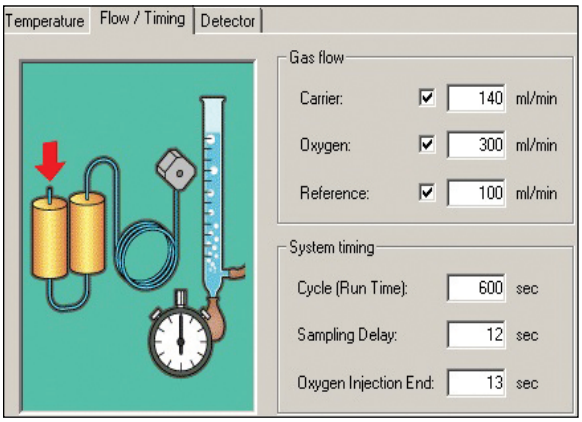

Figure 1. Oxygen parameters for coke analysis.

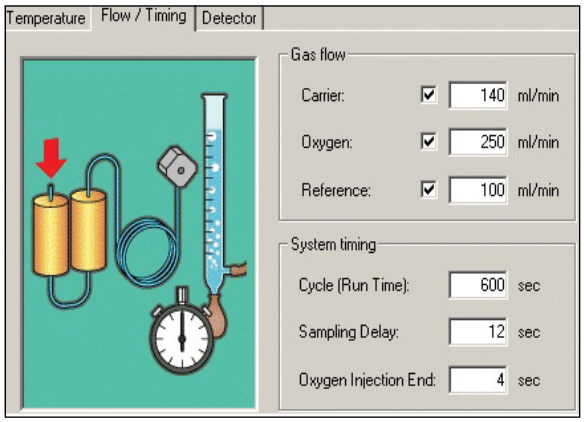

Figure 2. Oxygen parameters for soil analysis.

For **NC** and **N/Protein** configuration, the Oxygen flow is 300 ml/min and the OxyTune® Function dose the quantity of oxygen (automated Oxygen Injection Time) required for the best sample combustion, considering the category to which the product belongs (for example: Cheese/*Category A*, Cereals/*Category B*, Soil/*Category C*, and so on), and the weight of the sample to be analyze. Figure 3 shows the OxyTune pages of the analysis of 300 mg of milk powder (Category A), cereals (Category B), soil (Category C) and beer (Category D). The seconds of oxygen injection are visualized on top of the table, in the examples given corresponding to 78, 66, 30 and 12 seconds of oxygen will be injected respectively for complete combustion.

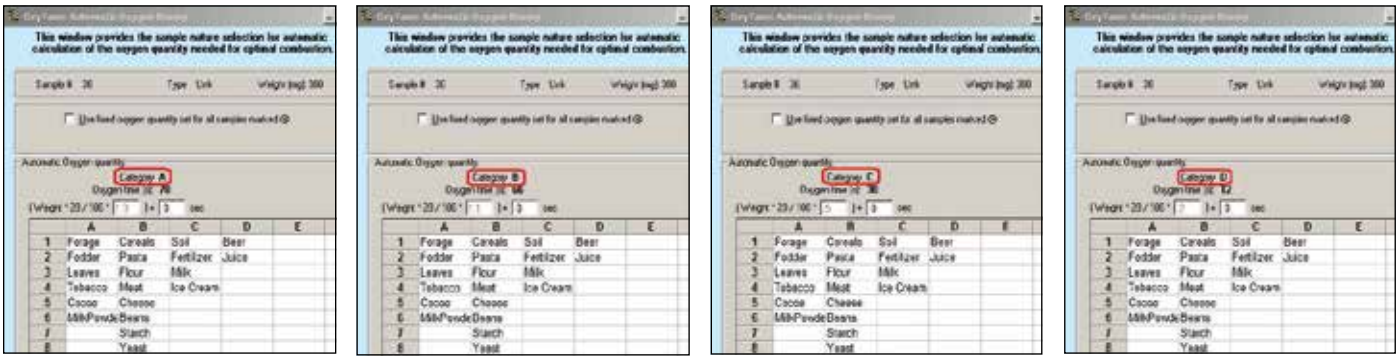

Figure 3. OxyTune pages of the different categories.

Summary

The *smart* optimization of the amount of oxygen needed for proper combustion by the Eager*Smart* Data Handling Software provides complete combustion of any matrix (solid, liquid, viscous and gas, organic and inorganic) at any sample weight is achieved. The oxygen is introduced only for the time required to provide a sound “FLASH” combustion, which also increases the lifetime of the catalysts, reducing the maintenance of the analyzer and the overall cost of analysis.

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

ThermoFisher SCIENTIFIC