CHNS Elemental analysis

MANUFACTURER : Carlo-Erba (Isomass)
MODEL : EA1108

Analysis

- Elemental analyser for the determination of total carbon, hydrogen, nitrogen, and sulphur (C, H, N, S) in a compound using the '***dynamic flash combustion***' technique:
    - complete and instantaneous oxidation of the sample and its conversion into combustion products
    - reduction of the combustion gases when passed through a reduction furnace
    - separation by gas chromatography (helium carrier gas)
    - detection by a thermal conductivity detector (TCD) giving an output signal proportional with the concentration of the components
    - calibration of the instrument is performed using certified standards and 'quality control' samples are run for validation of the results

- Detection limits for the analyses:
    - 0.3 % for C, H, N
    - 1.0 % for S

- Types of samples:
    - solids and liquids
    - organic and inorganic: organic chemicals, pharmaceuticals, fuels, graphite, metal powders, polymers, rubber, soils and sediments, ceramics, carbon fibers, etc.

- Quantities of sample required: 2 mg per one analysis (duplicate analyses are always performed) – a minimum of 8-10 mg are necessary for accurately performing the weighing manipulations.

- A submission form indicating the approximate chemical composition and the theoretical percentages of each element in the sample has to be completed (one for each sample) – the information is needed for the technicians to be able to determine the appropriate methods and procedures of analysis.

Application

- Accurate determination of elemental composition (carbon, hydrogen, nitrogen, and sulphur (C/H/N/S)) in a wide variety of compounds.

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Example

Sample Name	% Nitrogen	% Carbon	% Hydrogen	% Sulphur
Sample1-1	6.56	47.30	2.88	7.18
Sample1-2	6.72	47.36	2.84	7.09
	% Nitrogen	% Carbon	% Hydrogen	% Sulphur
Experimental values (average)	6.64	47.33	2.86	7.14
Theoretical values	6.78	47.50	2.93	7.57

- The results for the two analyses of the same sample not being concordant could indicate: presence of impurities, heterogeneity, decomposition, other. The concordance criteria are the following:
    - % of each element – C, H, N (accepted difference)
        - 5.00 – 9.99 (± 0.15)
        - 10.0 – 24.9 (± 0.25)
        - 25.0 – 90.0 (± 0.30)
    - % of each element – S (accepted difference)
        - < 25.0 (± 1.00)

- It should be noted that the results of the analyses will reflect the amount and the nature of various contaminants present in the sample (e. g., moisture, solvent, dust). Therefore the composition determined experimentally might not correspond to the theoretical values. Thus, it is very important for the samples to be dry, homogeneous and free of impurities.