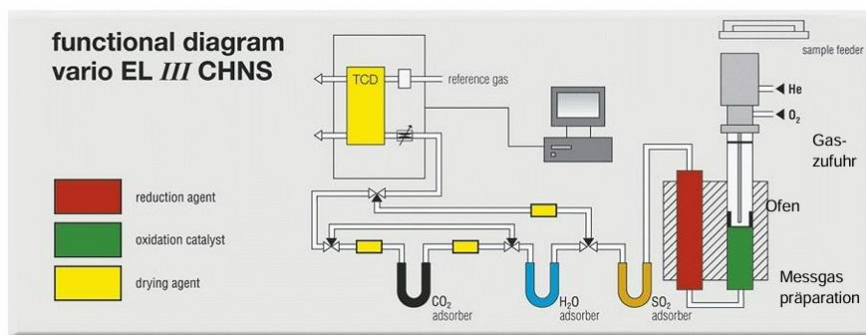


Elemental Analysis



Elements	Disturbing Elements	Required amount	Instrument	Responsible person
C H N S	F B Hg Os As U Sb Si	10-15 mg	Elementar Vario EL III	Ms. Vonhoff/ Ms. Pham
C H N S	F B Hg Os As U Sb Si	10-15 mg	Elementar Vario Micro Cube	Ms. Vonhoff/ Ms. Pham

Sample preparation and drop-off:

The submitted samples should be dry and ground to powder. Any moisture or solvent or inhomogeneity can bias the results, e.g. larger crystals can contain solvent, entrapped air biases the N results, moisture biases the H result, plus the weight percentages of the other elements.

Samples should be well labeled and submitted in closed vials/vessels/containers, ideally of glass. The sample label should be legible and identical to the one in the submission form. The minimum amount of sample required is 10 mg for solid samples (for duplicates) and 15 mg for oily or liquid samples (triplicates). Please consider that for weighing 5 mg per single measurement, a slightly larger amount should be submitted, if the substance sticks to the submission container and therefore cannot be taken out completely.

Hardly burning samples (e.g. lignin) should be indicated. They require another sample preparation e.g. additional oxidants like WO_3 .

Damaging and problematic substances:

Samples containing fluorine can in principle be measured, but there is a higher error expected. Fluorine content can lead to the formation of HF, which slowly destroys the quartz tubes of the combustion and reduction chamber. Samples with boron and silicium can also lead, similar to fluorine, to erroneous results. Samples containing such elements will be measured using quartz tubes that are close to the end of their service life and due for replacement.

Phosphorous is damaging the quartz tubes due to the formation of glassy $(\text{P}_2\text{O}_5)_x(\text{H}_2\text{O})_y\text{C}$, which can also influence the gas flow and thus accuracy of the results.

Samples containing Hg; As; U; Sb; Os cannot be measured. They would contaminate the instrumentation and would lead to severe damage in addition to their toxicity.

Principle of elemental analysis:

The elements C, H, N and S are oxidized and/or pyrolyzed in a stream of oxygen at 1150 °C in the CHNS modus or at 950°C in the CHN modus leading to a mixture of N_2 , NO_x , CO_2 , H_2O and SO_2 . Subsequently the nitrogen oxides are reduced to N_2 in the reduction chamber. The gases are separated with gas chromatography together with a specific temperature-controlled desorption technique. Finally the gases SO_2 , CO_2 , H_2O and N_2 are quantified with the thermal conductivity detector. The coupled software calculates from the gas quantities the percentages of the elements.