

## *Determination of carbon and sulfur in permanent magnets*

Permanent magnets play an important role for electric cars or renewable energies like wind power. Iron, cobalt or nickel based special alloys are used in loudspeakers, electric generators, electric motors or other electrical applications. The carbon and sulfur concentrations are crucial for the magnetic and mechanical properties. Whereas functionality is tailored by carbon concentration, sulfur atoms are mostly impurities.

Combustion analysis of these special alloys requires an individual optimization of furnace parameters and accelerators. Due to their magnetic properties, these materials interact strongly with the electromagnetic field, which results in an abrupt increase in temperature. This could result in bad spatter behavior for conventional crucibles, which is avoided by the innovative geometry of Elementar's cups, resulting in a longer lifetime of the combustion tube, as well as minimizing cleaning and maintenance work.

The carbon and sulfur content of three alloys used for the production of permanent magnets were analyzed. Each sample was analyzed four times. The sample masses were varied between 250 and 600 mg. For CoSm EXACC WS (2 g) was used as accelerator whereas EXACC WS (2 g) and EXACC FE (0.5 g) were applied for NdFeB.

MATERIAL	C [ppm]	SD	S [ppm]	SD
CoSm	155	4	< 1	n.a.
NdFeB	417	7	17	2

The inductar® CS cube shows a low limit of detection and high precision for carbon and sulfur analysis. As functionality of these special alloys is altered by changing carbon and sulfur concentrations, elemental analysis is important to assure the product quality.

The inductar CS cube is simple to operate and easy to service, which makes this instrument ideal for quality assurance.

### INSTRUMENT:

inductar® CS cube

### DETAILS:

carrier gas: oxygen

sample: 250 – 600 mg metallic pieces



### STANDARD:

ASTM E1019

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