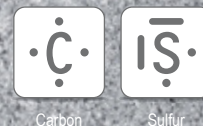


C,S determination in inconel powder



Suitable analyzers

- ELEMENTRAC CS-*i*

Used accessories

- Ceramic crucibles (90149)
- Tungsten accelerator (90220)
- Suitable calibration material (NIST or other)



Application Settings

I) General

Sample type:	Advanced
Standby flow:	180 l/h
Lance Purging:	off
Purging while closing:	off
Open Furnace:	yes
Furnace purge through:	Exhaust
Furnace purge time:	3 sec
Furnace purge flow:	180 l/h

Stabilizing

Stabilize by time:	on
Setting time:	25 sec

II) Analysis

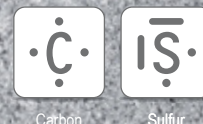
Voltage:	100 %
Power duration:	180 sec
Flow:	180 l/h
Chamber only:	0 sec
Lance and chamber:	0 sec
Drift compensation:	on

Channel	Max time [sec]	Min time [sec]	Integration delay [sec]	Comparator factor [%]
Low C	90	25	6	0.1
Low S	90	25	6	0.1

III) Postwaiting

Postwaiting time:	10 sec
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C,S determination in inconel powder



Sample preparation

Make sure that your sample is free from contaminations and inclusions which could influence the carbon determination. Pre-heat the crucibles at least for 1 h at 1000 °C. Let the crucibles cool down in a desiccator.

Procedure

- Prepare ELTRA analyzer (e.g. exchange anhydron, sodium hydroxide, platin catalyst if necessary); clean the combustion tube, brush, heat shield, dust trap
- Run three warm up samples (e.g. steel samples (92400-3050) with a minimum weight of 500 mg; add 1.7 g tungsten)
- Calibrate the analyzer with suitable calibration material (NIST or other)

The procedure of analysis inconel powder should be like this:

- (1) Weigh in approx. 500 mg into the crucible
- (2) Add 1.7 g of tungsten accelerator (90220)
- (3) Place the crucible on the pedestal and start analysis

Repeat steps (1) – (3) at least three times;

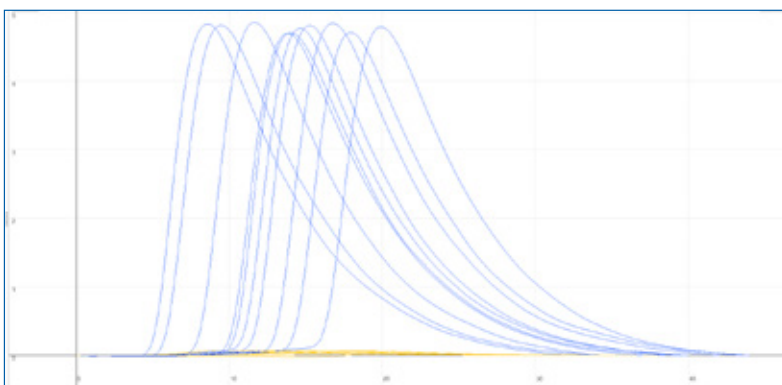
Mark the results and use the calibration function in the software.

-> Now start with the actual analysis.

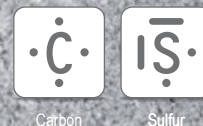


Typical results *1		
AR 943 Lot 719 G		
Weight (mg)	Carbon (ppm)	Sulfur (ppm)
750.1	321	12.3
755.0	324	19.0
778.9	317	16.2
767.6	321	16.4
794.1	322	17.3
763.8	318	15.1
753.8	315	16.7
761.1	326	17.8
752.6	318	15.0
764.9.	315	16.5
Average values		
	320	16.2
Deviation / Relative deviation (%)		
	3.5 (1.1%)	1.9 (11.9%)

1) certified values C: 320 +-30 ppm ; S: 16 +-4 ppm



C,S determination in inconel powder



Inconel 718 contains about 50 % of Nickel and in addition 17-20 % of chromium and about 3 % of molybdenum. Due to the high content of refractories the combustion process is challenging.

As the carbon peaks show the start of combustion and release of the embedded carbon and sulfur sometimes is late. The given measuring date illustrates that this does not affect the repeatability

The speed of combustion could be improved by using other accelerators (e.g. 2 g of Eltracell (tungsten/tin) or 1.7 g of tungsten and 0.7 g of high purity iron accelerator). However, the repeatability is getting worse when other accelerator or combinations are used instead of pure tungsten.

It is also possible to reduce the sample weight (e.g. 250 mg) to provide a slightly more homogenous combustion. Lower sample weights in general create a slightly higher deviation, because inhomogeneity of the sample show a higher impact. Neither the less the measured values are within the specified deviation:



Typical results ^{*1}		
AR 943 Lot 719 G		
Weight (mg)	Carbon (ppm)	Sulfur (ppm)
254	321	18.3
281	320	16.4
265	318	11.6
258	313	18.2
251	319	16.9
267	315	13.9
262	306	18.3
255	317	16.6
257	329	17.2
254	340	15.6
Average values		
	320	16.3
Deviation / Relative deviation (%)		
	9.2 (2.9%)	2.1 (13.1%)

1) certified values C: 320 ±30 ppm ; S: 16 ±4 ppm

