

This reference material was certified by the consensus of a network of expert laboratories using different methodologies, and can be used for calibration, assessment of precision and trueness and, to demonstrate traceability of results in chemical analysis by classical and instrumental methods.

This material is presented in the form of chips, with particle sizes between 0,50 mm and 0,85 mm (sieves 35 mesh and 20 mesh).

Properties	Certified Values	Expanded Uncertainties	Unit
C (total)	3,34	0,01	%
Si	2,07	0,03	
Mn	0,715	0,004	
Cu	0,473	0,006	
Cr	0,353	0,004	
Ni	0,272	0,003	
P	0,267	0,002	
Ti	0,019	0,003	
S	0,018	0,001	
Mo	0,004	0,001	
C (graphitic)	2,50	0,01	%

Lot Number: 01

Valid until : 01/2030

The certified values and uncertainties are assured by the validity period, considering that the material is handled and stored in accordance with the given instructions, except in case of damage or contamination. IPT will monitor periodically the properties of this reference material during its validity period, and any observed significant change will be reported to the user.

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## Uncertainties

The expanded uncertainties of the certified values were estimated by the combination, according to ISO Guide 35:2006, of uncertainties of characterization, obtained experimentally from the interlaboratory certification program data, and where relevant, with contributions of stability of material, both estimated at IPT. The coverage factor used is approximately 2, providing a confidence level of 95%.

## Traceability

The certified values of the properties of this material were obtained by means of measurements performed at IPT and by a network of collaborating laboratories, using one or more methods for each property studied. These methods were verified using reference materials with certified values and standards with values traceable to the International System of Units (SI) through NIST and other qualified producers. The measuring instruments were calibrated with standards traceable to SI through Inmetro and the Brazilian Calibration Network (RBC).

## Mass of samples

The mass of sample required for the proper realization of the determinations depends on the particular methodology, levels of analytes, and other factors. It is recommended using the masses established in the most current editions of recognized standard methods. However, to guarantee the validity of all the certified values stated herein and their respective uncertainties, should not be employed samples with masses less than 100 mg. This limit was estimated from the sample masses used in the study of homogeneity of this material.

## Handling and storage

Handling: The withdrawal of samples of this material must be accomplished in appropriate environment with clean accessories. Never return material to the bottle. Keep the material in its original bottle, tightly closed. Storage: This material should be stored in a clean place, at room temperature. The ideal relative humidity for storage is under 60% RH.

## Technical Notes

None.

## Additional Information

The preparation and certification of this reference material were coordinated by Tsai Soi Mui Lee and Sylvania Lourdes Moro. This Certificate replaces CRM IPT nº 1871-103

## Collaborating Laboratories

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## Methodologies Employed in the Certification of CRM IPT 69

C (graphitic)	Direct combustion (infrared) Combustion (gas - volumetry)
C (total)	Direct combustion (infrared) Combustion (gas - volumetry)
Cr	UV-Visible spectrophotometry (perchloric acid) Atomic Absorption Spectrometry Titrimetry (ferrous ammonium - permanganate)
Cu	UV-Visible spectrophotometry (diethyldithiocarbamate) Gravimetry (electrolysis) Titrimetry (iodometry - thiosulfate) Atomic Absorption Spectrometry
Mn	Atomic Absorption Spectrometry Titrimetry (sodium hydroxide - Acidimetry) UV-Visible spectrophotometry (persulfate)
Mo	UV-Visible spectrophotometry (thiocyanate - tin (II) chloride - butyl acetate) Atomic Absorption Spectrometry
Ni	Gravimetry (dimethylglyoxime) UV-Visible spectrophotometry (dimethylglyoxime) Atomic Absorption Spectrometry
P	UV-Visible spectrophotometry (molybdenum blue) Titrimetry (sodium hydroxide - Acidimetry)
S	Direct combustion (infrared) Combustion / Titrimetry (iodide-iodate) Combustion / Titrimetry (hydrogen peroxide-sodium hydroxide)
Si	Gravimetry (dehydration with sulfuric acid) Gravimetry (dehydration with perchloric acid)
Ti	UV-Visible spectrophotometry (hydrogen peroxide) UV-Visible spectrophotometry (chromotropic acid)

The latest version of the Certificates of IPT Reference Materials are available for download at: [www.ipt.br/nmr.htm](http://www.ipt.br/nmr.htm)

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