

IPT 122

Limestone, dolomitic (Votorantim, Brazil)

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 a dolomitic limestone presented in the form of powder, having particle sizes smaller than 75 µm (passed sieve 200 mesh). The results refer to the material dried at 110°C.

Properties	Certified Values	Expanded Uncertainties	Unit
CaO	32	0,5	%
MgO	17,5	0,2	%
SiO ₂	4,3	0,2	%
Al ₂ O ₃	1,24	0,06	%
Fe ₂ O ₃	0,65	0,02	%
K ₂ O	0,43	0,04	%
TiO ₂	0,06	0,01	%
P ₂ O ₅	0,048	0,007	%
MnO	0,042	0,003	%
Na ₂ O	0,019	0,005	%
SrO	0,018	0,004	%
Loss on Ignition (1000°C)	43,3	0,3	%

Lot Number: 01

Valid until : 11/2030

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.

Sao Paulo, 06/2020

Center for Chemistry and Manufactured Goods
Metrological References Laboratory

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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, with contributions of homogeneity 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, dry place, at room temperature.

Technical Notes

None.

Additional Information

The raw material for the preparation of this reference material was provided by Indústria Mineradora Pagliato Ltda – Votorantim, SP. The preparation of this reference material was coordinated by Celia Omine Iamashita and the certification programme was coordinated by João Marcos de Almeida Bispo.

This Certificate replaces CRM IPT nº 1757-103

Collaborating Laboratories

BUNGE FERTILIZANTES S.A. – Cajati, SP
Bianca Zanella Ramponi, Nauro Lourenço Domingues, Carmen Lúcia Galera.

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Edson Gonçalves Moreira, Mitiko Saiki, Edson Rodrigues Alves, Marina Beatriz Agostini Vasconcellos.

INSTITUTO DE PESQUISAS TECNOLÓGICAS DO ESTADO DE SÃO PAULO S.A. – IPT – São Paulo, SP
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INSTITUTO DE TECNOLOGIA MINERA – SEGEMAR – Argentina
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SAINTGOBAIN CERÂMICAS & PLÁSTICOS LTDA. – Vinhedo, SP
Avelar Francisco Teixeira, Sabrina Matheus.

SAINTGOBAIN VIDROS S.A. – São Paulo, SP
Luiz Roberto Frozza, Marcos Henrique Gibim, Nelson Gomes de Carvalho.

Methodologies Employed in the Certification of CRM IPT 122

Al ₂ O ₃	Optical Emission Spectrometry (inductively coupled plasma) Gravimetry (precipitation with ammonium hydroxide) X-Ray Fluorescence Spectrometry Atomic Absorption Spectrometry
CaO	Titrimetry (oxalate-permanganate) Titrimetry (EDTA complexometry) X-Ray Fluorescence Spectrometry
Fe ₂ O ₃	Atomic Absorption Spectrometry UV-Visible spectrophotometry (ortho-phenanthroline) Instrumental Neutron Activation Analysis X-Ray Fluorescence Spectrometry
K ₂ O	Atomic Absorption Spectrometry X-Ray Fluorescence Spectrometry Flame photometry
MgO	Titrimetry (EDTA complexometry) X-Ray Fluorescence Spectrometry Atomic Absorption Spectrometry Gravimetry (magnesium pyrophosphate)
MnO	Atomic Absorption Spectrometry X-Ray Fluorescence Spectrometry Instrumental Neutron Activation Analysis UV-Visible spectrophotometry (potassium periodate) Optical Emission Spectrometry (inductively coupled plasma)
Na ₂ O	Flame photometry Atomic Absorption Spectrometry
P ₂ O ₅	UV-Visible spectrophotometry (molybdenum blue) Optical Emission Spectrometry (inductively coupled plasma) UV-Visible spectrophotometry (fosfovanadomolibdate) X-Ray Fluorescence Spectrometry
Loss on Ignition (1000°C)	Gravimetry (Calcination at 1000 ° C)
SiO ₂	Gravimetry (insolubilization with polyethylene oxide resin) Gravimetry (dehydration with perchloric acid) Atomic Absorption Spectrometry X-Ray Fluorescence Spectrometry Gravimetry (insolubility in hydrochloric acid and dehydration to 110 ° C)
SrO	X-Ray Fluorescence Spectrometry Instrumental Neutron Activation Analysis Atomic Absorption Spectrometry
TiO ₂	UV-Visible spectrophotometry (hydrogen peroxide) X-Ray Fluorescence Spectrometry UV-Visible spectrophotometry (tiron) Atomic Absorption Spectrometry Optical Emission Spectrometry (inductively coupled plasma)

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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