



Certificate of Analysis 0941

Date: 06-14-2022

Version: 01

CRM ITAK-221

Certified Reference Material – Nickel Laterite Ore

Table 1 – ITAK-221 – Certified Values

Element/Unit	Certified Value ^[1]	s ^[2]	s _r ^[3]	s _L ^[4]	U ^[5]
Fe (%) ^{a, b}	13.75	0.23	0.13	0.19	± 0.063
Al ₂ O ₃ (%) ^{a, b}	4.754	0.089	0.048	0.075	± 0.025
SiO ₂ (%) ^{a, b}	49.29	0.66	0.37	0.54	± 0.17
Ni (%) ^{a, b}	4.063	0.096	0.034	0.090	± 0.029
Co (%) ^{a, b}	0.0626	0.0019	0.00082	0.0017	± 0.00061
Cr ₂ O ₃ (%) ^{a, b}	1.797	0.029	0.015	0.025	± 0.0082
Cu (%) ^{a, c}	0.380	0.026	0.0053	0.025	± 0.0091
MnO (%) ^{a, b}	0.489	0.012	0.0041	0.012	± 0.0039
TiO ₂ (%) ^{a, b}	0.1669	0.0083	0.0045	0.0070	± 0.0033
CaO (%) ^{a, b}	0.613	0.020	0.0075	0.018	± 0.0056
MgO (%) ^{a, b}	7.56	0.15	0.074	0.13	± 0.041
^[6] LOI (%) ^d	8.26	0.37	0.091	0.35	± 0.13

^[1] The Certified Value was calculated according to ISO Guide 35 and ISO 5725-2.

^[2] The standard deviation for proficiency assessment was calculated according to ISO 13528 and 5725-2. This standard deviation can be used for control charts for individual analysis ($n=1$).

^[3] The within-laboratory standard deviation was calculated according to ISO 5725-2.

^[4] The between-laboratory standard deviation was calculated according to ISO 5725-2.

^[5] The extended standard uncertainty of the mean ($\alpha=5\%$) was calculated according to ISO Guide 35.

^[6] Loss On Ignition.

Note: The letters in front of the elements are codes for Analytical Methods used.

Table 2 – ITAK-221 – Informative Values

Element/Unit	Reference Value ^[7]
Zn (%) ^{a, b}	0.098

^[7] These values are informative. They were calculated according to ISO Guide 35 and ISO 5725-2 from fifteen results from a varying number of laboratories.

DESCRIPTION

ITAK-221 was prepared from a sample of Nickel Laterite Ore donated by a Nickel Mining Company from Midwest of Brazil in 2012.

This Certified Reference Material (CRM) is presented as a fine powder.

INTENDED USE AND INSTRUCTIONS

ITAK-221 provides an important control in analytical data from exploration and can be used as a tool for grade control in routine mining and laboratory operations.

This Certified Reference Material can be used for calibration of analytical equipment, assess and develop new methods, validation of analytical methods, and arbitration – proficiency testing for example.

The bottles/sachets content should be thoroughly mixed before taking samples of ITAK-221.

The Certified Reference Material should be used without pre-treatment. ITAK is not responsible for any changes occurring after opening said bottles/sachets.

The Certified Reference Material should be stored in a dry place and without contact with excessive heat or moisture.

CERTIFICATION AND STATISTICAL EVALUATION OF ANALYTICAL DATA

ITAK-221 was analyzed by fourteen specialized laboratories. The statistical evaluation was carried out according to ISO GUIDE 35 and ISO 5725-2, using: identification and treatment of outliers, stragglers and technically invalid data, certified value calculation, standard deviation calculation, and extended standard uncertainty calculation.

The Technical Report: RT-037/2022 STD contains full details of all phases of manufacturing, certifying results, participating laboratories, and the statistical evaluation.

Note: This report is available on the ITAK database for CRM users.

ANALYTICAL METHODS

The methods used on the certification of CRM ITAK-221 are mentioned as follows:

- **a:** Fusion method and determination by X-Ray Fluorescence.
- **b:** Fusion method and determination by Atomic Emission Spectrometry (ICP-OES).
- **c:** Aqua Regia Digestion method and determination by Atomic Absorption Spectrometry (AAS).
- **d:** Gravimetric method.

PERIOD OF VALIDITY

This CRM certification is valid until: **June 14, 2032.**

CERTIFICATE REPRODUCTION

This certificate must not be modified and may only be reproduced in its entirety and without change.



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