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CERTIFICATE OF ANALYSIS

IMŻ 3.40

REFERENCE MATERIAL OF TITANO-MAGNETITE IRON ORE

Analysis listed as percent by weight [% m/m]

Fe	61.45	**Mn**	0.15
SiO_2	4.20	**Na_2O**	0.066
Al_2O_3	2.37	**FeO**	3.40
MgO	2.43	**K_2O**	(0.020)
CaO	1.22	**P**	(0.002)
TiO_2	2.45	**Cr**	(0.068)
V	0.30		

Values in brackets are informative

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Analysis	Fe	SiO_2	Al_2O_3	MgO	CaO	TiO_2	V	Mn
1	61.31	4.10	2.26	2.28	1.18	2.40	0.284	0.130
2	61.31	4.12	2.28	2.34	1.18	2.40	0.300	0.150
3	61.37	4.12	2.28	2.36	1.19	2.44	0.300	0.150
4	61.38	4.16	2.31	2.40	1.20	2.47	0.308	0.154
5	61.42	4.16	2.31	2.42	1.21	2.47	0.301	0.160
6	61.47	4.19	2.35	2.42	1.21	2.51	0.310	0.160
7	61.47	4.23	2.38	2.46	1.22	2.48	0.303	0.160
8	61.50	4.50	2.42	2.50	1.25	2.41		0.154
9	61.81		2.43	2.51	1.25	2.46		0.153
10			2.50	2.64	1.34			
11			2.58					
Average	61.449	4.198	2.373	2.433	1.223	2.449	0.3009	0.1523
Std. Dev.	0.152	0.129	0.101	0.102	0.048	0.039	0.0084	0.0093
Certified	**61.45**	**4.20**	**2.37**	**2.43**	**1.22**	**2.45**	**0.30**	**0.15**
C(95%)	0.12	0.113	0.071	0.075	0.036	0.031	0.008	0.007

Analizy	K_2O	P	Na_2O	FeO	Cr
1	0.0118	0.0015	0.0630	3.23	0.0666
2	0.0120	0.0017	0.0645	3.24	0.0685
3	0.0143	0.0017	0.0645	3.33	0.0688
4	0.0218	0.0023	0.0678	3.33	
5	0.0288		0.0686	3.41	
6	0.0297			3.61	
7				3.62	
8					
Average	(0.020)*	(0.002)*	0.0657	3.397	(0.068)*
Std. Dev.			0.0024	0.161	
Certified			**0.066**	**3.40**	
C(95%)			0.003	0.156	

* - informative value

C(95%) = (t · sd)/$\sqrt{n-1}$ - The half-width confidence interval, calculated for the 95 % confidence level, where t is the appropriate Student's t value, sd is the interlaboratory standard deviation and n is the number of acceptable mean values. For further information regarding the confidence interval for the certified value see ISO Guide 35:1989 section 4.

Certification Process: Both preparation of this reference material and certification process were prepared according to requirements of ISO Guide 31, ISO Guide 34 and ISO Guide 35. This reference material is in agreement with ISO Guide 30.

Chemical Analysis: Chemical analyses were carried out on dried at 105^{O}C powder samples. Single values in the above table are the means obtained by individual laboratories. The following methods were used for analysis:

Fe - titrimetric, XRF;
FeO - titrimetric;
SiO_2 - gravimetric, ICP-AES, XRF;
CaO - flame AAS, ICP-AES, XRF;
Mn - flame AAS, ICP-AES, XRF;
Al_2O_3 - flame AAS, ICP-AES, XRF;
TiO_2 - spectrophotometric, ICP-AES, XRF;
MgO - flame AAS, ICP-AES. XRF;
P - spectrophotometric as molybdenum blue, titrimetric;
K_2O - flame AAS, ICP-AES;
Na_2O - flame AAS, ICP-AES;
V - flame AAS, ICP-AES;
Cr - flame AAS, ICP-AES, XRF.

The laboratories participating in the testing of this Reference Material:

Instytut Metalurgii Żelaza, Gliwice, Poland
ArcelorMittal Steel, Kraków, Poland
ArcelorMittal, Ostrava, Czech Republic
Vitkowice Testing Center, Ostrava, Czech Republic
ISD Huta Częstochowa, Częstochowa, Poland
Zakład Badań Ochrony Środowiska, Dąbrowa Górnicza, Poland

Homogeneity: The homogeneity of this Reference Material was evaluated with the use of X-ray fluorescence spectrometry and found acceptable.

Traceability: This Reference Material was tested with the use of UV-Vis spectrometry, AAS, ICP-AES and C,S-analyzers and was found compatible to the following CRMs: NBS 690, BCS301/1, BCS 377, JK 28, JSS 63.

Origin of the material: Russia

Available form: 100g of powder sample, grain size less than 0.1 mm

Intended use: This Reference Material is intended for use in determination of chemical composition of iron ores by x-ray fluorescence spectrometry, UV-Vis spectrometry, AAS, ICP-AES and C,S-analyzers and other wet methods. Chemical analyses should be carried out on samples dried at 105^{O}C.

Validity of certification: The certification of IMZ3.40 is valid for 15 years - until May 2035, within the uncertainty specified provided this Reference Material is stored in accordance with the instructions given in this certificate (see Storage). The certification is nullified if this Reference Material is damaged, contaminated or otherwise modified.

Revision: This Reference Material was certified originally in November 2009. Additional tests were performed to prove that the material remains unchanged.

Storage: This Reference Material should be stored in dry place and in environment free from chemical or other aggressive vapours and should be protected against vibration. If the contents become changed (for example oxidized) because of contamination, the whole contents of bottle should be discarded.

Safety: This Reference Material and packing do not contain substances which can directly influence health. Radioactivity less than 0.12 Bq/g equivalent of 60Co

Inquiries regarding this Reference Material should be directed to:
rm@git.lukasiewicz.gov.pl

Approved by
Director of the Institute

Prof. Dr. Hab. Eng. Adam Zieliński

Certificate issue date: 26 June 2024

Certificate revision history:
26 June 2024 (editorial changes)
30th April 2020 (change of information regarding validity of certification, editorial changes; November 2009 (Original certificate date)