

Metal and Quality LLC
Certificate of Chemical Analysis
Certified Reference Material
RG36
Iron Ore



MEAN VALUES OF LABORATORIES (mass fraction in %)

	Fe	SiO ₂	FeO	Al ₂ O ₃	MgO	S	P	MnO	TiO ₂	Na ₂ O	K ₂ O	CaO	*IR
1	61.70	9.19	0.56	0.74	0.430	0.0056	0.0122	0.020	0.029	0.060	0.013	0.044	9.67
2	61.75	9.20	0.57	0.77	0.460	0.0065	0.0135	0.025	0.034	0.075	0.015	0.046	9.72
3	61.85	9.26	0.59	0.78	0.465	0.0065	0.0140	0.025	0.035	0.076	0.017	0.050	9.75
4	61.87	9.30	0.64	0.80	0.465	0.0066	0.0150	0.027	0.038	0.076	0.019	0.055	9.89
5	61.92	9.32	0.72	0.81	0.470	0.0067	0.0160	0.028	0.038	0.087	0.021	0.055	10.00
6	61.97	9.39	0.74	0.83	0.470	0.0070	0.0160	0.029	0.039	0.087		0.056	10.17
7	61.98	9.43	0.74	0.87	0.480	0.0075	0.0170	0.031	0.044	0.090			10.20
8	62.00	9.60	0.75	0.90	0.520	0.0080							10.22
9	62.07	9.61	0.76	0.93	0.540								
10	62.10	9.66		0.95									
11	62.15	9.74											
12	62.17												
13	62.24												
14	62.30												
M(M)	62.01	9.43	0.67	0.84	0.478	0.0068	0.0148	0.026	0.037	0.079	0.017	0.051	9.95
s(M)	0.18	0.19	0.09	0.07	0.033	0.0007	0.0017	0.003	0.005	0.010	0.003	0.005	0.23

M(M) - Mean of intralaboratory means

s(M) - Standard deviation of the intralaboratory means

***IR** - Insoluble Residue. Residue after dissolution of ore in concentrated hydrochloric acid when heated (DSTU GOST 23581.14:2008)

Additional information (one laboratory): loss on Ignition (LOI) at 900°C - 1.1%.

CERTIFIED VALUES (mass fraction in %)

	Fe	SiO ₂	FeO	Al ₂ O ₃	MgO	S	P	MnO	TiO ₂	Na ₂ O	K ₂ O	CaO	IR
M(M)	62.01	9.43	0.67	0.84	0.48	0.0068	0.015	0.026	0.037	0.079	0.017	0.051	10.0
C(95%)	0.10	0.13	0.06	0.05	0.03	0.0006	0.002	0.003	0.004	0.009	0.004	0.005	0.2

Uncertainty C(95%) estimated as the half-width confidence interval of Student's t-distribution, where "t" is the appropriate Student's t value and "n" is the number of acceptable mean values

$$C(95\%) = \frac{t \cdot s(M)}{\sqrt{n}}$$

SPECIFICATION The sample was made from the ore of the Kryvyi Rih basin of Ukraine in the form of an averaged powder sifted through a 100 micron sieve

HOMOGENEITY Samples were taken randomly from the entire batch of material and analyzed by X-ray spectroscopy on a Rigaku Simultix 15 analyzer. The obtained value of heterogeneity was insignificant and was not taken into account when assessing the uncertainty

STABILITY The CRM RG36 will remain stable provided that the bottle remains sealed and is stored in a cool and dry atmosphere. When the bottle is opened for analysis, the cap must be closed immediately after use

TRACEABILITY	The characterization of material has been achieved by means interlaboratory experiment in accordance to ISO Guide 35:2017. Each laboratory used standardized methods of analysis. Certified reference materials were used: ICRM R7/4, ICRM R28, ICRM R29, ICRM R36, ICRM R38, DSZU R004, JSS 850, NCS DC 18013, NCS DC 11017, IMZ PI 3.10, IMZ PI 3.11, IMZ PI 3.12, IMZ PI 3.13, IMZ PI 3.33
INTENDED USE	The CRM RG36 is intended for verification of analytical methods, calibration of analytical instruments in determining the composition of iron ore by wet chemical and X-ray spectral methods
DELIVERY	Supplied in glass bottles of 150 g
DATE OF ISSUE	September 2022
VALID	September 2037
SAFETY	CRM RG36 and packaging do not contain explosive and radioactive substances and substances that can harm human health and the environment
NOTE	<u>Before analysis, the sample must be dried for one hour at 105°C</u>

PARTICIPATING LABORATORIES

ArcelorMittal Kryvyi Rih, Ukraine
 Central GOK (Mining and Processing Plant), Ukraine
 Northern GOK (Mining and Processing Plant), Ukraine
 Poltava GOK (Mining and Processing Plant), Ukraine
 Southern GOK (Mining and Processing Plant), Ukraine
 Kryvyi Rih Iron Ore Plant, Ukraine
 Kamet-Steel, Ukraine
 Metal and Quality LLC, Ukraine
 Modern Certification and Inspection CCI, Ukraine
 Nikopol Ferroalloy Plant, Ukraine
 VÍTKOVICE TESTING, Czech Republic
 Zaporozhye Ferroalloy Plant, Ukraine
 Zaporizhstal Iron and Steel Works, Ukraine

THE METHODS USED

Fe - Dichromate Titration, XRF, ICP OES
 SiO₂ - Gravimetric with hydrochloric acid, XRF, ICP OES
 FeO - Dichromate Titration
 Al₂O₃ - Photometric, ICP OES
 MgO - ICP OES
 CaO - ICP OES
 S - Iodimetric Titration, Combustion Infrared
 P - Photometric, ICP OES, XRF
 MnO - ICP OES
 TiO₂ - Photometric with Diantiprylmethane, ICP OES
 Na₂O - Flame photometric, ICP OES, XRF
 K₂O - Flame photometric, ICP OES, XRF
 IR, LOI - Gravimetric

CONTACTS

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