

EUROPEAN COAL AND STEEL COMMUNITY
 COMMUNAUTÉ EUROPÉENNE DU CHARBON ET DE L'ACIER
 EUROPÄISCHE GEMEINSCHAFT FÜR KOHLE UND STAHL
 CERTIFIED REFERENCE MATERIAL
 CERTIFICATE OF CHEMICAL ANALYSIS

EURONORM - CRM No. 683-1 IRON ORE SINTER

LABORATORY MEANS (4 values).
 mass content in % related to the dried (105°C) sample

Line No.	Fe	Si	Ca	Mg	Al	Ti	Mn	P	Na	K	F	V	Cr	Zn	S
1	55.88	—	5.562	0.978	1.222	0.0879	0.4488	0.1425	0.0328	0.1270	—	—	0.0132	0.0080	0.0098
2	55.92	—	5.562	1.004	1.228	0.0900	0.4525	0.1425	0.0384	0.1294	0.0168	0.0209	0.0154	0.0092	0.0098
3	55.95	3.328	5.609	1.018	1.246	0.0905	0.4550	0.1426	0.0385	0.1340	0.0176	0.0212	0.0154	0.0095	0.0100
4	55.96	3.348	5.620	1.018	1.248	0.0908	0.4550	0.1432	0.0390	0.1390	0.0186	0.0218	0.0160	0.0097	0.0110
5	55.96	3.360	5.625	1.026	1.260	0.0920	0.4550	0.1448	0.0412	0.1400	0.0190	0.0230	0.0161	0.0097	0.0110
6	55.96	3.361	5.645	1.030	1.262	0.0928	0.4568	0.1454	0.0414	0.1420	0.0190	0.0230	0.0162	0.0097	0.0115
7	55.99	3.362	5.658	1.030	1.265	0.0929	0.4600	0.1455	0.0415	0.1435	0.0192	0.0233	0.0169	0.0099	0.0121
8	56.00	3.365	5.664	1.033	1.277	0.0930	0.4600	0.1465	0.0422	0.1435	0.0198	0.0239	0.0175	0.0100	0.0123
9	56.02	3.369	5.670	1.035	1.288	0.0935	0.4600	0.1472	0.0425	0.1438	0.0198	0.0240	0.0185	0.0100	0.0128
10	56.03	3.372	5.675	1.036	1.295	0.0938	0.4602	0.1480	0.0428	0.1478	0.0201	0.0243	0.0187	0.0104	0.0128
11	56.03	3.374	5.720	1.036	1.315	0.0950	0.4612	0.1486	0.0458	0.1478	0.0202	0.0252	0.0188	0.0104	0.0135
12	56.04	3.382	5.721	1.045	1.315	0.0954	0.4620	0.1486	0.0462	0.1493	0.0207	0.0255	0.0188	0.0104	0.0135
13	56.06	3.391	5.723	1.048	1.317	0.0998	0.4635	0.1488	0.0465	0.1495	0.0215	0.0260	0.0190	0.0105	0.0136
14	56.06	3.392	5.750	1.052	1.328	0.1005	0.4650	0.1493	0.0482	0.1512	0.0215	0.0270	0.0193	0.0106	0.0142
15	56.09	3.394	5.770	1.053	1.344	0.1033	0.4655	0.1500	0.0490	0.1515	0.0216	0.0282	0.0194	0.0114	0.0148
16	56.09	3.394	5.780	1.058	1.345	0.1034	0.4659	0.1502	0.0495	0.1532	0.0222	0.0288	0.0198	0.0122	0.0166
17	56.14	3.398	5.795	1.066	1.352	0.1050	0.4675	0.1530	0.0504	0.1554	0.0225	0.0310	0.0198	0.0134	0.0177
18	56.18	3.399	5.797	1.070	1.355	0.1060	0.4685	0.1539	0.0550	0.1642		0.0320	0.0200	0.0139	0.0178
19	56.19	3.425	5.812	1.085	1.366	0.1075	0.4731	0.1555	0.0562	0.1690		0.0337	0.0205	—	
20	56.29	3.440	5.826	—	1.382	0.1080	0.4750	0.1580	0.0583	0.1700					
21	56.34														
M_M	56.06	3.381	5.699	1.038	1.300	0.0971	0.4615	0.1482	0.0453	0.1476	0.0200	0.0257	0.0179	0.0105	0.013
s_M	0.12	0.027	0.082	0.025	0.048	0.0065	0.0067	0.0044	0.0065	0.0115	0.0016	0.0037	0.0020	0.0014	

M_M : Mean of the intralaboratory means. s_M : Standard deviation of the intralaboratory means.

The laboratory mean values have been examined statistically to eliminate any outlying values. Where a "—" appears in the table it indicates that an outlying value has been omitted.

CERTIFIED VALUES

mass content in %

	Fe	Si	Ca	Mg	Al	Ti	Mn	P	Na	K	F	V	Cr	Zn
M_M	56.06	3.38	5.70	1.04	1.30	0.097	0.462	0.148	0.045	0.148	0.020	0.026	0.018	0.010
s_M	0.12	0.03	0.08	0.02	0.05	0.006	0.007	0.004	0.007	0.012	0.002	0.004	0.002	0.001

All values are for "total" element content

The above values expressed as oxides.

	SiO ₂	CaO	MgO	Al ₂ O ₃	TiO ₂	MnO	P ₂ O ₅	Na ₂ O	K ₂ O	V ₂ O ₅	Cr ₂ O ₃
M_M	7.23	7.97	1.72	2.46	0.162	0.596	0.339	0.061	0.178	0.046	0.026

DESCRIPTION OF THE SAMPLE

This sample consists of material passing sieve of aperture size 75 µm. It is supplied only in bottles containing 100g.



This reference material prepared and issued by:

BUREAU OF ANALYSED SAMPLES LIMITED

Newham Hall, Middlesbrough, England

On behalf of: The Iron and Steel Nomenclature Co-ordinating Committee
 (COCOR) of the European Coal and Steel Community.

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 Usinor, Dunkerque (France)

METHODS USED ECRM 683-1

Element	Line Number	Methods
Fe	1	Coulometric oxidation
	2 - 3 - 4 - 5 - 6 - 8 - 9 - 10 - 11 - 12 - 13 - 14 - 15 - 16 - 17 - 19 - 21	Titrimetric with dichromate
	7	Titrimetric with stannous chloride
	18	XRF, fused bead technique, synthetic calibration
	20	Titrimetric with permanganate
Si	3 - 5 - 8 - 9 - 12 - 14 - 15 - 16 - 17 - 19 - 20	Gravimetric, dehydration with perchloric acid
	4 - 11	Gravimetric, dehydration with hydrochloric acid
	6 - 7 - 10	Photometric as molybdenum blue
	13	FAAS
	18	XRF, fused bead technique, synthetic calibration
Ca	1	Gravimetric, precipitation as oxalate
	2 - 5 - 6 - 7 - 8 - 10 - 11 - 12 - 13 - 14 - 15 - 17	FAAS
	3 - 4 - 16 - 20	Titrimetric with permanganate, precipitation as oxalate
	9	Complexometric, precipitation as oxalate
	18 - 19	XRF, fused bead technique, synthetic calibration
Mg	1 - 6	Gravimetric, precipitation as magnesium ammonium phosphate
	2 - 3 - 4 - 5 - 7 - 8 - 9 - 10 - 11 - 12 - 13 - 15 - 16 - 17 - 18 - 19	FAAS
	14	ICP AES
Al	1 - 2 - 7 - 8 - 9 - 10 - 11 - 12 - 14 - 15 - 16 - 17 - 18	FAAS
	3 - 5	Photometric with eriochrome cyanine
	4	Complexometric titration
	6	Gravimetric, precipitation with 8-hydroxyquinoline
	13 - 19	XRF, fused bead technique, synthetic calibration
	20	Photometric with chrome azurol S
Ti	1 - 4 - 6 - 10 - 11 - 15 - 18	Photometric with chromotropic acid
	2 - 3 - 8 - 9	Photometric with diantipyrylmethane
	5 - 14 - 20	Photometric with hydrogen peroxide
	7 - 12	XRF, fused bead technique, synthetic calibration
	13 - 16 - 17 - 19	FAAS
Mn	1 - 3 - 4 - 9 - 11 - 12 - 16	Photometric, oxidation with periodate
	2 - 14	Photometric, oxidation with persulphate/silver nitrate
	5 - 7 - 8 - 10 - 13 - 15 - 19 - 20	FAAS
	6 - 17	Titrimetric with arsenite, oxidation with persulphate/silver nitrate
	18	XRF, fused bead technique, synthetic calibration
P	1	XRF, fused bead technique, synthetic calibration
	2 - 20	Titrimetric, precipitation as phosphomolybdate
	3 - 4 - 5 - 6 - 7 - 9 - 10 - 12 - 14 - 16 - 19	Photometric as molybdenum blue
	8	Gravimetric, precipitation as phosphomolybdate
	11 - 13 - 18	Photometric as phosphovanadomolybdate with extraction
	15	Photometric as molybdenum blue with extraction
17	Photometric as phosphovanadomolybdate	
Na	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 - 12 - 14 - 16 - 17	FAAS
	11 - 13 - 18 - 19 - 20	FAES
	15	ICP AES

METHODS USED
ECRM 683-1

Element	Line Number	Methods
K	1 - 2 - 3 - 6 - 10 - 18	FAES
	4 - 5 - 7 - 8 - 9 - 11 - 12 - 13 - 14 - 16 - 17 - 19 - 20 15	FAAS ICP AES
F	2	Specific ion electrode, separation by distillation
	3 - 5 - 6 - 8 - 9 - 11 - 15	Specific ion electrode
	4 - 7 - 10 - 13	Photometric with alizarin fluorine blue, separation by distillation
	12 - 14 - 16	Photometric with alizarin fluorine blue, separation by pyrohydrolysis
	17	Specific ion electrode, separation by pyrohydrolysis
V	2 - 3 - 4 - 6 - 10 - 11 - 12 - 13 - 15 - 16 - 17 - 18	FAAS
	5 - 7	Photometric with dimethyl naphthidine
	8	Titrimetric with ammonium ferrous sulphate, potentiometric end point
	9	OES, solution technique, synthetic calibration
	14	OES, powder arc technique, synthetic calibration
	19	ICP AES
Cr	1	Photometric as chromate
	2 - 19	Photometric with diphenylcarbazide
	3 - 4 - 5 - 6 - 8 - 9 - 10 - 12 - 13 - 14 - 15 - 17 - 18	FAAS
	7	Titrimetric with ammonium ferrous sulphate, potentiometric end point
	11	OES, powder arc technique, synthetic calibration
	16	ICP AES
Zn	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 - 11 - 13 - 14 - 15 - 16 - 17 - 18	FAAS
	12	Gravimetric as phosphate
S	1 - 11	Gravimetric, precipitation as bariumsulphate
	2 - 4 - 6 - 9 - 10 - 13 - 15 - 16	Combustion, oxidation/reduction titration
	3 - 5 - 7 - 8 - 14	Combustion, infrared absorption
	12 - 18	Combustion, coulometric
	17	Combustion, acidimetric titration
		Abbreviations:-
		OES : Optical emission spectrometry
		XRF : X-ray fluorescence spectrometry
		FAAS : Flame atomic absorption spectrometry
		FAES : Flame atomic emission spectrometry
		ICP AES : Inductively coupled plasma atomic emission spectrometry

FURTHER INFORMATION

For information regarding the preparation and certification of EURONORM-CRMs and sources of supply please refer to ECSC Information Circular No. 1 available from the Institution responsible for standardization in your country. (In the UK this is the BSI, 2 Park Street, London. W1A 2BS.)

Pour tous renseignements sur les EURONORM-MRC se reporter à la Circulaire d'information No. 1 de la CECA, diffusée par les organismes nationaux de normalisation.

Wegen Erläuterungen über EURONORM-ZRM siehe Mitteilung Nr. 1 der EGKS, zu beziehen durch die nationalen Normenorganisationen.