

BREITLÄNDER
Eichproben + Labormaterial GMBH

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MICRO-Standards, Serie US

These standards are designed for quality assurance of microanalysis in metallurgy, geology, ceramic and building materials industry as well as for environmental monitoring. They are intended to serve as a reliable standard for parameter setting, peak identification and calibration of XRF-spectrometers in electron microanalysis.

Each of the candidate materials was carefully selected to be matrix-true for most frequent analytical tasks. They consist of pure elements, low alloy- and stainless steels, pig irons and cast irons, non-ferrous alloys and different mineral based materials.

The individual reference materials are mounted in a brass disc or in a brass ring. They are fixed into 1.5mm diameter holes by a high vacuum proof cold setting resin system, diamond polished and carbon coated.

The concentrations stated in the certificate are based on at least two independent laboratory means, obtained by different analytical techniques or taken from the certificate of the particular reference material used. The candidate materials were carefully selected and tested for homogeneity. With those materials partly heterogeneous by nature (marked in the table of available standards) the user is recommended to find the essential parts prior to excitation.

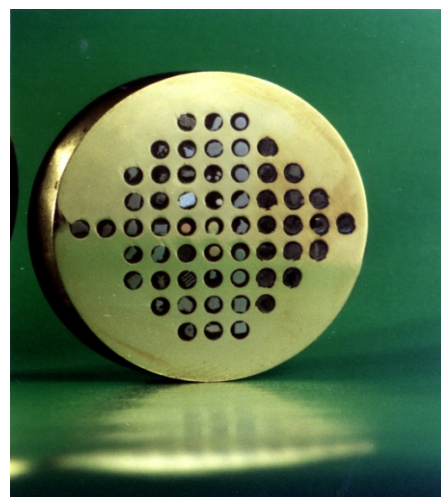
The values of element concentrations were achieved applying the ISO-REMCO Guide 35-1985 (E), thus the uncertainty of values, based on material inhomogeneity, analytical imprecision and estimate of residual systematic error is expressed by the last significant digit, according to the above cited document, i.e. the value 58.3 wt% means a concentration between 58.2 - 58.4 wt%.

We offer to supply your individual MICRO-Standards for SEM:

MICRO-Standard 'US 57' with up to 57 different reference materials mounted in a brass disc of 25mm, 5mm thick, manufactured in sets of 30, 43 or 57 samples

or

MICRO-Standard 'US 72' with up to 72 different reference materials mounted in brass ring of 45/25mm, 5mm thick



Select your individual MICRO-standards as per your choice from our down mentioned stock list of approx.180 selected samples to make up your individual standard.

List of available single standards for implementation into a US-MICRO-Standard

No.	Reference material		Symbol	Element concentration %
1	Kohlenstoff		C	C 99.9
2	Magnesium		Mg	Mg 99.9
3	Aluminium		Al	Al 99.9
4	Silizium		Si	Si 99.9
5	Titan		Ti	Ti 99.9
6	Vanadium		V	V 99.9
7	Chrom		Cr	Cr 99.9
8	Mangan		Mn	Mn 99.9
9	Eisen		Fe	Fe 99.9
10	Kobalt		Co	Co 99.9
11	Nickel		Ni	Ni 99.9
12	Kupfer		Cu	Cu 99.9
13	Zink		Zn	Zn 99.9
14	Gallium		Ga	Ga 99.9
15	Germanium		Ge	Ge 99.9
16	Selenium		Se	Se 99.9
17	Zirkonium		Zr	Zr 99.9
18	Niob		Nb	Nb 99.9
19	Molybdän		Mo	Mo 99.9
20	Silber		Ag	Ag 99.9
21	Cadmium		Cd	Cd 99.9
22	Antimon		Sb	Sb 99.9
23	Tellur		Te	Te 99.9
24	Hafnium		Hf	Hf 99.9
25	Tantal		Ta	Ta 99.9
26	Wolfram		W	W 99.9
27	Blei		Pb	Pb 99.9
28	Bismut		Bi	Bi 99.9
29	Kohlenstoffstahl		OC 54	C 0.55 S 0.010 Mn 0.60 Fe 98
30	Kohlenstoffstahl		OC 70	C 0.74 S 0.016 Mn 0.52 Fe 98
31	Kohlenstoffstahl		OC 84	C 0.83 S 0.015 Mn 0.45 Fe 98

No.	Reference material		Symbol	Element concentration %
32	niedrig leg. Stahl		16270	C 0.66 Si 0.21 P 0.019 S 0.011 Cr 0.33 Mn 0.43 Ni 1.8 Cu 0.05 Fe 96
33	Cr-Stahl		1Cr17	C 0.05 Si 0.40 S 0.016 Cr 16.3 Mn 0.42 Ni 0.15 Fe 82
34	Kanthal		1Cr21Al7	C 0.03 Al 6.9 Si 0.57 Cr 21.4 Mn 0.30 Ni 0.09 Mo 0.03 Fe 70
35	Edelstahl		1Cr18Ni10Mo	C 0.05 Si 0.32 S 0.018 Cr 18.5 Mn 0.91 Ni 9.9 Mo 2.3 Fe 67
36	Edelstahl		1Cr18Ni10	C 0.04 Si 0.45 S 0.016 Cr 17.6 Mn 1.11 Ni 9.8 Fe 70
37	Edelstahl		1Cr23Ni14	C 0.05 Si 0.46 S 0.007 Cr 23.5 Mn 1.61 Ni 13.7 Fe 60

No.	Reference material		Symbol	Element concentration %
38	Schnellarbeitsstahl		19857	C 0.96 Si 0.25 P 0.015 S 0.022 V 2.3 Cr 4.1 Mn 0.17 Co 10.5 Mo 0.03 W 9.5 Fe 72
39	Werkzeugstahl		1920B	C 1.40 S 0.017 V 5.7 Cr 4.7 Mn 0.35 Co 5.0 Mo 0.12 W 14.3 Fe 70
40	Gußeisen	* -	425092	C 4.1 Si 1.6 P 0.24 S 0.019 Mn 1.3 Fe 92
41	Gußeisen	* -	CKD 239	C 4.2 Mn 0.76 Si 0.27 P 0.024 S 0.018 Cr 0.052 Ni 2.42 Cu 0.085 Fe 92
42	Roheisen	* -	417111	C 4.1 Si 2.3 P 0.18 S 0.009 Cr 0.05 Mn 1.02 Fe 91
43	Roheisen	* -	106074	C 4.7 S 0.024 Mn 0.60 Cr 0.18 Fe 94

No.	Reference material		Symbol	Element concentration %
44	Roheisen	* -	120032	C 4.3 Si 0.48 S 0.034 Cr 0.14 Mn 0.60 Zn 0.02 Fe 94
45	Roheisen	* -	414022	C 4.5 Si 1.05 P 0.26 S 0.018 Mn 1.02 Fe 93
46	Eisenlegierung	* -	FeBNd	B 1.24 Al 0.13 Si 0.05 Cr 0.03 Mn 0.03 Pr 0.3 Nd 31.2 Fe 66
47	Ferrolegerung	* -	FeAl	C 0.03 Mg 0.2 Al 48 Si 1.4 Fe 49
48	Ferrolegerung	* -	FeSi	Al 0.5 Si 46 Mn 0.4 Fe 53
50	Ferrolegerung	* -	FeV	Al 4.4 Si 0.7 V 79 Fe 16
51	Ferrolegerung	* -	FeCr	C 0.45 Si 1.2 Cr 68 Fe 30
52	Ferrolegerung	* -	FeMn	C 7.2 Si 1.5 P 1.2 Mn 82 Fe 9
53	Ferrolegerung	* -	FeMo	Fe 62 Mo 38
54	Titanlegierung		BR Ti5	Al 6.8 Ti 89 Fe 0.08 Mo 4.0

No.	Reference material		Symbol	Element concentration %
55	Nickellegierung		Ni90Cr10	Si 0.3 Cr 9.5 Mn 0.04 Ni 89
56	Konstantan		Cu55Ni45	Mn 1.3 Ni 43.5 Cu 55.1
57	Sn-Bronze		Cu63Zn37	Fe 0.05 Ni 0.004 Cu 63.7 Zn 36.2
58	Al-Bronze		Cu84Al12Fe4	Al 11.6 Fe 3.7 Cu 84
59	P-Bronze		Cu90P10	P 10.5 Cu 89
60	Bronze		Cu94Sn6	Cu 94.6 Zn 0.004 Sn 5.3
61	Silberlot		Ag58Cu28Zn14	Cu 27.9 Zn 13.6 Ag 58.4
62	Ag-Legierung		Ag63Au37	Ag 63 Au 37
64	Galliumarsenid		GaAs	Ga 51.2 As 48.8
65	Indiumphosphid		InP	In 80.3 P 19.7
66	Indiumantimonid		InSb	In 48.5 Sb 51.5
69	Wolframkarbid, gesintert	* -	WC/TiC/Co	C 9 Co 6.2 Ti 0.9 W 77
70	Wolframkarbid, gesintert	* -	WC/Co	C 6 Co 8.8 W 85
71	Bornitrid	p	BN	B 43.6 N 56.4
72	Siliziumkarbid	p	SiC	C 29.9 Si 70.1
73	Titankarbid	p	TiC	C 20.0 Ti 80.0
74	Fluorid		CaF ₂	Ca 51 F 49

No.	Reference material		Symbol	Element concentration %
75	Jadeit		$\text{NaAlSi}_2\text{O}_6$	Na 10.9 Al 15.5 Si 23.8 K 1.4 Ca 1.3 Fe 1.2 O 46
76	Albit		$\text{NaAlSi}_3\text{O}_8$	Na 9.4 Al 10.1 Si 31.9 O 48
77	Korund		Al_2O_3	Al 53 O 47
78	Topaz		Al_2SiO_4	Al 32.3 Si 18.2 O 49
79	Orthoklas		KAlSi_3O_8	Na 0.9 Al 9.6 Si 31.6 K 10.8 O 47
80	Pyrop		$\text{Mg}_3\text{Al}_2\text{Si}_3\text{O}_{12}$	Mg 11.7 Al 11.3 Si 18.7 Ca 2.7 Ti 0.4 Cr 1.0 Fe 9.2 O 44
81	Quarz		SiO_2	Si 47 O 53
82	Wollastonit		CaSiO_3	Si 24 Ca 35 O 41
84	CaTi-Oxid	<u>s</u>	CaTiO_3	Ca 29.5 Ti 35.2 O 35
85	Andradit		$\text{Ca}_3\text{Fe}_2\text{Si}_3\text{O}_{12}$	Mg 2.4 Al 5.1 Si 19.5 Ca 20.5 Fe 11.3 O 41
86	Rutil		TiO_2	Ti 60 O 40
87	Olivin		MgFeSiO_4	Mg 27.2 Si 20.5 Fe 8.5 O 44

No.	Reference material		Symbol	Element concentration %
88	Chromit		FeCr_2O_4	Mg 8.5 Al 5.3 Cr 39 Fe 15 O 32
89	Hämatit	<u>s</u>	Fe_2O_3	Fe 69.9 O 30
90	Magnetit		Fe_3O_4	Fe 72 O 26
91	Kuprit		Cu_2O	Cu 89 O 11
92	Zirkon		ZrSiO_4	Si 14 Zr 52 O 34
93	Rhodochrosit		MnCO_3	Mn 48 O 42 C 10
94	Magnesit		MgCO_3	Mg 26.4 Si 2.9 Ca 2.1 O 54 C 14
95	Calcit		CaCO_3	Ca 39 O 48 C 12
96	Anhydrit		CaSO_4	S 22 Ca 32 O 46
97	Wolframit		$(\text{Mn, Fe})\text{WO}_4$	Mn 8.1 Fe 10.5 W 60 O 21
98	BaTi-Oxid	<u>s</u>	BaTiO_3	Ba 58.9 Ti 20.5 O 20
99	KTa-Oxid	<u>s</u>	KTaO_3	K 14.5 Ta 67.5 O 18
100	Pyrit		FeS_2	S 53 Fe 47
101	Chalcopyrit		CuFeS_2	Fe 30.3 Cu 36.0 S 33.7
102	Sphalerit		ZnS	S 34 Zn 66
103	Antimonit		Sb_2S_3	S 27 Sb 73

No.	Reference material		Symbol	Element concentration %
104	Galenit		PbS	S 7 Pb 93
105	Glas		GA-11	Na 1.6 Al 9.5 Si 20.6 K 1.1 Ca 0.7 Mn 21.2 Zn 4.0 O 41
106	Glas		GB-2	Al 2.9 Si 27.5 K 0.3 Ca 14.6 Fe 9.8 Ni 0.3 Cu 1.0 Zn 0.5 O 43
107	Glas		SD-44	Na 6.4 Mg 8.1 Al 14.2 Si 8.0 P 2.3 Ca 14.9 Fe 0.3 Zn 4.5 Pb 1.8 O 40
108	Glas		GSI-V	Na 11.3 Al 1.5 Si 26.1 K 1.8 Ca 4.4 Cr 2.2 Mn 4.3 Zn 3.2 Ba 4.3 O 41
109	Glas		FS-23	Al 0.9 Si 32.9 K 19.0 Ca 2.9 Ti 0.6 O 44

No.	Reference material		Symbol	Element concentration %
110	Hochofenschlacke		VP	Mg 7.7 Al 3.8 Si 19.6 S 0.5 K 0.6 Ca 25.0 Mn 0.8 O 41
111	Indium		In	In 99.9
112	Zinn		Sn	Sn 99.9
113	Gold		Au	Au 99.9
114	niedrig leg. Stahl	ch	5Cr1/2Mo	C 0.13 Si 0.25 Cr 4.3 Mn 0.46 Ni 0.10 Cu 0.13 Mo 0.46 Fe 94
115	niedrig leg. Stahl	ch	9Cr1Mo	C 0.13 Si 0.38 Cr 8.7 Mn 0.41 Ni 0.24 Cu 0.15 Mo 0.96 Fe 89
116	Cr-Stahl	ch	AISI 446	C 0.09 Si 0.37 Cr 23.8 Mn 0.46 Ni 0.31 Cu 0.06 Mo 0.05 Fe 74.8
117	Edelstahl	ch	AISI 310	C 0.07 Si 0.53 Cr 25.5 Mn 1.7 Ni 20.1 Cu 0.30 Mo 0.15 Fe 51.7

No.	Reference material		Symbol	Element concentration %
118	Edelstahl	ch	AISI 347	C 0.06 Si 0.77 Cr 17.4 Mn 1.5 Ni 9.9 Cu 0.10 Nb 0.70 Mo 0.17 Fe 69.4
119	Edelstahl	ch	Nitronic 40	C 0.04 Si 0.64 Cr 20.2 Mn 9.5 Ni 6.6 Cu 0.43 Mo 0.12 Fe 62.5
120	Edelstahl	ch	Nitronic 50	C 0.05 Si 0.56 Cr 21.2 Ni 11.9 Cu 0.38 Nb 0.16 Mo 2.2 Fe 58.9
121	Edelstahl	ch	Nitronic 60	C 0.08 Si 4.1 Cr 16.4 Mn 8.2 Ni 8.2 Cu 0.40 Mo 0.23 Fe 62.4
122	Edelstahl	ch	17-4-PH	C 0.05 Si 0.51 Cr 15.51 Mn 0.52 Ni 4.4 Cu 3.2 Nb 0.28 Mo 0.10 Fe 75.5

No.	Reference material		Symbol	Element concentration %
123	Edelstahl	ch	Invar 36	C 0.06 Si 0.27 Cr 0.17 Mn 0.76 Ni 36.1 Cu 0.08 Mo 0.01 Ta 0.18 Fe 62.4
124	Edelstahl	ch	Carp20CB3	C 0.2 Si 0.32 Cr 19.6 Ni 33.6 Mn 0.48 Cu 3.2 Co 0.27 Nb 0.51 Mo 2.1 Ta 0.21 Fe 39.6
125	Edelstahl	ch	Haynes 556	C 0.11 Si 0.45 Cr 21.8 Mn 1.00 Co 17.7 Ni 20.2 Cu 0.09 Mo 2.9 W 2.4 Fe 33.4
126	Edelstahl	ch	Maraging 300	C 0.01 Si 0.03 Ti 0.62 Cr 0.16 Mn 0.03 Co 8.9 Ni 18.6 Cu 0.03 Mo 4.9 Fe 66.7
127	Edelstahl	ch	BCS 467	C 0.069 Mn 0.68 Si 0.45 P 0.015 S 0.019 Ni 8.95 Cr 18.05 Nb 1.06 Fe 70.7

No.	Reference material		Symbol	Element concentration %
128	Edelstahl	ch	NBS 339	C 0.052 Mn 0.738 Si 0.654 S 0.013 Cu 0.199 Ni 8.89 Cr 17.42 V 0.058 Co 0.096 Mo 0.248 Se 0.247 Fe 71.2
129	Edelstahl	ch	NHKG P-10	C 0.09 Mn 0.44 Si 1.38 P 0.022 Ni 10.51 Cr 17.34 Ti 0.84 Fe 69.3
130	Edelstahl	ch	IMZ 1.12	C 0.085 Mn 1.60 Si 0.56 P 0.038 S 0.017 Ni 10.56 Cr 18.63 Mo 2.07 Ti 0.73 Fe 65.7
131	Edelstahl	ch	CS 3/4/04	C 0.072 Mn 0.66 Si 0.29 P 0.046 S 0.007 Ni 9.21 Cr 18.05 Cu 0.10 Ti 0.63 Co 0.026 Fe 70.9

No.	Reference material		Symbol	Element concentration %
132	Schnellarbeitsstahl		24/3	C 0.94 Si 0.20 Mn 0.44 S 0.048 Cu 0.20 Ni 0.17 Cr 4.46 V 1.05 Mo 9.57 W 2.83 Co 8.92 Ti 0.22 Fe 70.9
133	Schnellarbeitsstahl		24/4	C 1.37 Si 0.31 Mn 0.58 S 0.023 Cu 0.34 Ni 0.26 Cr 3.99 V 4.62 Mo 1.54 W 11.71 Co 0.03 Ti 0.02 Fe 75.5
134	Werkzeugstahl	ch	M2	C 0.86 Si 0.39 V 1.9 Cr 4.3 Mn 0.31 Ni 0.20 Cu 0.14 Co 0.16 Mo 5.1 W 6.3 Fe 80.5
135	Werkzeugstahl	ch	T1	C 0.79 Si 0.29 V 1.1 Cr 4.3 Mn 0.33 Co 0.39 Ni 0.23 Cu 0.12 Mo 0.40 W 18.0 Fe 74.0

No.	Reference material		Symbol	Element concentration %
136	Werkzeugstahl	ch	D2	C 1.49 Si 0.35 V 0.97 Cr 12.1 Mn 0.32 Ni 0.23 Cu 0.05 Mo 0.86 W 0.15 Fe 83.5
137	Gußeisen	*	KS	C 1.7 Si 3.2 S 0.14 Cr 0.7 Mn 0.13 Ni 0.01 Mo 0.6 Fe 93.5
138	Gußeisen	*	US	C 2.85 Si 0.6 P 0.6 S 0.02 Cr 1.2 Mn 0.3 Ni 0.04 Cu 1.4 Fe 93.0
139	Gußeisen	*	RS	C 2.8 Si 1.6 P 0.4 S 0.05 Cr 0.17 Cu 0.06 Mo 0.1 Sn 0.07 Sb 0.05 Pb 0.015 Fe 93.0
140	Gußeisen	*	IN	C 3.45 Si 1.75 P 0.05 S 0.01 Cr 0.04 Mn 0.2 Ni 0.7 Cu 0.12 Fe 93.6

No.	Reference material		Symbol	Element concentration %
141	Gußeisen	*	PN	C 4.0 Si 0.95 P 0.27 S 0.2 Ni 1.2 Cu 0.5 Fe 93.9
142	Al-Legierung		CKD 401	Al 85 Si 6.9 Ti 0.29 Cr 0.26 Mn 0.83 Fe 1.01 Cu 3.9 Zn 0.99
143	Al-Legierung		CKD 405	Mg 1.20 Al 83 Si 12.2 Cr 0.28 Mn 0.65 Fe 0.47 Ni 1.37 Cu 0.31 Zn 0.18
144	Ni-Legierung	ch	Inco 718	Al 0.56 Ti 1.0 Cr 18.5 Mn 0.11 Fe 18.8 Co 0.25 Ni 52.2 Nb 5.1 Mo 3.1
145	Ni-Legierung	ch	Inco 625	Ti 0.28 Cr 21.3 Mn 0.22 Fe 4.4 Co 0.19 Ni 60.9 Nb 3.3 Mo 8.8
146	Ni-Legierung	ch	Haynes 214	Al 4.4 Cr 16.1 Mn 0.17 Fe 3.6 Ni 75.6

No.	Reference material		Symbol	Element concentration %
147	Ni-Legierung	ch	Haynes 230	Al 0.37 Cr 21.5 Mn 0.50 Fe 1.4 Co 0.40 Ni 60.1 Mo 1.04 W 14.2
148	Ni-Legierung	ch	Haynes 242	Al 0.24 Cr 7.9 Mn 0.33 Fe 1.09 Ni 64.7 Mo 25.4
149	Ni-Legierung	ch	Hastalloy G-30	Al 0.20 Cr 28.8 Mn 1.11 Fe 14.9 Co 3.6 Ni 40.3 Nb 0.70 Mo 5.0 W 3.1
150	Ni-Legierung		PY-79	C 0.006 Al 0.03 Si 0.09 Mn 0.50 S 0.002 Mo 3.5 Cu 4.3 Fe 14.8 Ni 77
151	Ni-Legierung		PY-80	C 0.006 Al 0.03 Mn 0.50 S 0.040 Mo 3.6 Nb 3.0 Cu 0.06 Ti 3.0 Fe 10.2 Ni 79.5
152	Cu-Legierung	ch	CDA 485	Fe 0.08 Zn 36.1 Sn 0.99 Pb 1.8 Cu 61.0

No.	Reference material		Symbol	Element concentration %
153	Cu-Legierung	ch	CDA 655	Si 3.1 Mn 1.02 Fe 0.04 Cu 96
154	Cu-Legierung	ch	CDA 836	Fe 0.03 Ni 0.78 Zn 4.3 Sn 4.6 Sb 0.09 Pb 5.4 Cu 85
155	Cu-Legierung	ch	CDA 937	Sb 0.35 Ni 0.36 Zn 0.27 Sn 9.8 Pb 9.6 Cu 80
156	Cu-Legierung	ch	CDA 955	Mn 0.16 Fe 4.0 Ni 4.4 Zn 0.09 Al 10.6 Cu 81
157	Cu-Legierung	ch	CDA 932	Fe 0.08 Ni 0.09 Zn 3.2 Sn 6.7 Sb 0.07 Pb 6.4 Cu 83.4
158	Cu-Legierung	ch	CDA 863	Al 6.0 Fe 2.3 Mn 3.7 Zn 23.3 Sn 0.04 Pb 0.03 Cu 65
159	Cu-Legierung	ch	CDA 642	Al 7.0 Fe 0.10 Si 1.97 Zn 0.20 Sn 0.05 Cu 90.6
160	Ag-Legierung		P5Ag19Cu75	P 5.8 Ag 18.9 Cu 75

No.	Reference material		Symbol	Element concentration %
161	Ag-Legierung		Cu16Zn16Cd25Ag42	Cu 16.0 Zn 16.5 Cd 25.0 Ag 42.3
162	Ag-Legierung		Cu27Zn21Ag51	Cu 27.1 Zn 21.3 Ag 51.6
163	Ag-Legierung		Cu17Ag83	Cu 17.1 Ag 82.8
164	Kassiterit		SnO ₂	Sn 78.8 O 21
165	Pollucit		CsAl ₂ Si ₃ O ₁₀	Cs 33.3 Al 10.4 Si 21.1 O 35
166	Apatit		Ca ₃ (PO ₄) ₂	P 19 Ca 41 O 40
167	Celestinit		SrSO ₄	S 16 Sr 51 O 33
168	Scheelit		CaWO ₄	Ca 15.6 W 62.0 O 22
169	Crocoit		PbCrO ₄	Cr 18.7 Pb 59.5 O 22
170	Baryt		BaSO ₄	S 15.0 Ba 55.8 O 29
171	Skutterudit		(Co, Ni, Fe)As ₃	S 3.3 Co 15.4 Ni 5.0 Fe 2.9 As 73.3
172	Titanit, brasil.		CaTiSiO ₅	Al 1.4 Si 17.0 Ca 19.2 Ti 20.6 O 41
173	Yttriumoxid	p	Y ₂ O ₃	Y 79 O 21
174	Bariumcarbonat	p	BaCO ₃	Ba 70 O 24 C 6
175	Neodymoxid	p	Nd ₂ O ₃	Nd 79 O 21

No.	Reference material		Symbol	Element concentration %
176	Europiumoxid	p	Eu ₂ O ₃	Eu 86 O 14
177	Gadoliniumoxid	p	Gd ₂ O ₃	Gd 87 O 13
178	Dysprosiumoxid	p	Dy ₂ O ₃	Dy 87 O 13
179	Holmiumoxid	p	Ho ₂ O ₃	Ho 87 O 13

Abbreviations of material properties:

* = heterogeneous material

p = powder

ch = chipped material

s = synthetic material