



GELLER MICROANALYTICAL LABORATORY, Inc.

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Certified to ISO-9001 and 17025

Pure Elements & Compounds

January 2019

STANDARD	Formula	FORM	PURE	STANDARD	Formula	FORM	PURE	STANDARD	Formula	FORM	PURE
Aluminum	Al	F	4N	Indium Antimonide	InSb	P	3N ?	Selenium	Se	C	3N
Aluminum Fluoride	AlF3	P	2N5	Indium Tin Oxide	ITO	P	4N	Silicon	Si	C	5N
Aluminum Oxide	Al2O3	C	4N ?	10% In, inhomogenous				Silicon Carbide	SiC	CVD	Opt ?
Aluminum Nitride	AlN	P	2N+	Iridium	Ir	P	3N5	Silicon Dioxide	SiO2	EM	2N5 ?
Antimony	Sb	B	4N8	Iron Carbide	Fe3C	F	3N	1000Å/Silicon	SiO2	TF	3N5
Barium Fluoride	BaF2	C	2N	Iron	Fe	P	4N	Silicon Nitride	Si3N4	HP	2N
Barium Sulfate	BaSO4	P	3N ?	Iron Fluoride	FeF3	P	3N	468Å/Silicon	Si3N4	TF	2N5
Barium Titanate	BaTi4O9	HP	2N5 ?	Iron Nitride	Fe2.4N	P	3N ?	Silver	Ag	F	3N
Barium Titanate	BaTiO3	P	3N	Iron Oxide	FeO	P	3N ?	Silver Chloride	AgCl	C *	5N
Beryllium	Be	F	2N	Iron Oxide	Fe2O3	P	5N	Silver Oxide	Ag2O	P	3N ?
Bismuth	Bi	B	6N?	Iron Oxide	Fe3O4	EM	5N	Silver Sulfide	Ag2S	C	?
Bismuth Telluride	Bi2Te3	B	2N5N	Iron Phosphide	FeP	EM	3N	Sodium Chloride	NaCl	C	2N5
Bismuth Oxide	Bi2O3	P	2N5 ?	Iron Sulfide	FeS2	P	3N?	Sodium Fluoride	NaF	C	5N
Boron	B	B	2N5	Lead	Pb	F	4N8	Strontium Fluoride	SrF2	C	3N
Boron Carbide	B4C	P	5N?	Lead Oxide	PbO	F	2N8	Tantalum	Ta	F	3N5
Boron Nitride	BN	B	4N	Lead Telluride	PbTe	P	5N	Tantalum Carbide	TaC	HP	3N?
				Lead Sulfide	PbS	P	Opt ?	Tantalum Nitride	TaN	P	4N8
Boron Phosphide	BP	P	3N	Lanthanum Hexaboride	LaB6	P	3N5 ?	Tantalum Oxide	Ta2O5	P	1N8 ?
Cadmium	Cd	F	4N7	Lanthanum Fluoride	LaF3	P	Opt	Tantalum Oxide	Ta2O5	TF	2N8
Cadmium Sulfide	CdS	P	3N	Lutetsium Fluoride	LuF3	P	3N	1000Å/Ta			2N5
Calcium Carbonate	CaCO3	C	3N ?	Lithium Fluoride	LiF	P	4N	Tantalum Silicide	TaSi2	P	2N5
Calcium Fluoride	CaF2	C	3N	Magnesium	Mg	C *	3N	Tellurium	Te	B	5N
Carbon (Pyrolytic)	C	CVD	3N ?	Magnesium Fluoride	MgF2	F	3N?	Terbium	Tb	F	3N
Carbon (Diamond)	C	C	?	Magnesium Oxide	MgO	C	4N	Thallium Chloride	TlCl	P	3N8 ?
Cerium Oxide	CeO2	P	2N1	Manganese	Mn	B	3N	Thorium Oxide	ThO2	P	2N5 ?
Cesium Iodide	CsI	O *	2N ?	Manganese Sulfide	MnS	B	2N5	Thulium	Tm	F	2N5
Cesium Bromide	CsBr	P *	4N	Manganese Oxide	MnO2	P	?	Tin	Sn	F	5N
Chromium	Cr	B	4N6	Mercury Telluride	HgTe	C	5N	Tin Oxide	SnO2	EM	2N5
Chromium Carbide	Cr3C2	P	2N8	Mercury Sulfide	HgS	P	4N5 ?	Titanium	Ti	F	2N5
Chromium Nitride	Cr2N	P	2N5	Molybdenum	Mo	C	4N	Titanium Al Carbide	Ti2AlC	P	2N ?
Chromium Oxide	Cr2O3	HP	5N	Molybdenum boride	MoB	P	2N	Titanium Carbide	TiC	HP	2N5
Cobalt	Co	F	5N	Molybdenum Carbide	Mo2C	F	3N5 ?	Titanium Diboride	TiB2	HP	2N5 ?
Cobalt Oxide	Co3O4	P	3N	Molybdenum Silicide	MoSi2	HP	3N	Titanium Dioxide	TiO2	EM	2N5
Cobalt Silicide	CoSi2	P	2N	Molybdenum Oxide	MoO3	P	2N5 ?	Titanium Nitride	TiN	P	4N5
Cobalt Sulfide	CoS	P	2N5	Osmium	Os	P	4N5	Titanium Oxide	TiO	HP	3N
Copper	Cu	F	4N5	Neodymium oxide	Nd2O3	P	2N8	Titanium Silicide	TiSi2	P	3N
Cupric Oxide	CuO	P	3N	Neodymium fluoride	NdF3	F	3N	Tungsten	W	F	4N
Cuprous Oxide	Cu2O	EM	3N	Nickel	Ni	C	4N4	Tungsten Carbide	WC	HP	4N8
Copper Sulfide	CuS	M	3N	Nickel oxide	NiO	F	3N5 ?	Tungsten Oxide	WO3	P	2N+
Copper Sulfide	Cu2S	M	2N+ ?	Nickel Phosphide	Ni2P	P	3N	Tungsten Silicide	WSi2	P	2N5
Dysprosium	Dy	F *	3N					Tungsten Sulfide	WS2	P	2N8
Erbium	Er	F *	3N ?	Nickel Silicide	NiSi2	P	3N?	Vanadium	V	F	2N5
Europium Oxide	Eu2O3	HP	3N	Niobium	Nb	F	3N7	Vanadium Carbide	VC	HP	4N ?
Gadolinium	Gd	F *	3N ?	Nickel Aluminate	NiAl	P	2N5	Vanadium Nitride	VN	P	2N5 ?
Gallium Arsenide	GaAs	C	5N ?	Niobium Carbide	NbC	P	2N5 ?	Vanadium Oxide	V2O5	P	4N ?
Gallium Nitride	GaN	P	3N	Niobium Oxide	Nb2O5	HP	4N ?	Ytterbium	Yb	F	3N
Gallium Phosphide	GaP	P	2N5	Palladium	Pd	P	3N	Ytterbium oxide	Yb2O3	P	3N
Gallium Antimonide	GaSb	P	2N5 ?	Platinum	Pt	F	3N	Yttrium	Y	F *	3N
Germanium	Ge	B	2N	Potassium Bromide	KBr	F	4N?	YAG	YAIO	C	?
Germanium Oxide	GeO	P	2N5	Potassium Chloride	KCl	C	3N5 ?	Yttrium Oxide	Y2O3	P	4N
Gold	Au	F	4N	Potassium Iodide	KI	C	3N?	Zinc	Zn	F	3N8
Hafnium	Hf	F	2N5 ?	Praeseodymium Fluoride	PrF3	C	3N8	Zinc Oxide	ZnO	HP	3N
Hafnium Boride	HfB2	P	4N7	Rhenium	Re	F	3N7	Zinc Selenide	ZnSe	C	?
Hafnium Carbide	HfC	B	6N	Rhenium Oxide	ReO3	F	3N?	Zinc Sulfide	ZnS	C	?
Hafnium Nitride	HfN	P	2N5	Rhodium	Rh	W	2N8	Zirconium	Zr	F	3N5
Hafnium Oxide	HfO2	P	3N?	Rubidium Chloride	RbCl	F	3N?	Zirconium Carbide	ZrC	HP	?
Holmium	Ho	B	3N	Rubidium Iodide	RbI	P	2N7	Zirconium Nitride	ZrN	P	2N5
Indium	In	F	4N	Ruthenium	Ru	P	2N8	Zirconium Oxide (Mineral)	ZrO2	C	2N7 ?
Indium Arsenide	InAs	C	?	Samarium	Sm	F	3N				
Indium Phosphide	InP	C	5N ?	Scandium	Sc	F	2N9				

M Natural mineral
Opt optical crystal
TF Thin film
HP Hot pressed

B Bulk material
C Crystalline
EM End member mineral
F Foil

? No certificate available. Most original containers with marked purity.
With EDS analysis we see no additional elements (>0.1%)
"N" is the # of "9"s. 5N would be 99.999% pure, 2N5 would be 99.5%
"+" means higher purity
W wire section

* These standards are very sensitive to humidity and should be kept in vacuum. We suggest our Vacu-Storr

Minerals

MINERAL	FORMULA (Approximate formula)		
Acanthite	Ag ₂ S	Diopside	CaMgSi ₂ O ₆
Albite	NaAlSi ₃ O ₈	Dolomite	CaMg(CO ₃) ₂
Almandine	Fe ₃ +2Al ₂ (SiO ₄) ₃	Fayalite	Fe ²⁺ SiO ₄
Andradite	Ca ₃ Fe ₂ +3(SiO ₄) ₃	Fluorapatite	Ca ₅ (PO ₄) ₃ F
Anorthite	CaAl ₂ Si ₂ O ₈	Forsterite	Mg ₂ SiO ₄
Augite	(Ca,Na)(Mg,Fe,Al,Ti)(Si,Al) ₂ O ₆	Hematite	Fe ₂ O ₃
Baddeleyite	ZrO ₂	Hornblende (Amphibole)	Ca ₂ (Mg,Fe ²⁺) ₄ Al(Si ₇ Al)O ₂₂ (OH,F) ₂
Barite	BaSO ₄	Kyanite	Al ₂ O ₃ •SiO ₂
Benitoite	BaTiSi ₃ O ₉	Magnetite	Fe ₃ O ₄
Biotite (black mica)	K(Mg,Fe ²⁺) ₃ (Al,Fe ³⁺)Si ₃ O ₁₀ (OH,F) ₂	Orthoclase	K ₂ O•Al ₂ O ₃ •6SiO ₂
Bytownite	(Na,Ca)Al(Al,Si)Si ₂ O ₈	Pyrope	Mg ₃ Al ₂ (SiO ₄) ₃
Calcium Carbonate	CaCO ₃	Quartz	SiO ₂
Cassiterite	SnO ₂	Rutile	TiO ₂
Chalcocite	Cu ₂ S	Sodalite	Na ₄ (AlCl)Al ₂ (SiO ₄) ₃
Cinnabar	HgS	Spessartine	Mn ²⁺ ₃ Al ₂ (SiO ₄) ₃
Chrysoberyl	BeAl ₂ O ₄	Spinel	MgAl ₂ O ₄
Covellite	CuS	Titanite	CaTiSiO ₅
Cuprite	Cu ₂ O	Uraninite	UO ₂
Diamond	C (natural cleaved ~1mm)	Willemite (Troosite)	Zn ₂ SiO ₄
Diamond (like)	Matches Raman for Diamond	Wollastonite	CaSiO ₃

Note: electron probe compositions provided upon request or with standard. Some standards have minor phases of other materials

NIST Standards: Glasses & Alloys

Glasses	B2O3	Na2O	MgO	Al2O3	SiO2	Cl	K2O	CaO	TiO2	V2O5	Cr2O3	MnO2	Fe2O3	ZrO2	PbO	Bi2O3	BaO	ZnO	CoO	CuO			
612		14.0		2.0	72.0			12.0		+50 ppm of 51 other elements													
93a	12.5	3.9		2.2	80.8	.06	.01	.01	.01				.028	.04									
K252					40.0							5.0					35.0	10.0	5.0	5.0			
K229					30.0										70.0								
K326	30.0	2.0	30.1		29.9			8.0															
K309				15.0	40.0			15.0					15.0				15.0						
Ti Alloys	Fe	C	Mn	P	S	Si	Cu	Zn	Pb	Sn	Ni	Cr	V	Mo	Ti	As	W	Zr	Nb	Ta	Al	Co	
654b	.23					.045	.004			.023	.028	.025	4.31	.013	88.05			.008				6.34	
1128	.134	.011								3.04		2.96	15.13		75.64							3.06	
Miscellaneous NIST Standards																							
1104	.088			.005			61.33	35.31	2.77	.43	.07												
1108	.004		.0025				64.9	34.4	0.06	.39	.033												
1110	.033						84.5	15.2	0.03	.051	.053												
1230	Bal	.044	.64	.023	.0007	.43	.14			24.2	14.8	.23	1.18	2.12							.24	.15	
1243	.79	.024	.019	.003	.0018	.018	.007			58.78	19.20	.12	4.25	3.06			.053				1.23	12.46	
1297		.066	7.11	.038	.0033	.397	.442			5.34	16.69	.08	.33									.13	
C2402	7.3	.01	.64	.007	.018	.85	.19			51.5	16.15	.22	17.1			4.29						1.5	
2321	Solder: Sn 60%, Pb 40%																						
SRM-481	6 wire in one 3mm φ disc. Ag:Au (pure Ag, pure Au, 20:80, 40:60, 60:40, 80:20).																						
SRM-482	5 wires in one 3mm φ mount. Cu:Au (20:80, 40:60, 60:40, 80:20) + pure Cu.																						
871	Phosphor bronze (CDA-521)																						
Steels																							
461	Bal	.15	.36	.053	.019	.047	.34		.003	.022	1.73	.13	.024	.3	.01	.028	.01	<.005	.011	.002	.005	.26	
462	Bal	.40	.94	.045	.019	.28	.20		.006	.066	.70	.74	.058	.08	.037	.046	.053	.063	.096	.036	.02	.10	
464	Bal	.54	1.32	.017	.021	.48	.094		.02	.043	.13	.078	.29	.029	.004	.018	.022	.01	.037	.069	.005	.02	
465	Bal	.037	.032	.008	.01	.029	.019		<.0005	.001	.026	.004	.002	.005	.20	.01	.001	.002	.001	.001	.19	.03	
466	Bal	.065	.11	.012	.009	.025	.033		.001	.005	.051	.011	.007	.011	.057	.014	.006	<.005	.005	.002	.01	.04	
467	Bal	.11	.23	.033	.009	.26	.067		.00	.1	.088	.036	.041	.021	.26	.14	.20	.094	.29	.23	.16	.07	
468	Bal	.26	.47	.023	.02	.075	.26		<.0005	.009	1.03	.54	.17	.20	.011	.008	.077	<.005	.006	.005	.04	.16	
661	Bal	.39	.66	.015	.015	.223	.042		.01	1.99	.69	.011	.19	.02	.017	.01	.009	.22	.02	.02	.03		
663	Bal	.57	1.50	.02	.005	.74	.09		.0022	.32	1.31	.31	.30	.05	.01	.04	.05	.049			.24	.05	
664	Bal	.87	.25	.01	.025	.066	.25		.024	.14	.06	.10	.49	.23	.05	.10	.069	.15	.11		.15		
665	Bal	.008	.0057	.002	.0059	.008	.0058			.041	.007	.0006	.005	.0006	.002							.01	
1761	Bal	1.03	.68	.043	.033	.19																	
1762	Bal	.034	2.03	.036	.03	.36																	
1763	Bal	.20	1.59	.012	.022	.65																	
1764	Bal	.59	1.22	.023	.012	.06	.5			1.48	.106	.20	.28						.42				
1765	Bal	.006	.14	.007	.004	.005																	
1766	Bal	.015	.06	.004	.002	.01																	
1767	Bal	.051	.02	.005	.009	.02																	
1768	Bal	.001	.014	.0013	.0003		.0006			.0014											.002	.002	

Alloys- Certified by a group of laboratories, NIST traceable (but not under ISO-17025 or ISO-9000)

Analysis provided with each alloy purchased .

Stainless Steels + High Temp.	Low Alloy + Specialty	Nickel/Cobalt	Copper/Brass/Bronze
AISI 302	C-4140	Inco 600	CDA 360
AISI 303	C-4340	Inco 625	CDA 510
AISI 304	C-8620	Inco 718	CDA 655
AISI 316	Tool Steel A-6	Inco 800	CDA 857
AISI 321	Tool Steel D-2	Hastaloy C-22	
AISI 410	Tool Steel H-13	Hastaloy C-276	
AISI 440C	Tool Steel M-2	Hastaloy X	
PH13-8MO	2-Cr-1Mo (36a)		
15-5 PH	9Cr-1Mo (38a)		
17-4PH	50 NIL		
CARP 20CB3	52100		
Maraging 300	AISI 4820		
HK-40	AISI 9310		

PLEASE READ CAREFULLY!

The metal alloys on this list cannot be assumed to be homogenous at the micrometer scale. If you intend to use ZAF corrections electron beam excited x-ray analysis (wavelength or energy dispersive) the sample volume must be homogenous within the electron excited volume. It is a misuse to use these metal alloys for bulk quantitative analyses. Nevertheless, they are useful for comparison purposes (in a least square sense) to compare against unknown materials. Every effort is made to insure that cutting, grinding, and polishing of the materials do not alter their composition. Our standards are alumina abrasive and epoxy free as they are not used in the preparation.

Miscellaneous Standards (some traceable):

BPSG (not a NIST standard), 4% P, 3.3% B.

Al-Cu: NIST traceable standard for energy dispersive x-ray detector calibration.

C-Cu-Ag: Standard for electron backscattering adjustment. Used for gunshot residue calibration

GSR- Gun shot residue: mixture of BaF2, Sb, and Pb particles in epoxy and carbon coated.

Bold marked standards are at extra cost. See price list or call.

- **If you do not see a standard on the list that you would like, please contact us for availability.**
- **We can custom prepare your materials for use in our mounting system.**
- **We will polish your Taylor, Microbeam Consultants, SPI or other standard mounts. Price on request.**