



# GELLER MICROANALYTICAL LABORATORY, Inc.

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9001 and 17025

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Certified to ISO-

## Pure Elements & Compounds

Feb 2011

STANDARD	FORM	PURITY	STANDARD	FORM	PURITY	STANDARD	FORM	PURITY			
Silver Oxide	Ag2O	P	3N	Indium Antimonide	InSb	P	3N	Silicon Carbide	SiC	CVD	Opt
Aluminum Carbide	Al4C3	P	4N	Indium Tin Oxide	ITO	P	3N	Silicon Dioxide	SiO2	EM	2N5
Aluminum	Al	F	3N	10% In, inhomogenous				1000Å/Silicon	SiO2	TF	3N5
Aluminum Fluoride	AlF3	P	2N5	Iridium	Ir	F	3N	Silicon Nitride	Si3N4	HP	2N
Aluminum Oxide	Al2O3	C	4N	Iron Carbide	Fe3C	F	3N	468Å/Silicon	Si3N4	TF	2N5
Aluminum Nitride	AlN	P	2N+	Iron	Fe	P	3N	Silver	Ag	F	3N5
Antimony	Sb	B	2N	Iron Fluoride	FeF2	F	3N	Silver Chloride	AgCl	C	5N
Barium Fluoride	BaF2	C	2N	Iron Fluoride	FeF3	P	3N	Silver Sulfide	Ag2S	C	?
Barium Sulfate	BaSO4	P	3N	Iron Nitride	Fe3N	P	2N5	Sodium Chloride	NaCl	C	2N5
	BaTi4O9										
Barium Titanate	9	HP	2N5	Iron Oxide	FeO	P	3N	Sodium Fluoride	NaF	C	5N
Barium Titanate	BaTiO3	P	5N	Iron Oxide	Fe2O3	P	5N	Strontium Fluoride	SrF2	P	3N
Beryllium	Be	F	3N	Iron Oxide	Fe3O4	EM	5N	Strontium Oxide	SrO	P	2N5
Bismuth	Bi	B	2N8	Iron Phosphide	FeP	EM	3N	Tantalum	Ta	F	3N
Bismuth Telluride	Bi2Te3	B	2N	Iron Sulfide	FeS2	P	3N	Tantalum Carbide	TaC	HP	3N
Bismuth Oxide	Bi2O3	P	2N5	Lead	Pb	P	Opt	Tantalum Nitride	TaN	P	4N8
								Ta2O5			
Boron	B	P	1N75	Lead Oxide	PbO	F	2N8	Tantalum Oxide	5	P	1N8
								Ta2O5			
Boron Carbide	B4C	P	5N	Lead Sulfide	PbS	P	Opt	Tantalum Oxide	5	TF	2N8
Boron Nitride	BN	B	4N	Lanthanum Hexaboride	LaB6	P	3N5	1000Å/Ta			2N5
Boron Phosphide	BP	P	3N	Lanthanum Oxide	La2O3	C	3N	Tantalum Silicide	TaSi2	P	2N5
Cadmium	Cd	F	Opt	Lithium Fluoride	LiF	P	4N	Tellurium	Te	B	2N
Cadmium Sulfide	CdS	P	3N	Magnesium	Mg	C	3N	Terbium	Tb	F	2N5
Calcium Carbonate	CaCO3	C	3N+	Magnesium Fluoride	MgF2	F	3N	Thorium	Th	F	?
Calcium Fluoride	CaF2	C	3N	Magnesium Oxide	MgO	C	4N	Thallium Chloride	TlCl	P	3N8
Carbon (Pyrolytic)	C	CVD	5N	Manganese	Mn	C	3N	Thorium Oxide	ThO2	P	2N5
Carbon (Diamond)	C	C	4N7	Manganese Sulfide	MnS	B	2N5	Thulium	Tm	F	2N5
Cerium Oxide	CeO2	P	2N5	Mercury Iodide	HgI2	P	2N+	Tin	Sn	F	2N5
Cesium Iodide	CsI	O	2N	Mercury Oxide	MnO2	P	?	Tin Oxide	SnO2	EM	2N5
CsBr	P	3N	2N7	Mercury Sulfide	HgS	P	4N5	Titanium	Ti	F	2N7
Chromium	Cr	P	4N6	Molybdenum	Mo	C	4N	Titanium Al Carbide	Ti2AlC	P	2N
Chromium Nitride	Cr2N	P	2N5	Molybdenum Carbide	Mo2C	F	4N8	Titanium Carbide	TiC	HP	2N5
Chromium Oxide	Cr2O3	HP	5N	Molybdenum Silicide	MoSi2	HP	3N	Titanium Diboride	TiB2	HP	2N5
Cobalt	Co	F	5N	Molybdenum Oxide	MoO3	P	2N5	Titanium Dioxide	TiO2	EM	2N5
Cobalt Oxide	Co3O4	P	3N	Osmium	Os	P	2N	Titanium Nitride	TiN	P	4N5
Cobalt Silicide	CoSi2	P	2N	Neodymium oxide	Nd2O3	P	2N8	Titanium Oxide	TiO	HP	3N
Copper	Cu	F	2N	Neodymium fluoride	NdF3	F	3N	Titanium Silicide	TiSi2	P	3N
Cupric Oxide	CuO	P	3N	Nickel	Ni	C	2N5	Tungsten	W	F	4N
Cuprous Oxide	Cu2O	EM	3N	Nickel oxide	NiO	F	3N5	Tungsten Carbide	WC	HP	4N8
Copper Sulfide	CuS	M	3N	Nickel Phosphide	Ni2P	P	3N	Tungsten Nitride	WN	P	3N
Copper Sulfide	Cu2S	M	2N+	Nickel Silicide	NiSi2	P	3N	Tungsten Oxide	WO3	P	2N+
Dysprosium	Dy	F	4N	Niobium	Nb	P	Opt	Tungsten Silicide	WSi2	P	Opt
Erbium	Er	F	5N	Nickel Aluminate	NiAl	P	2N5	Uranium 238	U	F	4N
Europium Oxide	Eu2O3	HP	3N	Niobium Carbide	NbC	P	2N5	partially oxidized			
Gadolinium	Gd	F	5N	Niobium Oxide	Nb2O5	HP	4N	Vanadium	V	F	2N5
Gallium Arsenide	GaAs	C	5N	Palladium	Pd	P	3N	Vanadium Carbide	VC	HP	4N
Gallium Nitride	GaN	P	3N	Platinum	Pt	F	4N	Vanadium Nitride	VN	P	2N5
Gallium Phosphide	GaP	P	2N5	Potassium Bromide	KBr	F	4N	Vanadium Oxide	V2O5	P	4N
Gallium Antimonide	GaSb	P	2N5	Potassium Chloride	KCl	C	3N5	Ytterbium	Yb	F	3N
Germanium	Ge	B	2N	Potassium Iodide	KI	C	3N	Yttrium	Y	F	3N
Germanium Oxide	GeO	P	2N5	Praeseodymium Fluoride	PrF3	C	3N8	YAG	YAIO	C	?
Gold	Au	F	3N	Rhenium	Re	HP	3N	Yttrium Oxide	Y2O3	P	4N
Hafnium	Hf	F	3N	Rhenium Oxide	ReO3	F	3N	Zinc	Zn	F	4N8
Hafnium Boride	HfB2	P	4N7	Rhodium	Rh	P	3N	Zinc Oxide	ZnO	HP	?
Hafnium Carbide	HfC	B	6N	Rubidium Chloride	RbCl	F	3N	Zinc Selenide	ZnSe	C	?
Hafnium Nitride	HfN	P	2N5	Rubidium Iodide	RbI	P	2N7	Zinc Sulfide	ZnS	C	?
Hafnium Oxide	HfO2	P	3N	Ruthenium	Ru	P	2N8	Zirconium	Zr	F	2N8
Holmium	Ho	B	3N	Samarium	Sm	P	3N5	Zirconium Carbide	ZrC	HP	?
Indium	In	F	3N	Scandium	Sc	F	4N8	Zirconium Nitride	ZrN	P	2N5
Indium Arsenide	InAs	C	?	Selenium	Se	C	3N	Zirconium Oxide	ZrO2	C	2N7
Indium Phosphide	InP	C	5N	Silicon	Si	C	Opt	Zirconium Oxide	ZrO2	C	2N7

**Abbreviations:**

M Natural mineral

B Bulk material

**Purity:**

? Means we do not have an analysis but the purity is at least 2N.

Opt optical crystal  
TF Thin film  
HP Hot pressed  
P

C Crystalline  
EM End member mineral  
F Foil

"N" is the # of "9"s. 5N would be 99.999% pure, 2N5 would be 99.5%  
"+" means higher purity

# Minerals

MINERAL	FORMULA (Approximate formula)	MINERAL, continued	FORMULA (Approximate formula)
Acanthite	Ag <sub>2</sub> S	Diopside	CaMgSi <sub>2</sub> O <sub>6</sub>
Albite	NaAlSi <sub>3</sub> O <sub>8</sub>	Dolomite	CaMg(CO <sub>3</sub> ) <sub>2</sub>
Almandine	Fe <sub>3</sub> +2Al <sub>2</sub> (SiO <sub>4</sub> ) <sub>3</sub>	Fayalite	Fe <sup>2+</sup> SiO <sub>4</sub>
Andradite	Ca <sub>3</sub> Fe <sub>2</sub> +3(SiO <sub>4</sub> ) <sub>3</sub>	Fluorapatite	Ca <sub>5</sub> (PO <sub>4</sub> ) <sub>3</sub> F
Anorthite	CaAl <sub>2</sub> Si <sub>2</sub> O <sub>8</sub>	Forsterite	Mg <sub>2</sub> SiO <sub>4</sub>
Barite	BaSO <sub>4</sub>	Hematite	Fe <sub>2</sub> O <sub>3</sub>
Benitoite	BaTiSi <sub>3</sub> O <sub>9</sub>	Hornblende (Amphibole)	Ca <sub>2</sub> (Mg,Fe <sup>2+</sup> ) <sub>4</sub> Al(Si <sub>7</sub> Al)O <sub>22</sub> (OH,F) <sub>2</sub>
Biotite (black mica)	K(Mg,Fe <sup>2+</sup> ) <sub>3</sub> (Al,Fe <sup>+3</sup> )Si <sub>3</sub> O <sub>10</sub> (OH,F) <sub>2</sub>	Kyanite	Al <sub>2</sub> O <sub>3</sub> •SiO <sub>2</sub>
Bytownite	(Na,Ca)Al(Al,Si)Si <sub>2</sub> O <sub>8</sub>	Magnetite	Fe <sub>3</sub> O <sub>4</sub>
Calcium Carbonate	CaCO <sub>3</sub>	Orthoclase	K <sub>2</sub> O•Al <sub>2</sub> O <sub>3</sub> •6SiO <sub>2</sub>
Cassiterite	SnO <sub>2</sub>	Quartz	SiO <sub>2</sub>
Chalcocite	Cu <sub>2</sub> S	Rutile	TiO <sub>2</sub>
Cinnabar	HgS	Sodalite	Na <sub>4</sub> (AlCl)Al <sub>2</sub> (SiO <sub>4</sub> ) <sub>3</sub>
Chrysoberyl	BeAl <sub>2</sub> O <sub>4</sub>	Spinel	MgAl <sub>2</sub> O <sub>4</sub>
Covellite	CuS	Willemite (Troosite)	Zn <sub>2</sub> SiO <sub>4</sub>
Cuprite	Cu <sub>2</sub> O	Wollastonite	CaSiO <sub>3</sub>
<b>Diamond</b>	C (natural cleaved ~1mm)	<b>Note:</b> electron probe compositions provided upon request or with standard.	
Diamond (like)	Matches Raman for Diamond	Some standards have minor phases of other materials	

## NIST Standards: Glasses & Alloys

Glasses	B203	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				.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						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					1.23	12.46		
C2402	7.3	.01	.64	.007	.018	.85	.19				51.5	16.15	.22	17.1								1.5	
2321		Solder: Sn 60%, Pb 40%																					
SRM-481	6 wire in one 3mm disc. Ag: Au (pure Ag, pure Au, 20:80, 40:60, 60:40, 80:20).																						
SRM-482	5 wires in one 3mm mount. Cu: Au (20:80, 40:60, 60:40, 80:20) + pure Cu.																						
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		.05	.05	
664	Bal	.87	.25	.01	.025	.066	.25		.024		.14	.06	.10	.49	.23	.05	.10	.069	.15	.11	.15	.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 303	C-4140	Inco 600	CDA 360
AISI 304	C-4340	Inco 625	CDA 510
AISI 316	C-8620	Inco 718	CDA 655
AISI 321	Tool Steel A-6	Inco 800	CDA 857
AISI 410	Tool Steel D-2	Hastaloy C-22	
AISI 440C	Tool Steel H-13	Hastaloy C-276	
PH13-8MO	Tool Steel M-2	Hastaloy X	
15-5 PH	2-Cr-1Mo (36a)		
17-4PH	9Cr-1Mo (38a)		
CARP 20CB3			
Maraging 300			
HK-40			

**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 gun shot residue calibration

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

**Bold** marked standards are at extra cost. See price list.

- **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.**