



# GELLER MICROANALYTICAL LABORATORY, Inc.

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*Elements & Compounds*

*December 2021*

*Certified to ISO-9001 and 17025*

STANDARD	Formula	FORM	PURITY	STANDARD	Formula	FORM	PURITY	STANDARD	Formula	FORM	PURITY
Aluminum	Al	F	4N	Indium Antimonide	InSb	P	3N ?	Selenium	Se	C	3N
Aluminum Fluoride	AlF3	P	2N5	Indium Sn Ox 10% In	ITO	P	4N	Silicon	Si	C	5N
Aluminum Oxide	Al2O3	C	4N ?	(Inhomogenous)				Silicon Carbide	SiC	CVD	Opt ?
Aluminum Nitride	AlN	P	2N+	Indium Selenide	In2Se3	P	4N	Silicon Dioxide	SiO2	EM	2N5 ?
Antimony	Sb	B	4N8	Indium Sulfide	In2S3	P	3N8	1000A/Silicon	SiO2	TF	3N5
Barium Fluoride	BaF2	C	2N	Iridium	Ir	P	3N5	Silicon Nitride	Si3N4	HP	2N
Barium Sulfate	BaSO4	P	3N ?	Iron Carbide	Fe3C	F	3N	468A/Silicon	Si3N4	TF	2N5
Barium Titanate	BaTi4O9	HP	2N5 ?	Iron	Fe	P	4N	Silver	Ag	F	3N
Barium Titanate	BaTiO3	P	3N	Iron Fluoride	FeF3	P	3N	Silver Chloride	AgCl	C *	5N
Beryllium	Be	F	2N	Iron Nitride	Fe2.4N	P	3N ?	Silver Oxide	Ag2O	P	3N ?
Bismuth	Bi	B	6N?	Iron Oxide	FeO	P	3N ?	Silver Sulfide	Ag2S	C	?
Bismuth Telluride	Bi2Te3	B	2N5N	Iron Oxide	Fe2O3	P	5N	Sodium Chloride	NaCl	C	2N5
Bismuth Oxide	Bi2O3	P	2N5 ?	Iron Oxide	Fe3O4	EM	5N	Sodium Fluoride	NaF	C	5N
Boron	B	B	2N5	Iron Phosphide	FeP	EM	3N	Strontium Fluoride	SrF2	C	3N
Boron Carbide	B4C	P	5N?	Iron Sulfide	FeS2	P	3N?	Tantalum	Ta	F	3N5
Boron Nitride	BN	B	4N	Lead	Pb	F	4N8	Tantalum Carbide	TaC	HP	3N?
Boron Phosphide	BP	P	3N	Lead Oxide	PbO	F	2N8	Tantalum Nitride	TaN	P	4N8
Cadmium	Cd	F	4N7	Lead Telluride	PbTe	P	5N	Tantalum Oxide	Ta2O5	P	1N8 ?
Cadmium Sulfide	CdS	P	3N	Lead Sulfide	PbS	P	Opt ?	Tantalum Oxide	Ta2O5	TF	2N8
Cadmium Telluride	CdTe	B	5N	Lanthanum Hexaboride	LaB6	P	3N5 ?	1000A/Ta			2N5
Calcium Carbonate	CaCO3	C	3N ?	Lanthanum Fluoride	LaF3	P	Opt	Tantalum Silicide	TaSi2	P	2N5
Calcium Fluoride	CaF2	C	3N	Lutetium Fluoride	LuF3	P	3N	Tellurium	Te	B	5N
Carbon (Pyrolytic)	C	CVD	3N ?	Lithium Fluoride	LiF	P	4N	Terbium	Tb	F	3N
<b>Carbon (Diamond)</b>	C	C	?	Magnesium	Mg	C *	3N	Thallium Chloride	TlCl	P	3N8 ?
Cerium Oxide	CeO2	P	2N1	Magnesium Fluoride	MgF2	P	3N?	Thorium Oxide	ThO2	P	2N5 ?
Cesium Iodide	CsI	O *	2N ?	Magnesium Oxide	MgO	C	4N	Thulium	Tm	F	2N5
Cesium Bromide	CsBr	P *	4N	Manganese	Mn	B	3N	Tin	Sn	F	5N
Chromium	Cr	B	4N6	Manganese Sulfide	MnS	B	2N5	Tin Oxide	SnO2	EM	2N5
Chromium Carbide	Cr3C2	P	2N8	Manganese Oxide	MnO2	P	?	Tin Sulfide	SnS	P	2N5
Chromium Nitride	Cr2N	P	2N5	Mercury Telluride	HgTe	C	5N	Tin Selenide	SnSe	P	5N
Chromium Oxide	Cr2O3	HP	5N	Mercury Sulfide	HgS	P	4N5 ?	Titanium	Ti	F	2N5
Cobalt	Co	F	5N	Molybdenum	Mo	C	4N	Titanium Al Carbide	Ti2AlC	P	2N ?
Cobalt Oxide	Co3O4	P	3N	Molybdenum boride	MoB	P	2N	Titanium Carbide	TiC	HP	2N5
Cobalt Silicide	CoSi2	P	2N	Molybdenum Carbide	Mo2C	P	3N5 ?	Titanium Diboride	TiB2	HP	2N5 ?
Cobalt Sulfide	CoS	P	2N5	Molybdenum Silicide	MoSi2	HP	3N	Titanium Dioxide	TiO2	EM	2N5
Copper	Cu	F	4N5	Molybdenum Oxide	MoO3	P	2N5 ?	Titanium Nitride	TiN	P	4N5
Cupric Oxide	CuO	P	3N	Osmium	Os	P	4N5	Titanium Oxide	TiO	HP	3N
Cuprous Oxide	Cu2O	EM	3N	Neodymium oxide	Nd2O3	P	2N8	Titanium Silicide	TiSi2	P	3N
Coper Selenide	CuSe	B	2N5	Neodymium fluoride	NdF3	F	3N	Tungsten	W	F	4N
Copper Sulfide	CuS	M	3N	Nickel	Ni	C	4N4	Tungsten Carbide	WC	HP	4N8
Copper Sulfide	Cu2S	M	2N+ ?	Nickel oxide	NiO	P	3N5 ?	Tungsten Oxide	WO3	P	2N+
Dysprosium	Dy	F *	3N	Nickel Phosphide	Ni2P	P	3N	Tungsten Silicide	WSi2	P	2N5
Erbium	Er	F *	3N ?	Niobium Nitride	NbN	P	2N5	Tungsten Sulfide	WS2	P	2N8
Europium Oxide	Eu2O3	HP	3N	Nickel Silicide	NiSi2	P	3N?	Vanadium	V	F	2N5
Gadolinium	Gd	F *	3N ?	Niobium	Nb	F	3N7	Vanadium Carbide	VC	HP	4N ?
Gallium Arsenide	GaAs	C	5N ?	Nickel Aluminate	NiAl	P	2N5	Vanadium Nitride	VN	P	2N5 ?
Gallium Nitride	GaN	P	3N	Niobium Carbide	NbC	P	2N5 ?	Vanadium Oxide	V2O5	P	4N ?
Gallium Phosphide	GaP	P	2N5	Niobium Oxide	Nb2O5	HP	4N ?	Ytterbium	Yb	F	3N
Gallium Antimonide	GaSb	P	2N5 ?	Palladium	Pd	P	3N	Ytterbium oxide	Yb2O3	P	3N
Gallium Selenide	G23Se3	P	4N	Platinum	Pt	F	3N	Yttrium	Y	F *	3N
Gallium Sulfide	Ga2S3	B	4N	Potassium Bromide	KBr	C	4N?	YAG	YAIO	C	?
Germanium	Ge	B	2N	Potassium Chloride	KCl	C	3N5 ?	Yttrium Oxide	Y2O3	P	4N
Germanium Oxide	GeO	P	2N5	Potassium Iodide	KI	C	3N?	Zinc	Zn	F	3N8
Gold	Au	F	4N	Praeseodymium Fluoride	PrF3	C	3N8	Zinc Oxide	ZnO	HP	3N
Hafnium	Hf	F	2N5 ?	Rhenium	Re	F	3N7	Zinc Selenide	ZnSe	C	?
Hafnium Boride	HfB2	P	4N7	Rhenium Oxide	ReO2	F	3N?	Zinc Sulfide	ZnS	C	?
Hafnium Carbide	HfC	B	6N	Rhodium	Rh	W	2N8	Zirconium	Zr	F	3N5
Hafnium Nitride	HfN	P	2N5	Rubidium Chloride	RbCl	F	3N?	Zirconium Carbide	ZrC	HP	?
Hafnium Oxide	HfO2	P	3N?	Rubidium Iodide	RbI	P	2N7	Zirconium Nitride	ZrN	P	2N5
Holmium	Ho	B	3N	Ruthenium	Ru	B	3N	Zirconium Oxide (Mineral)	ZrO2	C	2N7 ?
Indium	In	F	4N	Samarium	Sm	F	3N				
Indium Arsenide	InAs	C	?	Scandium	Sc	F	2N9				
Indium Phosphide	InP	C	5N ?								

See next page for the FORM abbreviations. Note: supplier's certifications for metals does not include O, C, etc. concentrations.

N - is the # of "9"s. 5N would be 99.999% pure, 2N5 would be 99.5%. "+" means higher purity  
 ? - No certificate available. Most original containers with marked purity. With EDS analysis we see no additional elements (>0.1%)  
 \* - These standards are very sensitive to humidity and should be kept in vacuum. We suggest using our Vacu-Storr desiccators.

TF - Thin film                      C - Crystalline                      Opt -Optical crystal  
 H - Hot pressed                    EM - End member mineral            W - wire section  
 F - Metal foil                        M - Natural mineral                    B - Bulk material

## Minerals

MINERAL	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 <sub>2</sub> <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>
Augite	(Ca,Na)(Mg,Fe,Al,Ti)(Si,Al) <sub>2</sub> O <sub>6</sub>	Hematite	Fe <sub>2</sub> O <sub>3</sub>
Baddeleyite	ZrO <sub>2</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>
Barite	BaSO <sub>4</sub>	Kyanite	Al <sub>2</sub> O <sub>3</sub> •SiO <sub>2</sub>
Benitoite	BaTiSi <sub>3</sub> O <sub>9</sub>	Magnetite	Fe <sub>3</sub> O <sub>4</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>	Orthoclase	K <sub>2</sub> O•Al <sub>2</sub> O <sub>3</sub> •6SiO <sub>2</sub>
Bytownite	(Na,Ca)Al(Al,Si)Si <sub>2</sub> O <sub>8</sub>	Pyrope	Mg <sub>3</sub> Al <sub>2</sub> (SiO <sub>4</sub> ) <sub>3</sub>
Calcium Carbonate	CaCO <sub>3</sub>	Quartz	SiO <sub>2</sub>
Cassiterite	SnO <sub>2</sub>	Rutile	TiO <sub>2</sub>
Chalcocite	Cu <sub>2</sub> S	Sodalite	Na <sub>4</sub> (AlCl)Al <sub>2</sub> (SiO <sub>4</sub> ) <sub>3</sub>
Cinnabar	HgS	Spessartine	Mn <sup>2+</sup> <sub>3</sub> 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	Titanite	CaTiSiO <sub>5</sub>
Cuprite	Cu <sub>2</sub> O	Uraninite	UO <sub>2</sub>
Diamond	C (natural cleaved ~1mm)	Willemite (Troosite)	Zn <sub>2</sub> SiO <sub>4</sub>
Diamond (like)	Matches Raman for Diamond	Wollastonite	CaSiO <sub>3</sub>

**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					
	Fe	C	Mn	P	S	Si	Cu	Zn	Pb	Sn	Ni	Cr	V	Mo	Ti	As	W	Zr	Nb	Ta	Al	Co
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					1.99	.22	.053	1.03	.18			.021				.055
1762	Bal	.034	2.03	.036	.03	.36	.12			.046	1.15	.92	.200	.35	.095	.018		.029	.07	.021	.069	.062
1763	Bal	.20	1.59	.012	.022	.63	.043		.044		.51			.5	.31			.1				.095
1764	Bal	.59	1.22	.023	.012	.06	.5				1.48	.106	.20	.28					.42			
1765	Bal	.006	.14	.007	.004	.005			.002		.154	.051	.004	.005	.0055							.1022
1766	Bal	.015	.06	.004	.002	.01	.015		.003		.021	.024	.009	.0035					.005		.012	.002
1767	Bal	.051	.02	.005	.009	.02	.0014			.006	.002		.033	.02	.011				.01		.004	.005
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 .

<b>Stainless Steels + High Temp.</b>	<b>Low Alloy + Specialty</b>	<b>Nickel/Cobalt</b>	<b>Copper/Brass/Bronze</b>
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.**