

# TABLE OF CONTENTS

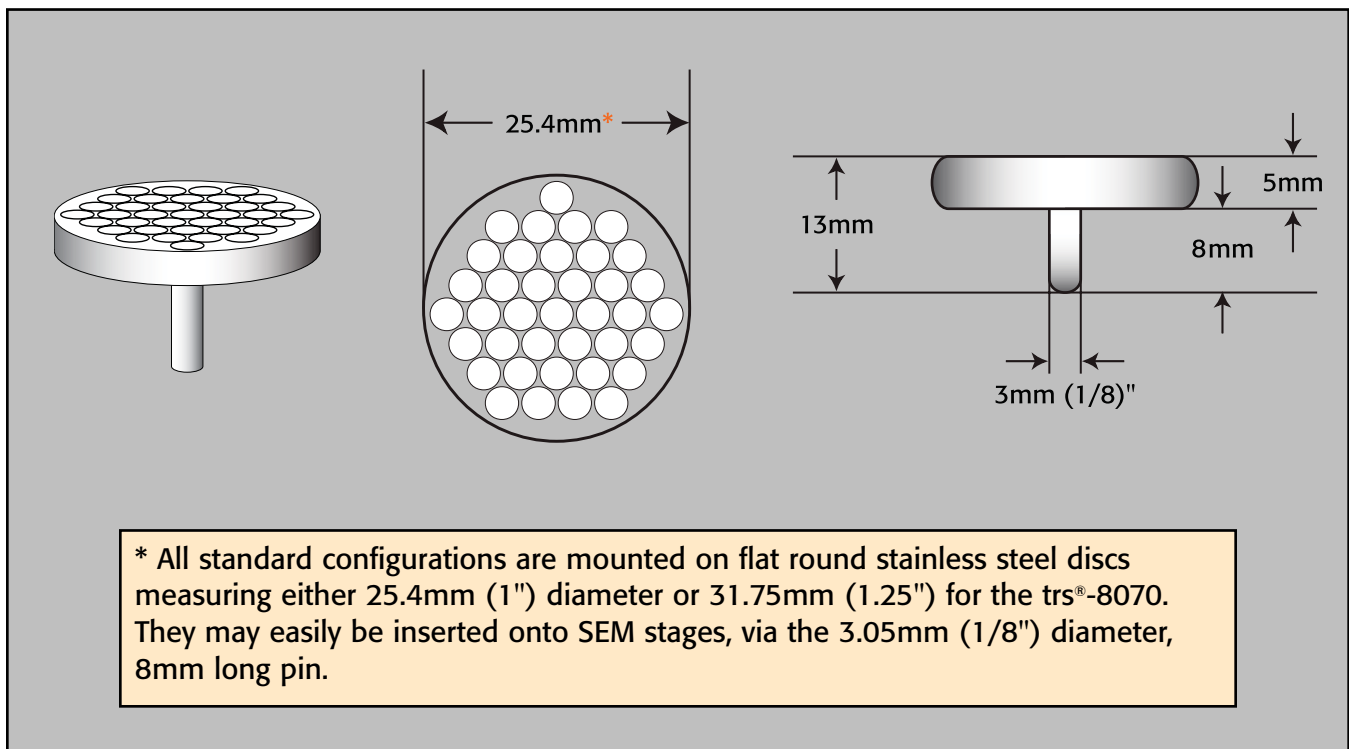
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Chapter 1	The tousimis reference standards™ Overview	2
Chapter 2	The tousimis reference standards™ Individual Maps	4
	#8026 Periodic Table I - (elements from Li to Ge)	4
	#8027 Periodic Table II - (elements from Se to U)	5
	#8028 Periodic Table III - (elements not included in I and II)	6
	#8025 General Metallurgical - (40 elements represented)	7
	#8045 General Metallurgical - (42 elements represented)	8
	#8030 Biological - (21 elements represented in 19 niches)	9
	#8060 Special - for 38 individual standards	10
	NIST®-SRM # 481 Au-Ag Alloy System	11
	NIST®-SRM # 482 Au-Cu Alloy System	12
Chapter 3	Materials List for the tousimis reference standards™	13
	Aluminum - Cadmium	14
	Calcium - Dysprosium	15
	Flourine - Lanthanum	16
	Lead - Nitrogen	17
	Oxygen - Selenium	18
	Silicon - Sulfur	19
	Tantalum - Zirconium	20
	Steel / Iron Alloys	21
	Aluminum, Lead/Tin, NB-Tungsten 20% Molybdenium, Brass, Gold/Silver	22
	Glass Standards	23
	User's Notes	24

## The tousimis reference standards™ Overview

The **tousimis**® laboratories have developed and made available a complete spectrum of electron probe X-ray microanalysis reference standards for the TEM, STEM, SEM, and EXPM. Expertise acquired through forty years of experience working with microanalysis reference materials enables **tousimis**® to offer the most reliable calibration standards available. Elements/compounds of the highest purity are carefully selected in our laboratories, then painstakingly mounted and polished flat by a novel **tousimis**® laboratories procedure, and finally coated with spectrographically pure carbon for electroconductivity. Since these precision standards are polished to a high, flat finish, they can be used not only for qualitative microanalysis in the energy dispersive spectrometer, but also for precise take-off angle measurements quantitative analysis in both energy and wavelength systems.

### trs® Standard Configuration



The tousimis X-Ray Microanalysis Reference Standards since 1957 can be used in the EDS or WDS modes.

On the following pages, please note the size and configuration of each **tousimis**® X-ray reference standard. All of the standards are in stock with the configuration shown except the #8060 and the new #8070. The #8060 and #8070 are "special"; in other words, you may choose the exact elements, compounds, or alloys that are best suited to your needs. An extensive listing of elements, compounds and alloys can be found on the following pages, all of which have been collected and analyzed during the many years of our involvement in the field. From this list you may choose each standard to create your "special" #8060 or #8070. Our experience of over forty years in the development of X-ray reference standards has allowed us to select and reselect only the finest elements, compounds, minerals and alloys available throughout the world.

## **Pure Elements (metals & semiconductors):**

With purities up to 6-9's (99.9999%).

## **Natural Minerals**

Selected from all over the world and chosen on the basis of their optical, chemical, x-ray diffraction, and electron probe x-ray microanalysis characteristics.

## **Synthetic**

Minerals, compounds, and alloys suitable for x-ray microanalysis prepared by the latest technology.

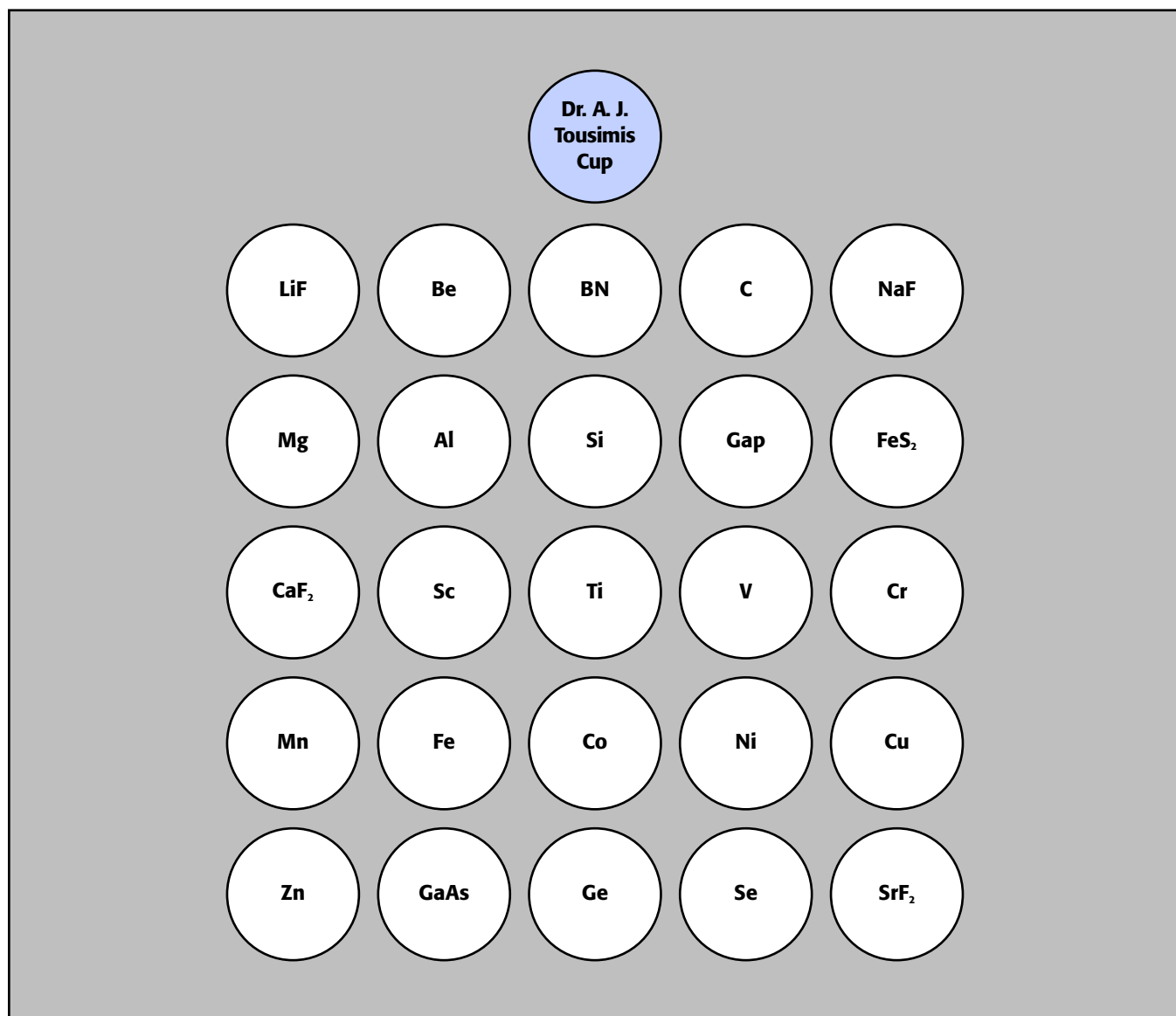
**tousimis**® can also prepare standards to your specifications for any x-ray microanalytical use whether it is in biology, mineralogy, or metallurgy. Please write or call.

**tousimis**® X-ray reference standards (trs®) are furnished with certificates of analysis in most cases. These analyses are based on at least 3 independent laboratory analyses with procedures and standardizations traceable to the US NIST or other laboratories.

Repolishing service of trs® is available; call or write to have us restore your old and used trs® standards, for a nominal charge. We will be assisting you with the X-ray reference standards and keeping you up-to-date with our ever growing collection via new acquisitions.

## tousimis reference standards™ Individual Maps

## #8026 Periodic Table I - (elements from Li to Sr)

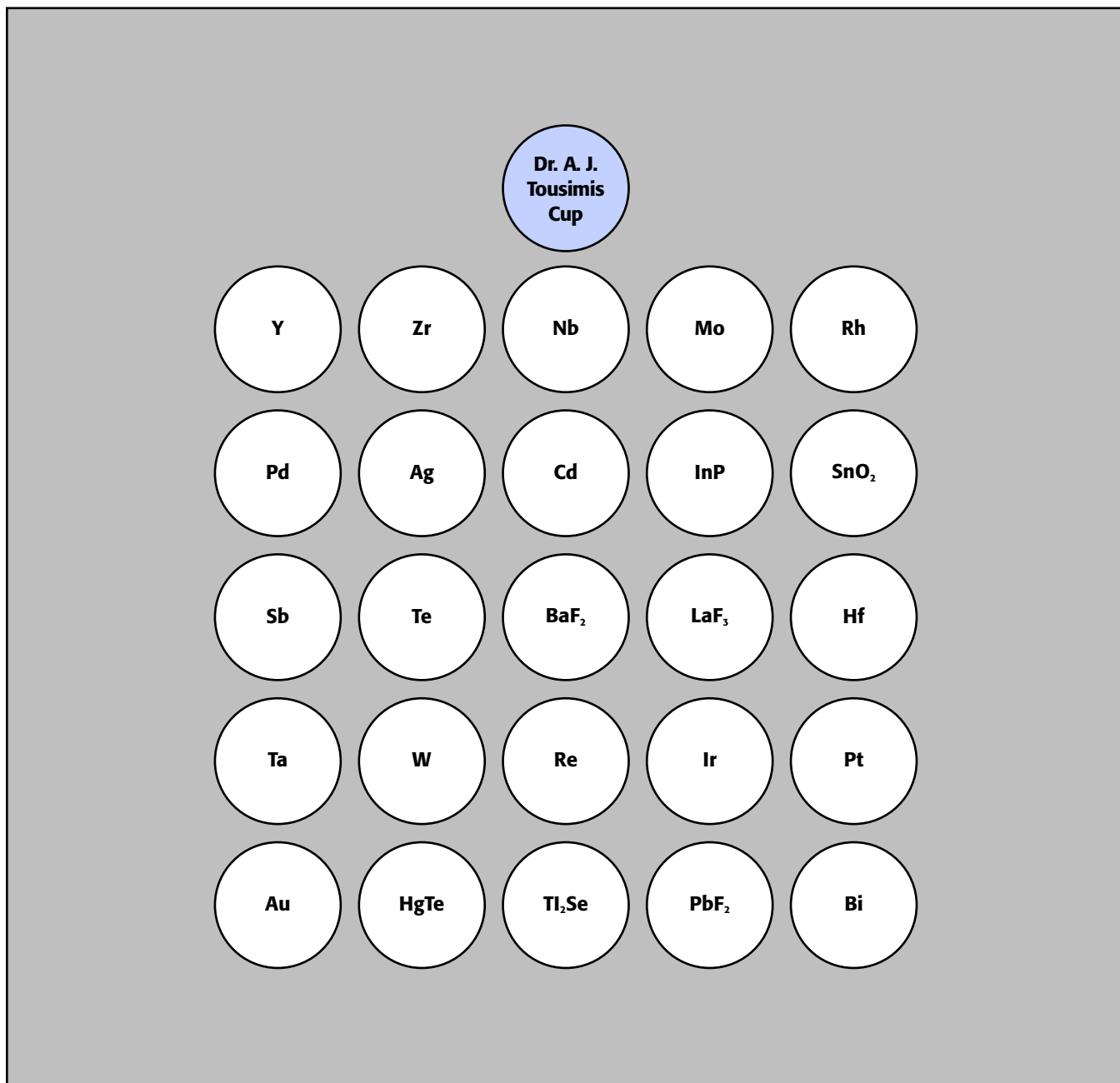


Mounted and polished on a stainless steel disc [diameter: 25.4 mm, height: 5 mm], with or without pin [diameter: 3 mm, length: 8 mm]. Please inquire for custom configuration.

*Certification of all standards is furnished free of charge except for natural minerals: certifications are available at a nominal charge.*

The tousimis X-Ray Microanalysis Reference Standards since 1957 can be used in the EDS or WDS modes.

**#8027 Periodic Table II - (elements from Se to U)**



Mounted and polished on a stainless steel disc [diameter: 25.4 mm, height: 5 mm], with or without pin [diameter: 3 mm, length: 8 mm]. Please inquire for custom configuration.

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**#8028 Periodic Table III - (elements not included in I and II)**

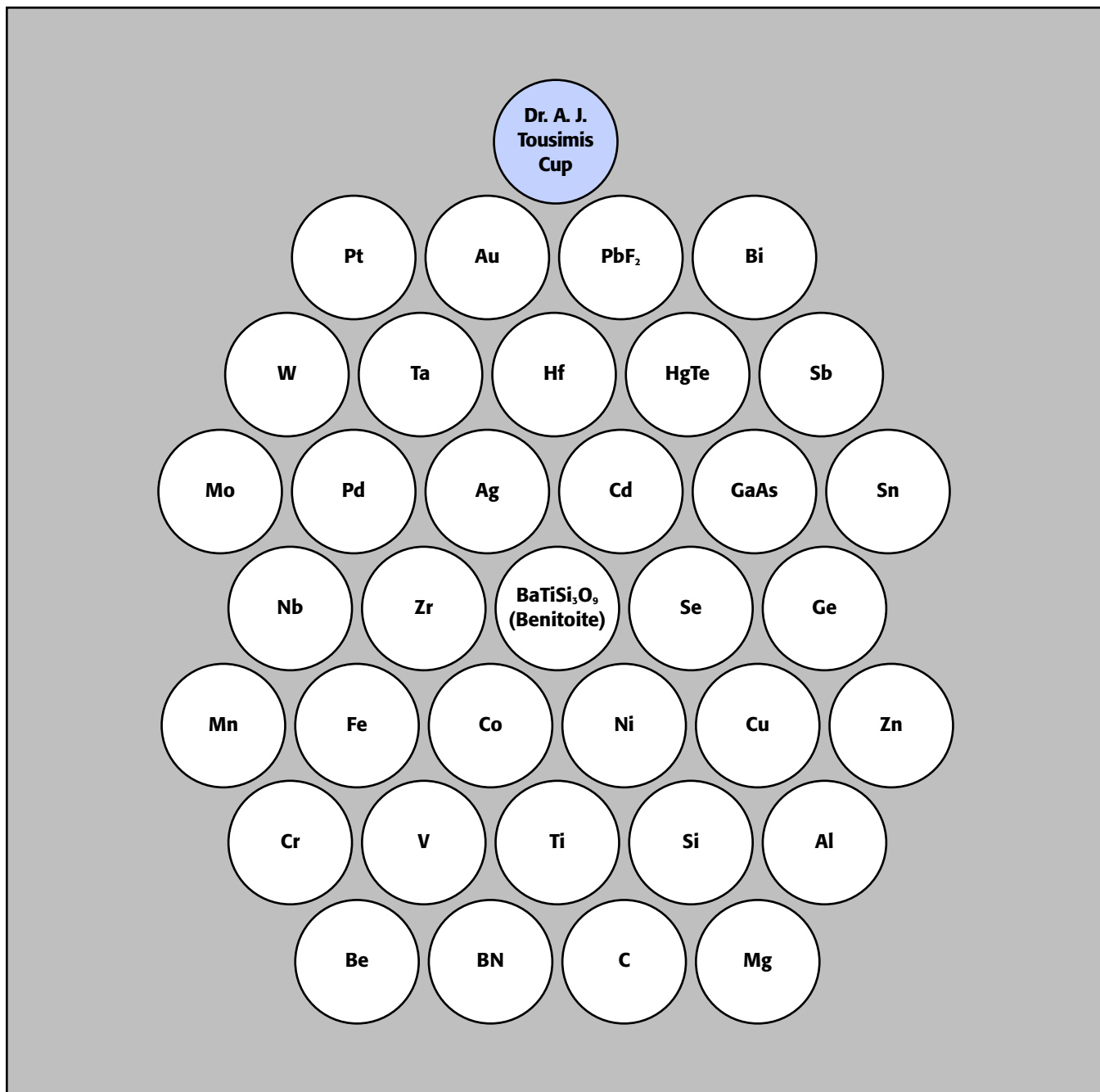
		<b>Ca<sub>5</sub>(PO<sub>4</sub>)<sub>3</sub>F</b> (Fluorapatite)		
<b>CaB<sub>2</sub>(SiO<sub>4</sub>)<sub>2</sub></b>	<b>NaCl</b>	<b>MgCo<sub>3</sub></b>	<b>Al<sub>2</sub>O<sub>3</sub></b>	<b>SiO</b>
<b>ZnS</b>	<b>KBr</b>	<b>Rubidium Acid Phthalate</b>	<b>CsI</b>	<b>BaTiSi<sub>3</sub>O<sub>9</sub></b> (Benitoite)
<b>CaF<sub>3</sub></b>	<b>PrF<sub>3</sub></b>	<b>Gd</b>	<b>Tb</b>	<b>Dy</b>
<b>Ho</b>	<b>Tm</b>	<b>Yb</b>	<b>Lu</b>	<b>HgS</b>
<b>MnCO<sub>3</sub></b>	<b>CaCO<sub>3</sub></b>	<b>ZnCO<sub>3</sub></b>	<b>CaWO<sub>4</sub></b>	<b>PbCO<sub>3</sub></b>

Mounted and polished on a stainless steel disc [diameter: 25.4 mm, height: 5 mm], with or without pin [diameter: 3 mm, length: 8 mm]. Please inquire for custom configuration.

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**#8025 General Metallurgical - (40 elements represented)**

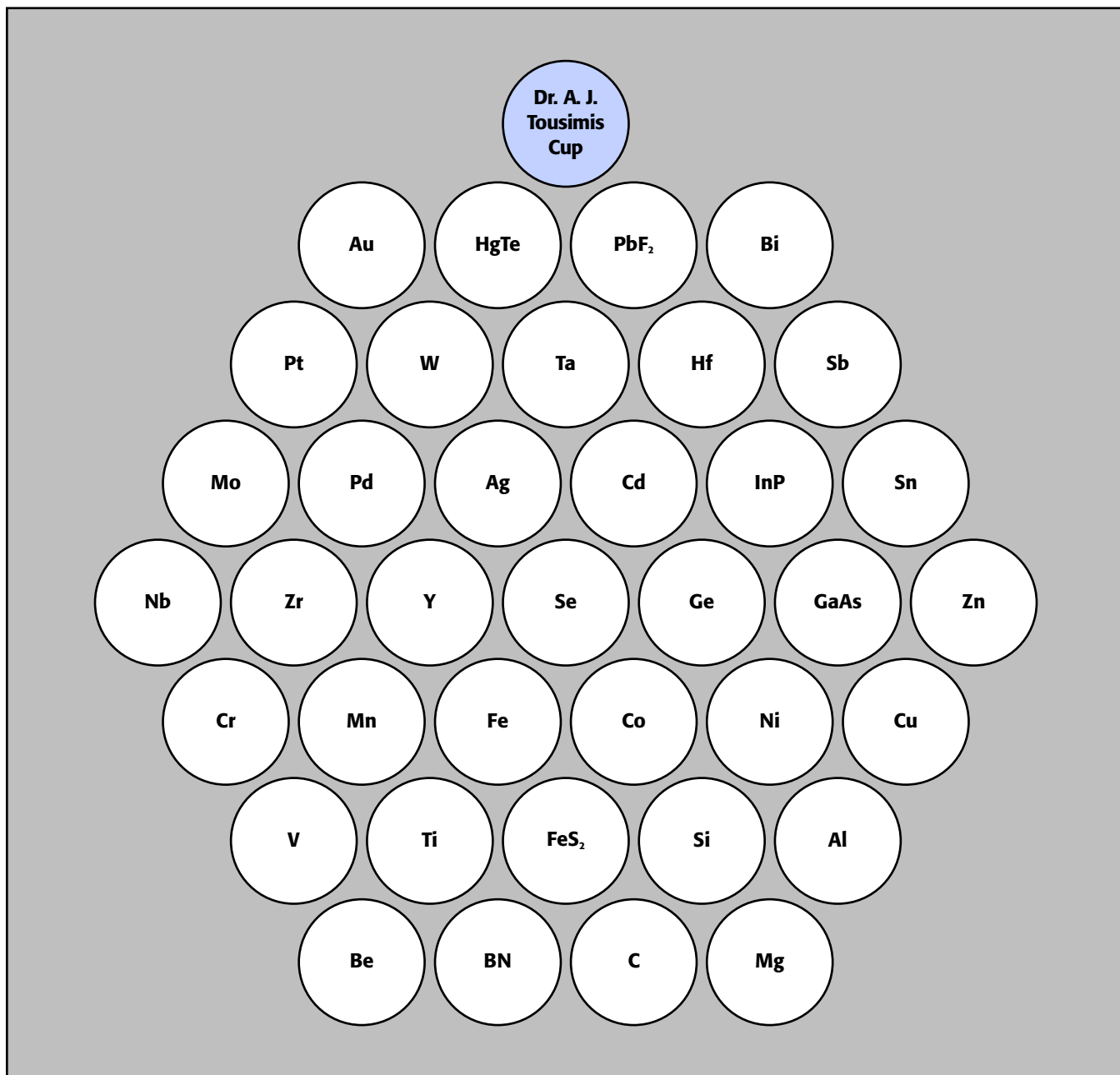


Mounted and polished on a stainless steel disc [diameter: 25.4 mm, height: 5 mm], with or without pin [diameter: 3 mm, length: 8 mm]. Please inquire for custom configuration.

*Certification of all standards is furnished free of charge except for natural minerals: certifications are available at a nominal charge.*

The tousimis X-Ray Microanalysis Reference Standards since 1957 can be used in the EDS or WDS modes.

**#8045 General Metallurgical - (42 elements represented)**

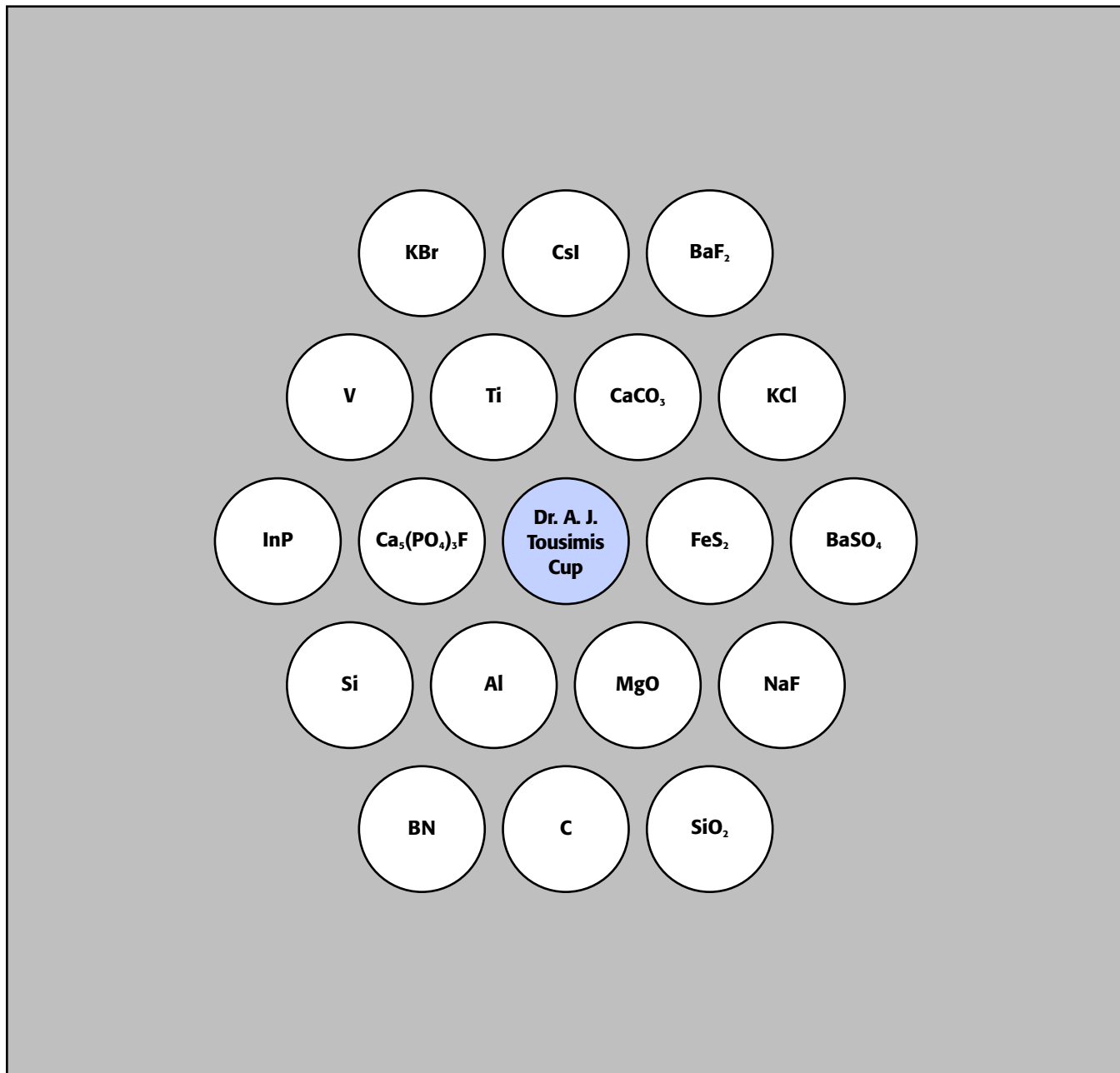


Mounted and polished on a stainless steel disc [diameter: 25.4 mm, height: 5 mm], with or without pin [diameter: 3 mm, length: 8 mm]. Please inquire for custom configuration.

*Certification of all standards is furnished free of charge except for natural minerals: certifications are available at a nominal charge.*

The tousimis X-Ray Microanalysis Reference Standards since 1957 can be used in the EDS or WDS modes.

**#8030 Biological - (21 elements represented in 18 niches)**



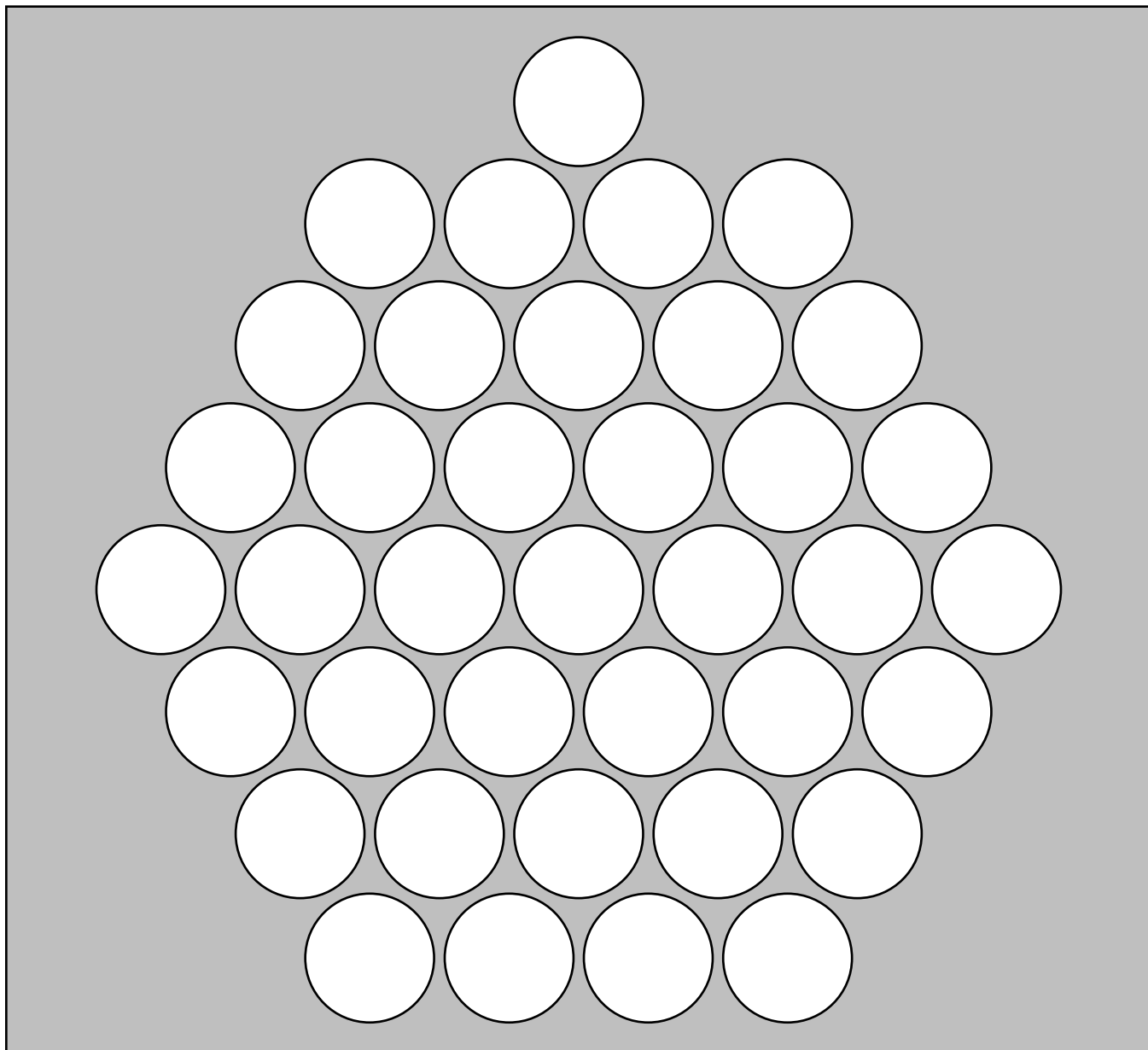
Mounted and polished on a stainless steel disc [diameter: 25.4 mm, height: 5 mm], with or without pin [diameter: 3 mm, length: 8 mm]. Please inquire for custom configuration.

*Certification of all standards is furnished free of charge except for natural minerals: certifications are available at a nominal charge.*

The tousimis X-Ray Microanalysis Reference Standards since 1957 can be used in the EDS or WDS modes.

**#8060 Custom - (for 38 individual standards)**

**Custom Design Your Configuration; Select Your Standards from Our Material List**



**Fill in the above map with your choice of elements/compounds and alloys listed in the following pages. Arrange the map configuration you desire, and we will prepare the standard for you. Allow ten working days for shipping. The blank discs are 25.4mm (1") diameter, and 5mm thick, with or without mounting pin [please specify].**

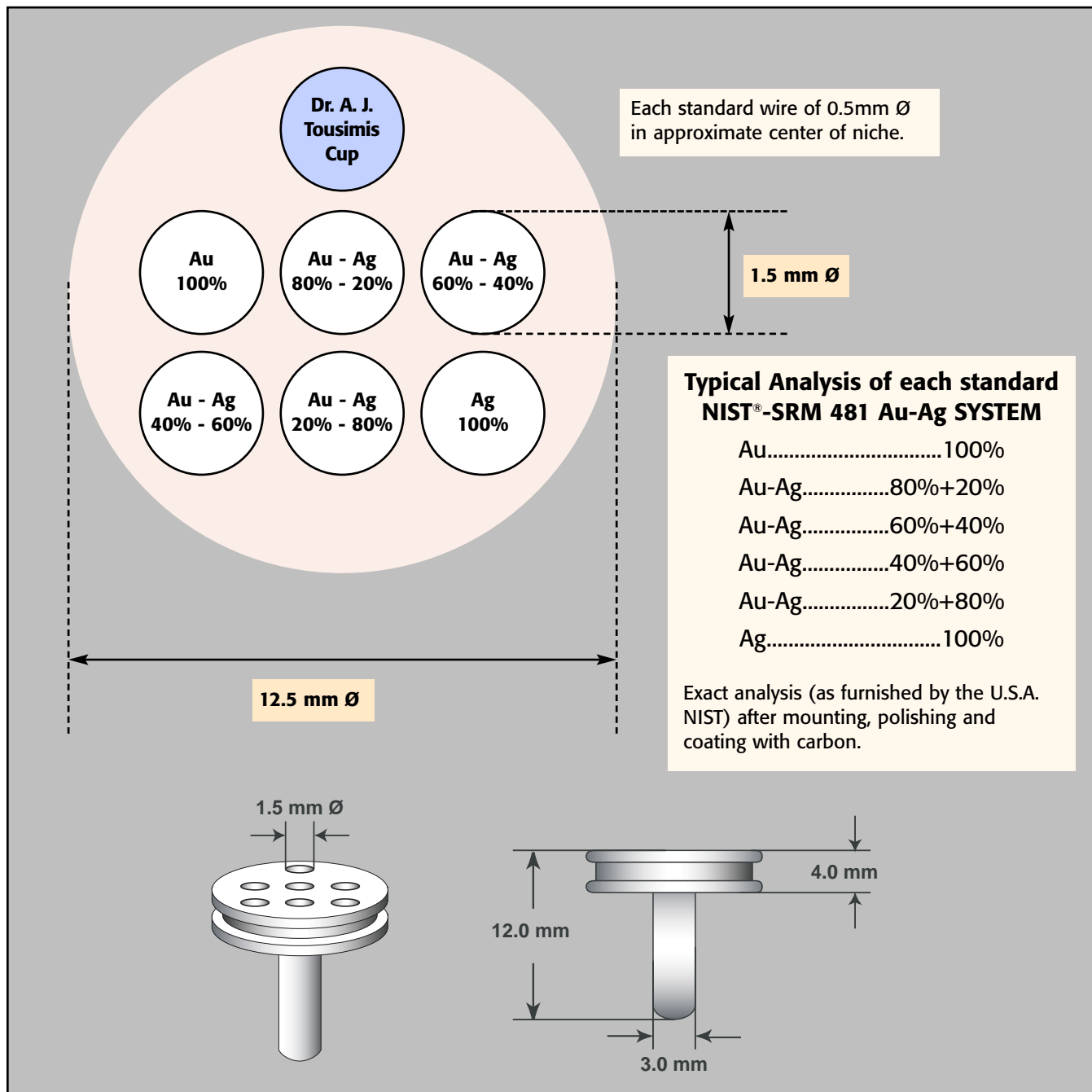
Mounted and polished on a stainless steel disc [diameter: 25.4 mm, height: 5 mm], with or without pin [diameter: 3 mm, length: 8 mm]. Please inquire for custom configuration.

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The tousimis X-Ray Microanalysis Reference Standards since 1957 can be used in the EDS or WDS modes.

**NIST®-SRM # 481 Pure Element Au-Ag Alloy System**

**For EDS & WDS Microanalysis**



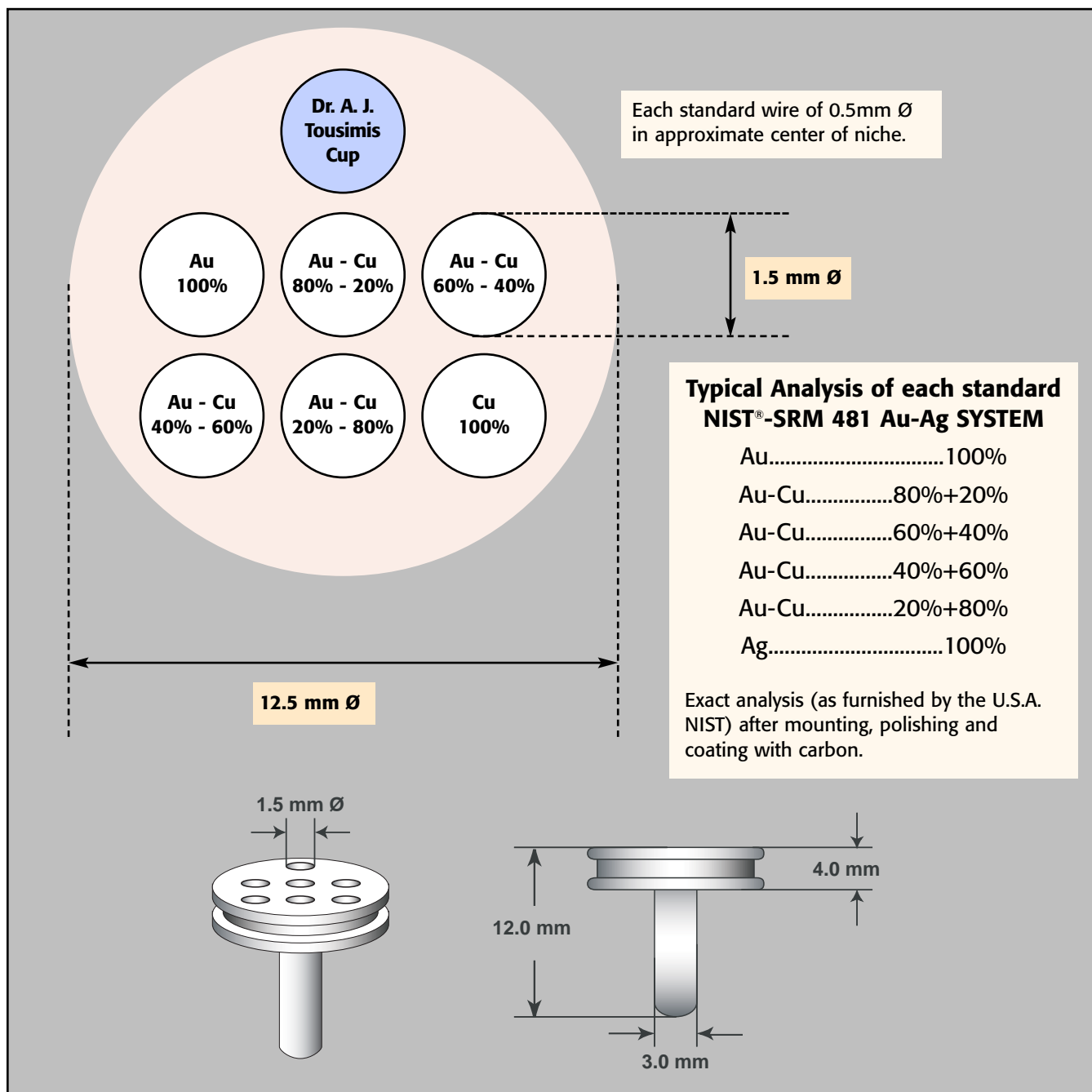
Mounted and polished on a stainless steel or Aluminum disc [diameter: 12.5 mm, height: 12 mm], with or without pin [diameter: 3 mm, length: 8 mm]. Please inquire for custom configuration.

*Certification of all standards is furnished free of charge.*

The tousimis X-Ray Microanalysis Reference Standards since 1957 can be used either EDS or WDS modes.

**NIST®-SRM # 482 Pure Element Au-Cu Alloy System**

**For EDS & WDS Microanalysis**



Mounted and polished on a stainless steel or Aluminum disc [diameter: 12.5 mm, height: 12 mm], with or without pin [diameter: 3 mm, length: 8 mm]. Please inquire for custom configuration.

*Certification of all standards is furnished free of charge.*

The tousimis X-Ray Microanalysis Reference Standards since 1957 can be used either EDS or WDS modes.

## Materials List for the tousimis reference standards™

*These notes apply to all tousimis® x-ray reference standards listed in this catalog...*

1. \* Indicates hygroscopic and could be damaged by high electron fluxes.
2. \*\* Available at \$500.00 above the basic price of our catalog #8060.
3. \*\*\* These standards are of the highest purity currently available. Certificates of analyses are issued, as per order, at a nominal charge. Please inquire.
4. (n) designates a natural mineral while (s) designates a synthetic mineral. Certificates of analyses are issued at a nominal charge. Please inquire.
5. Single crystal materials (elements and compounds) are available upon request at much higher prices.
6. Uranium and Thorium compounds are available on special request. Radioactive materials handling charge (\$500.00) is required. If any elements or compounds are not listed, please inquire.
7. To average out the structural integrity of minerals, alloys, and glass standards, the investigator should analyze, using a 25µm radius electron beam, in at least three to ten randomly selected areas of the standard. Typical composition of the major elemental components for these standards are listed. A certificate of analysis will be issued with each X-ray reference standard as mounted and ready to use, on request at a nominal charge.
8. Whenever NIST is indicated, reference is to the National Institute of Standards and Technology, formerly known as NBS (U.S. National Bureau of Standards) A charge for holder fabrication is added.
9. ALCOA is a trademark of the Aluminum Company of America.
10. trs® is a trademark of tousimis research corporation.
11. Many of these X-ray reference standards can be custom mounted in the trs® #8060, or in any customer designed or desired holder. A charge for holder fabrication is added.
12. Certificates of analyses (traceable to NIST or other laboratories) are furnished free of charge for all pure metals and semiconductors. For natural minerals, alloys, and glasses, see previous notes.
13. Substitution and reconditioning service is available. Please call.

*The tousimis® laboratories have been supplying the world's laboratories with X-ray reference standards since 1957.*

*We welcome you to our satisfied family of tousimis® x-ray reference standard users.*

ALUMINUM (Al)		BARIUM (Ba)	
Al		BaSO <sub>4</sub>	(n)
KAlSi <sub>3</sub> O <sub>8</sub>	(n)	BaF <sub>2</sub>	
NaAlSi <sub>3</sub> O <sub>8</sub>	(n)	BaTiSi <sub>3</sub> O <sub>9</sub>	(n)
Fe <sub>3</sub> Al <sub>2</sub> (SiO <sub>4</sub> ) <sub>3</sub>	(n)		
Al <sub>2</sub> O <sub>3</sub>	(n), (**)	BERYLLIUM (Be)	
Al <sub>2</sub> O <sub>3</sub>	(s)	Be	
Be <sub>3</sub> Al <sub>2</sub> Si <sub>6</sub> O <sub>18</sub>	(n)	Be <sub>3</sub> Al <sub>2</sub> Si <sub>6</sub> O <sub>18</sub>	(n)
BeAl <sub>2</sub> O <sub>4</sub>	(n)	BeAl <sub>2</sub> O <sub>4</sub>	(n)
Ca <sub>3</sub> Al <sub>2</sub> (SiO <sub>4</sub> ) <sub>3</sub>	(n)	Be <sub>2</sub> SiO <sub>4</sub>	(n)
LiAlSi <sub>2</sub> O <sub>6</sub>			
ANTIMONY (Sb)		BISMUTH (Bi)	
Sb		Bi	
Ag <sub>3</sub> Sb	(n)	BORON (B)	
InSb		B(special order only)(**)	
Ag <sub>3</sub> Sb <sub>3</sub>	(n)	Mg <sub>3</sub> B <sub>7</sub> O <sub>13</sub> Cl	(n)
Sb <sub>2</sub> O <sub>3</sub>	(n)	BN	
Ag <sub>5</sub> SbS <sub>4</sub>	(n)	CaB <sub>2</sub> (SiO <sub>4</sub> ) <sub>2</sub>	(n)
Sb <sub>2</sub> S <sub>3</sub>	(n)	B <sub>2</sub> O <sub>3</sub>	(*)
ARSENIC (As)		BROMINE (Br)	
As		KBr	(*), (***)
As <sub>2</sub> Se <sub>3</sub>	(***)	AgBr	(*), (***)
As <sub>2</sub> Te <sub>3</sub>	(***)		
GaAs		CADMIUM (Cd)	
InAsS		Cd	
FeAsS	(n)	CdF <sub>2</sub>	
Co <sub>3</sub> AsS <sub>4</sub>	(n)	CdTe	(***)
Pb <sub>5</sub> (AsO <sub>4</sub> ) <sub>3</sub> Cl	(n)		
Pb <sub>4</sub> Fe(AsO <sub>4</sub> ) <sub>2</sub> Cl <sub>4</sub>	(n)		
As <sub>2</sub> S <sub>3</sub>	(n)		

\* Indicates hygroscopic and could be damaged by high electron fluxes

\*\* Available at \$500.00 instead of the basic price of our catalog #8060

\*\*\* These standards are of the highest purity currently available. Certificates of analyses are issued, as per order, at a nominal charge. Please inquire.

(n) designates a natural mineral while (s) designates a synthetic mineral. Certificates of analyses for the natural(n) are issued at a nominal charge. Please inquire.

# Material List (Calcium - DYSPROSIUM)

## CALCIUM (Ca)

$\text{Ca}_2\text{Fe}_2(\text{SiO}_4)_3$	(n)
$\text{CaCO}_3$	(n)
$\text{CaB}_2(\text{SiO}_4)_2$	(n)
$\text{CaF}_2$	(n)
$\text{CaF}_2$	(n)
$\text{CaSO}_4$	(***)
$\text{CaMg}(\text{CO}_3)_2$	(n)
$\text{Ca}_5(\text{PO}_4)_3\text{F}$	(n)
$\text{Na}_2\text{Ca}(\text{SO}_4)_3$	(n)
$\text{Ca}_3\text{Al}(\text{SiO}_4)_3$	(n)
$\text{CaWO}_4$	(n)
$\text{CaTiSiO}_5$	(n)
$\text{CaSiO}_3$	(n)

## CARBON (C)

C	(pyrolytic graphite)
$\text{CaCO}_3$	(n)
$\text{PbClO}_3$	(n)
$\text{CaMg}(\text{CoO}_3)_2$	(n)
$\text{MgCO}_3$	(n)
$\text{RbC}_8\text{H}_5\text{O}_4$	(*), (***)
$\text{FeCO}_3$	(n)
$\text{ZnCO}_3$	(n)

## CERIUM (Ce)

$\text{CeF}_3$
$\text{CeO}_2$

## CESIUM (Cs)

CsI	(*), (***)
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## CHLORINE (Cl)

$\text{Mg}_3\text{B}_7\text{O}_{13}\text{Cl}$	(n)
NaCl	(n), (*)
$\text{Pb}_5(\text{AsO}_4)_2\text{Cl}_4$	(n)
$\text{Pb}_4\text{Fe}(\text{AsO}_4)_2\text{Cl}_4$	(n)
KCl	(*), (***)
$\text{Pb}_5(\text{PO}_4)_3\text{Cl}$	(n)
$\text{Pb}_5(\text{VO})_3\text{Cl}$	(n)

## CHROMIUM (Cr)

Cr
$\text{Cr}_2\text{O}_3$
$\text{PbCrO}_4$

## COBALT (Co)

Co	
CoAsS	(n)

## COPPER (Cu)

Cu	
$\text{Cu}_2\text{S}$	(n)
CuS	(n)
$\text{Cu}_2\text{O}$	(n)
$\text{Cu}_3\text{AsS}_4$	(n)

## DYSPROSIUM (Dy)

Dy
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# Material List (FLOURINE - LANTHANUM)

FLOURINE (F)		HOLMIUM (Ho)	
BaF <sub>2</sub>		Ho	
CaF <sub>2</sub>	(n)		
CaF <sub>2</sub>		INDIUM (In)	
CdF <sub>2</sub>		InSb	
CeF <sub>3</sub>		InAs	
Ca <sub>5</sub> (PO <sub>4</sub> ) <sub>3</sub> F	(n)	InP	
LaF <sub>3</sub>		IODINE (I)	
PbF <sub>2</sub>		CsI	(*), (***)
LiF	(***)	IRIDIUM (Ir)	
MgF <sub>2</sub>		Ir	(**)
NdF <sub>3</sub>		IRON (Fe)	
PrF <sub>3</sub>		Fe	
NaF		Fe <sub>3</sub> Al <sub>2</sub> (SiO <sub>4</sub> ) <sub>3</sub>	(n)
SrF <sub>2</sub>		Ca <sub>3</sub> Fe <sub>2</sub> (SiO <sub>4</sub> ) <sub>3</sub>	(n)
GADOLINIUM (Gd)		FeAsS	(n)
Gd		Fe <sub>2</sub> O <sub>3</sub>	(n)
GALLIUM (Ga)		FeTiO <sub>3</sub>	(n)
GaAs		Fe <sub>3</sub> O <sub>4</sub>	(n)
GaP		Pb <sub>4</sub> Fe(AsO <sub>4</sub> ) <sub>2</sub> Cl <sub>4</sub>	(n)
GERMANIUM (Ge)		FeS <sub>2</sub>	(n)
Ge		FeCO <sub>3</sub>	(n)
GeTe		LANTHANUM (La)	
GOLD (Au)		LaF <sub>2</sub>	
Au			
HAFNIUM (Hf)			
Hf			

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## LEAD (Pb)

PbSO <sub>4</sub>	(n)
PbCO <sub>3</sub>	(n)
PbCrO <sub>4</sub>	(n)
PbS	(n)
PbSe	
PbTe	
Pb <sub>5</sub> (AsO <sub>4</sub> ) <sub>3</sub> Cl	(n)
Pb <sub>4</sub> Fe(AsO <sub>4</sub> ) <sub>3</sub> Cl	(n)
Pb <sub>5</sub> (VO <sub>4</sub> ) <sub>3</sub> Cl	(n)
PbMoO <sub>4</sub>	(n)

## LITHIUM (Li)

LiF	(***)
LiAlSi <sub>2</sub> O <sub>6</sub>	(n)

## LUTETIUM (Lu)

Lu	(***)
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## MAGNESIUM (Mg)

Mg	
Mg <sub>3</sub> B <sub>7</sub> O <sub>13</sub> Cl	(n)
CaMgSi <sub>2</sub> O <sub>6</sub>	(n)
CaMg(CO <sub>3</sub> ) <sub>2</sub>	(n)
MgSi <sub>2</sub> O <sub>6</sub>	(n)
MgCO <sub>3</sub>	(n)
MgF <sub>2</sub>	
MgO	

## MANGANESE (Mn)

Mn	
MnO	(n)
MnCO <sub>3</sub>	(n)

## MERCURY (Hg)

HgS	(n)
HgTe	

## MOLYBDENUM (Mo)

Mo	
PbMoO <sub>4</sub>	(n)

## NEODYMIUM (Nd)

NdF <sub>3</sub>	
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## NICKEL (Ni)

Ni	
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## NIOBIUM (Nb)

Nb	
Nb <sub>2</sub> O <sub>5</sub>	

## NITROGEN (N)

BN	
Si <sub>3</sub> N <sub>4</sub>	

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## OXYGEN (O)

NOTE: For oxides only. See alternate listings for carbonates and silicates.

Al<sub>2</sub>O<sub>3</sub> (n), (\*\*)

Al<sub>2</sub>O<sub>3</sub>

TiO<sub>2</sub>

SnO<sub>2</sub>

CeO<sub>2</sub>

Cr<sub>2</sub>O<sub>3</sub>

BeAl<sub>2</sub>O<sub>4</sub>

PbCrO<sub>4</sub> (n)

Cu<sub>2</sub>O (n)

FeTiO<sub>3</sub> (n)

Fe<sub>2</sub>O<sub>3</sub> (n)

MnO (n)

MgO

Nb<sub>2</sub>O<sub>5</sub>

SiO<sub>2</sub> (n)

SiO<sub>2</sub>

Sb<sub>2</sub>O<sub>3</sub> (n)

SiO

TeO<sub>2</sub> (\*\*\*)

PbMoO<sub>4</sub> (n)

## PALLADIUM (Pd)

Pd

## PHOSPHORUS (P)

Ca<sub>5</sub>(PO<sub>4</sub>)<sub>3</sub>F (n)

GaP

InP

Pb<sub>5</sub>(PO<sub>4</sub>)<sub>3</sub>Cl (n)

## PLATINUM (Pt)

Pt

## POTASSIUM (K)

KAlSi<sub>3</sub>O<sub>8</sub> (n)

KBr (\*), (\*\*\*)

KCl (\*), (\*\*\*)

## PRASEODYMIUM (Pr)

PrF<sub>3</sub>

## RHENIUM (Re)

Re

## RHODIUM (Rh)

Rh

## RUBIDIUM (Rb)

RbC<sub>8</sub>H<sub>5</sub>O<sub>4</sub> (s), (\*), (\*\*\*)

## SCANDIUM (Sc)

Sc (\*\*\*)

## SELENIUM (Se)

Se

As<sub>2</sub>Se<sub>3</sub> (\*\*\*)

PbSe

Ti<sub>2</sub>Se

ZnSe

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SILICON (Si)		SODIUM (Na)	
Si		NaAlSiO <sub>8</sub>	(n)
KAlSi <sub>3</sub> O <sub>8</sub>	(n)	Na <sub>2</sub> Ca(SO <sub>4</sub> ) <sub>2</sub>	(n)
NaAlSi <sub>3</sub> O <sub>8</sub>	(n)	NaCl	(n), (*)
Fe <sub>3</sub> Al <sub>2</sub> (SiO <sub>4</sub> ) <sub>3</sub>	(n)	NaF	(*)
Ca <sub>3</sub> Fe <sub>2</sub> (SiO <sub>4</sub> ) <sub>3</sub>	(n)	<b>STRONTIUM (Sr)</b>	
BaTiSi <sub>3</sub> O <sub>9</sub>	(n)	SrSO <sub>4</sub>	(n)
CaB <sub>2</sub> (SiO <sub>4</sub> ) <sub>2</sub>	(n)	SrF <sub>2</sub>	
CaMgSi <sub>2</sub> O <sub>6</sub>	(n)	<b>SULFUR (S)</b>	
Mg <sub>2</sub> Si <sub>2</sub> O <sub>6</sub>	(n)	Ag <sub>2</sub> S	(n)
Ca <sub>3</sub> Al <sub>2</sub> (SiO <sub>4</sub> ) <sub>3</sub>	(n)	PbSO <sub>4</sub>	(n)
Be <sub>2</sub> SiO <sub>4</sub>	(n)	FeAsS	(n)
SiO <sub>2</sub>	(n)	BaSO <sub>4</sub>	(n)
SiO <sub>2</sub>		CaSO <sub>4</sub>	(n)
SiO		Cu <sub>2</sub> S	(n)
Si <sub>2</sub> N <sub>4</sub>		HgS	(n)
LiAlSi <sub>2</sub> O <sub>6</sub>	(n)	CoAsS	(n)
CaTiSiO <sub>5</sub>	(n)	CuS	(n)
CaSiO <sub>3</sub>	(n)	Cu <sub>3</sub> AsS <sub>4</sub>	(n)
ZrSiO <sub>4</sub>	(n)	PbS	(n)
<b>SILVER (Ag)</b>		Na <sub>2</sub> Ca(SO <sub>4</sub> ) <sub>2</sub>	(n)
Ag		AsS <sub>3</sub>	(n)
Ag <sub>2</sub> S	(n)	Ag <sub>3</sub> SbS <sub>3</sub>	(n)
Ag <sub>3</sub> SbS <sub>3</sub>	(n)	FeS <sub>2</sub>	(n)
AgBr	(*), (***)	ZnS	(n)
AgCl	(*), (***)	ZnS	
Ag <sub>3</sub> Sb	(n)	Ag <sub>5</sub> SbS <sub>4</sub>	(n)
Ag <sub>5</sub> SbS <sub>4</sub>	(n)	Sb <sub>2</sub> S <sub>3</sub>	(n)

\* Indicates hygroscopic and could be damaged by high electron fluxes

\*\* Available at \$500.00 instead of the basic price of our catalog #8060

\*\*\* These standards are of the highest purity currently available. Certificates of analyses are issued, as per order, at a nominal charge. Please inquire.

(n) designates a natural mineral while (s) designates a synthetic mineral. Certificates of analyses for the natural(n) are issued at a nominal charge. Please inquire.

# Material List (TANTALUM - ZIRCONIUM)

<b>TANTALUM (Ta)</b>		<b>TITANIUM (Ti)</b>	
Ta		Ti	
<b>TELLURIUM (Te)</b>		BaTiSi <sub>3</sub> O <sub>9</sub>	(n)
Te		TiO <sub>2</sub>	(n)
As <sub>2</sub> Te <sub>3</sub>	(***)	TiO <sub>2</sub>	
CdTe	(***)	FeTiO <sub>3</sub>	(n)
GeTe		CaTiSiO <sub>5</sub>	(n)
HgTe		<b>TUNGSTEN (W)</b>	
PbTe		W	
TeO <sub>2</sub>		CaWO <sub>4</sub>	(n)
<b>TERBIUM (Tb)</b>		<b>VANADIUM (V)</b>	
Tb		V	
<b>THALLIUM (Tl)</b>		Pb <sub>5</sub> (VO <sub>4</sub> ) <sub>3</sub> Cl	(n)
Tl <sub>2</sub> Se		<b>YTTERBIUM (Yb)</b>	
<b>THULLIUM (Tm)</b>		Yb	
Tm		<b>ZINC (Zn)</b>	
<b>TIN (Sn)</b>		Zn	
Sn		ZnCO <sub>3</sub>	(n)
SnO <sub>2</sub>	(n)	ZnS	(n)
SnSe		ZnSe	
		<b>ZIRCONIUM (Zr)</b>	
		Zr	
		ZrSiO <sub>4</sub>	(n)

\* Indicates hygroscopic and could be damaged by high electron fluxes

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STEEL / IRON ALLOYS	
trs* #	trs #
<b>11h</b> NIST STEEL BASIC, open hearth C 0.2, Mn 0.5, Si 0.2; Fe balance + traces	<b>464</b> NIST LOW ALLOY STEEL-D, C 0.5, Mn 0.94, Si 0.5, V 0.3, Fe balance + traces
<b>12h</b> NIST STEEL BASIC, open hearth C 0.4, Mn 0.8, Si 0.2; Fe balance + traces	<b>465</b> NIST INGOT IRON-E, Ti 0.2, Al 0.2; Fe balance + traces
<b>13g</b> NIST STEEL BASIC, open hearth C 0.6, Mn 0.8, Si 0.3; Fe balance + traces	<b>466</b> NIST INGOT IRON-F, Mn 0.11; Fe balance + traces
<b>14f</b> AISI 1078 CARBON STEEL, C 0.75, Mn 0.4, Si 0.2; Fe balance + traces	<b>468</b> NIST LOW ALLOY STEEL-H, C 0.26, Mn 0.5, Cu 0.26, Ni 1.03; Fe balance + traces
<b>16e</b> NIST STEEL BASIC, open hearth C 1.1, Mn 0.4, Si 0.2; Fe balance + traces	<b>479a</b> NIST AUSTENITIC STAINLESS STEEL, Ni 1.09, Cr 18.1, Fe balance + traces
<b>26</b> REFRACTORY, Cr 18.0, Fe 18.0, Co 20.0, Ni 37.0, Mo 3.9	<b>483</b> NIST Fe/Si ALLOY, Si 3.3, Fe 96.7; traces
<b>32e</b> NIST STEEL SAE 3140, C 0.4, Mn 0.8, Si 0.3, Ni 1.2, Cr 0.7; Fe balance + traces	<b>600</b> INCONEL, Cr 15.5, Fe 8.0, Ni 74.7; traces
<b>C46</b> KOVAR, Fe 53.0, Co 17.0, Ni 29.0	<b>661</b> AISI 4340 STEEL, C 0.39, Mn 0.66, Si 0.223, Ni 2.00, Cr 0.69, Mo 0.20; Fe balance
<b>304</b> STAINLESS STEEL, Cr 19.0, Mn 1.5, Fe 69.7, Ni 9.25; traces	<b>662</b> AISI 94B17 STEEL MODIFIED, Mn 1.05, Si 0.40, Cu 0.51, Ni 0.60, Cr 0.30, Ta 0.21; Fe balance
<b>308</b> STAINLESS STEEL 1197, Cr 12.9, Ni 32.6, Mo 3.2, W 6.0, Ti 3.32; Fe balance + traces	<b>663</b> Cr-V STEEL MODIFIED, C 0.57, Mn 1.5, Si 0.74, Cr 1.31, V 0.31; Fe balance + traces
<b>316</b> STAINLESS STEEL C44, Cr 17.61, Mn 1.7, Mo 2.27, Ni 12.44; Fe balance + traces	<b>664</b> NIST HIGH CARBON STEEL MODIFIED, C 0.87, Mn 0.25, Cu 0.25, Mo 0.49, Ti 0.23; Fe balance
<b>342a</b> NIST NODULAR CAST IRON, C 1.9, Mn 0.3, Si 2.73, Cu 0.13; Fe balance	<b>665</b> NIST ELECTROLYTIC IRON, Fe 99.9% plus trace elements.
<b>410</b> STAINLESS STEEL, Cr 11.5-13.5, Mn 1.0, Si 1.0; Fe balance + traces	<b>1134</b> HIGH-SILICON STEEL, Si 3.20, Al 0.33; Fe balance + traces NIST
<b>440c</b> STAINLESS STEEL, Cr 16-18, Mn 1.0, Si 1.0; Fe balance + traces	<b>1135</b> HIGH-SILICON STEEL, Si 3.20; Fe balance + traces
<b>461</b> NIST LOW ALLOY STEEL-A, C 0.15, Mn 0.36, Cu 0.34, Ni 1.73; Fe balance + traces	<b>1155</b> AISI 316, NIST STAINLESS STEEL, Cr 19.0, Ni 14.0, Mo 3.0; Fe balance + traces
<b>462</b> NIST LOW ALLOY STEEL-B, C 0.4, Mn 0.94, Si 0.3, Ni 0.7, Cr 0.74; Fe balance + traces	<b>1157</b> TOOL STEEL AISI M-2, C 0.84, Mn 0.34, Cr 4.36, V 1.82, Mo 4.86, W 6.28; Fe balance + traces
<b>463</b> NIST LOW ALLOY STEEL-C, C 0.2, Mn 0.94, Si 0.3, Cu 0.5, Ni 0.4, Fe balance + traces	

**Typical analyses are given for identification information only. Exact analysis furnished with each purchase.**

**ALUMINUM ALLOYS**

trs #:

**SS332 ALUMINUM K21**, Si 9.9, Fe 0.72, Cu 3.21, Mg 1.01, Ni 0.53; Al balance + traces (ALCOA)\*

**KB356 ALUMINUM 422**, Si 7.50, Mg 0.45; Al balance + traces (ALCOA)\*

**SSA357 ALUMINUM**, Si 7.1, Mg 0.6; Al balance + traces (ALCOA)\*

**KD380 ALUMINUM 71**, Si 9.14, Fe 1.13, Cu 3.59, Mn 0.34, Sn 2.76, Al balance + traces (ALCOA)\*

**SS384 ALUMINUM AG13**, Si 11.5, Fe 1.0, Cu 3.5, Zn 0.6, Al balance + traces (ALCOA)\*

**WA1199 ALUMINUM (PURE)**, traces less than .002 each (complete certificate of analysis by ALCOA and tousimis® laboratories included)

**630 ALUMINUM BRONZE**, Al 10.0, Cu 81.6, Fe 3.10, Ni 4.50, traces

**C1255 NIST ALUMINUM CASTING 356**, Si 7.17, Mg 0.35, Ti 0.15, Al balance

**LEAD / TIN ALLOYS**

AVAILABLE AS INDIVIDUAL ALLOYS NOT AS A GROUP

Pb-Sn ..... 90%-10%

Pb-Sn ..... 70%-30%

Pb-Sn ..... 60%-40%

Pb-Sn ..... 50%-50%

Pb-Sn ..... 37%-63%

**NB-TUNGSTEN 20% MOLYBDENIUM ALLOY (NIST)**

480\*\* W 78.5, Mo 21.5

**BRASS ALLOYS**

**478 CARTRIDGE BRASS**, Cu 72.8, Zn 27.1 (NIST)

**670 BRASS**, Al 4.73, Mn 3.97, Fe 3.07, Cu 63.90, Zn 24.10; traces

**1103 FREE-CUTTING BRASS WROUGHT**, Cu 59.3, Zn 35.7, Pb 3.73, Fe 0.3, Sn 0.9; traces (NIST)

**1106 NAVAL BRASS-A**, Cu 59.0, Zn 40.0; traces (NIST)

**GOLD / COPPER ALLOY (NIST)**  
THE TWO ELEMENTS AND FOUR ALLOYS

**NIST®-SRM 482 Au-Cu SYSTEM**

Au.....100%

Au-Cu.....80%+20%

Au-Cu.....60%+40%

Au-Cu.....40%+60%

Au-Cu.....20%+80%

Ag.....100%

**GOLD / SILVER ALLOY (NIST)**  
THE TWO ELEMENTS AND FOUR ALLOYS

**NIST®-SRM 481 Au-Ag SYSTEM**

Au.....100%

Au-Ag.....80%+20%

Au-Ag.....60%+40%

Au-Ag.....40%+60%

Au-Ag.....20%+80%

Ag.....100%

\* Registered trademark of the Aluminum Company of America.

\*\* Registered trademark of the National Institute of Standards and Technology.

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## GLASS STANDARDS

- 93a** **BOROSILICATE GLASS**, SiO<sub>2</sub> 80.8, B<sub>2</sub>O<sub>3</sub> 12.5, Na<sub>2</sub>O 3.9, Al<sub>2</sub>O<sub>3</sub> 2.2 (NIST)
- 402** **STANDARD GLASS**, Si 37.40, Al 1.32, Na 2.86, B 3.99 + Oxygen
- 404** **STANDARD GLASS**, Si 32.50, Al 1.60, Ca 3.03, Zn 2.65, Na 11.5, F 4.96 + Oxygen
- 405** **STANDARD GLASS**, Si 34.00, Al 0.60, Ca 4.65, Mg 1.7, Na 11.6, K 0.40 + Oxygen
- 408** **STANDARD GLASS**, Si 26.34, Pb 28.4, K 9.8 + Oxygen
- 621** **SODA-LIME GLASS CONTAINER**, SiO<sub>2</sub> 71.13, Na<sub>2</sub>O 12.74, CaO 10.70, Al<sub>2</sub>O<sub>3</sub> 2.76, K<sub>2</sub>O 2.00 (NIST)

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