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Product Information and Frequently Asked Questions

Special XRF Calibration Materials

Dual Element and Variable Stoichiometry Standards / Stoichiometric factors for dual element standards

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Micromatter has manufactured calibration and reference materials for several decades. Our products contain highest quality materials, such as ultra-pure metals or stable inorganic compounds.

What are dual element standards?

Micromatter dual element standards contain compounds of well-defined composition. The area weight noted on the standard and the certification sheet refers to the entire compound. The cation and anion contents can be calculated from the molecular mass of the compound using the stoichiometric ratios of the two components.

Dual element standards are an economic alternative to single element standards as they can be used for calibrating an XRF spectrometer in different energy regions. For example, zinc telluride (ZnTe) can be used to calibrate both the zinc and the tellurium peak. It is not necessary to purchase a separate pure tellurium standard.

Why are some Micromatter standards marked as having 'variable stoichiometry'?

Micromatter produces a number of dual element standards, such as gallium phosphide or gallium arsenide, by evaporation of solid binary compounds onto the desired backing material (Nuclepore membrane or Mylar). Our manufacturing technique follows an established process commonly used in the semiconductor industry.

It has been evaluated that the resulting deposits have a different composition than the starting material. This composition is variable and depends on various factors during the material deposition. Micromatter has recently verified the accuracy of these particular standards by independent chemical analysis. Therefore, any standards that are certified to have a variable stoichiometry are accompanied with individual concentrations/loadings specified for both of the elements in the compound. It is crucial that for compounds with variable stoichiometry, the loadings specified by Micromatter be used, rather than those calculated using stoichiometric factors.

Stoichiometric Factors for dual-element standards with non-variable stoichiometry

The following table lists convenient conversion factors for the calculation of elemental weights from given area weights.

Note: The stoichiometric factor for all pure element standards is 1.00.

Example:
What is the area weight of scandium in my ScF3 standard, if its certified weight is 45.8µg/cm2?

45.8 µg/cm2 x 0.441 (tabulated factor for Sc) = 20.16 µg/cm2

Element	Compound	Factor	Element	Compound	Factor
Li	LiF	0.250	**La**	LaF_3	0.709
Na	NaCl	0.393	**Ce**	CeF_3	0.711
Mg	MgF_2	0.390	**Pr**	PrF_3	0.712
Si	SiO	0.637	**Nd**	NdF_3	0.717
P	GaP	0.308	**Sm**	SmF_3	0.725
S	CuS_x	*	**Eu**	EuF_3	0.727
Cl	KCl	0.476	**Gd**	GdF_3	0.734
	NaCl	0.607	**Tb**	TbF_3	0.736
K	KCl	0.524	**Dy**	DyF_3	0.740
	KI	0.236	**Ho**	HoF_3	0.743
Ca	CaF_2	0.513	**Er**	ErF_3	0.746
Sc	ScF_3	0.441	**Tm**	TmF_3	0.748
Zn	ZnTe	0.339	**Yb**	YbF_3	0.752
Ga	GaP	0.692	**Lu**	LuF_3	0.754
	GaAs	0.482			
As	GaAs	0.518	**W**	WO_3	0.793
Br	CsBr	0.375	**Hg**	AgHg	*
Rb	RbI	0.402	**Tl**	TlCl	0.852
Sr	SrF_2	0.698			
Y	YF_3	0.609			
Zr	ZrF_4	0.546			
Nb	Nb_2O_3	0.795			
Mo	MoO_3	0.667			
Cd	CdSe	0.587			
I	RbI	0.598			
	KI	0.764			
Cs	CsBr	0.625			
Ba	BaF_2	0.783			

*Composition varies. See Certification Sheet for details.