

Specification – Certified Reference Material

Certipur® ICP Multi element standard solution V

Accreditation:



Deutsche
Akkreditierungsstelle
D-RM-15185-01-00

Merck KGaA, Darmstadt, Germany is accredited by the German accreditation authority as registered reference material producer (D-RM-15185-01-00) in accordance with **ISO 17034**.

Producer: Merck KGaA, Frankfurter Str. 250, 64293 Darmstadt, Germany
Description of CRM: ICP Multi element standard solution V
Ord. No.: 1.04492.0500
Expiry date: 3 years
Storage: +15°C to +25°C tightly closed in the original container
Matrix: HCl 5%

Element	Specification	Associated uncertainty, $U=k \cdot u$ ($k=2$) as mass concentration	Traceable to NIST SRM®
Al	15 - 25 mg/l	±4 mg/l	SRM 3101a
As	15 - 25 mg/l	±4 mg/l	SRM 3103a
B	1.5 - 2.5 mg/l	±0.4 mg/l	SRM 3107
Ba	1.5 - 2.5 mg/l	±0.4 mg/l	SRM 3104a
Be	0.75 - 1.25 mg/l	±0.2 mg/l	SRM 3105a
Ca	7.5 - 12.5 mg/l	±2 mg/l	SRM 3109a
Cd	1.5 - 2.5 mg/l	±0.4 mg/l	SRM 3108
Cr	1.5 - 2.5 mg/l	±0.4 mg/l	SRM 3112a
Cu	1.5 - 2.5 mg/l	±0.4 mg/l	SRM 3114
Fe	1.5 - 2.5 mg/l	±0.4 mg/l	SRM 3126a
Hg	4.0 - 6.0 mg/l	±1 mg/l	SRM 3133
K	75 - 125 mg/l	±10 mg/l	SRM 3141a
Li	1.5 - 2.5 mg/l	±0.4 mg/l	SRM 3129a
Mg	0.75 - 1.25 mg/l	±0.2 mg/l	SRM 3131a
Mn	0.75 - 1.25 mg/l	±0.2 mg/l	SRM 3132
Na	15 - 25 mg/l	±4 mg/l	SRM 3152a
Ni	3.7 - 6.3 mg/l	±1 mg/l	SRM 3136
P	7.5 - 12.5 mg/l	±2 mg/l	SRM 3139a
Pb	15 - 25 mg/l	±4 mg/l	SRM 3128
Sc	0.75 - 1.25 mg/l	±0.2 mg/l	SRM 3148a
Se	15 - 25 mg/l	±4 mg/l	SRM 3149
Sr	0.75 - 1.25 mg/l	±0.2 mg/l	SRM 3153a
Te	15 - 25 mg/l	±4 mg/l	SRM 3156
Ti	1.5 - 2.5 mg/l	±0.4 mg/l	SRM 3162a
Y	0.75 - 1.25 mg/l	±0.2 mg/l	SRM 3167a
Zn	1.50 - 2.50 mg/l	±0.4 mg/l	SRM 3168a



Metrological traceability: This certified reference material has been measured applying high precision ICP-OES and is directly traceable to the corresponding **NIST SRM®** as mentioned on page 1.
NIST: National Institute of Standards and Technology, Gaithersburg, USA.

Measurement method: Inductively coupled plasma optical emission spectrometry ICP-OES.

Application and correct use: This certified reference material is intended for use as **wavelength calibration standard** for atomic spectrometry, spectrophotometry and other analytical techniques. Shake well before use and never pipet directly from the original container.

Associated uncertainty:

The associated uncertainty U_{CRM} reported with the certified values is calculated as combined expanded uncertainty $U_{CRM}=k \cdot u_{CRM}$ in accordance with GUM and EA-4/02, with $k=2$ as the coverage factor for a 95% coverage probability.

The combined uncertainty u_{CRM} is derived from combination of the squared uncertainty contributions:

$$u_{CRM} = \sqrt{u^2_{\text{Characterisation}} + u^2_{\text{Homogeneity}} + u^2_{\text{Stability}}}$$

$u_{\text{characterisation}}$: is the uncertainty in accordance with DIN EN ISO/IEC 17025 which includes the contributions of the primary reference material and the measuring system. The characterisation measurements have been conducted by our DAkkS accredited calibration laboratory.

$u_{\text{homogeneity}}$: is the between-bottle variation in accordance with ISO 17034. The assessment of homogeneity is performed by analysis of a representative number of systematically chosen sample units.

$u_{\text{stability}}$: is the uncertainty obtained from short-term and long-term stability in accordance with ISO 17034. The stability studies are the basis for the quantification of the expiry date of this elemental standard for the unopened bottle.

Detailed information is provided by the certificates and the certification report on our website.

