

Specification – Certified Reference Material

Certipur® ICP Multi element standard solution VI

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 VI
Ord. No.: 1.04488.0100
Expiry date: 3 years
Storage: +15°C to +25°C tightly closed in the original container
Matrix: HNO₃ 6%

Element	Specification	Associated uncertainty, $U=k \cdot u$ ($k=2$) as mass concentration	Traceable to NIST SRM®
Ag	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3151
Al	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3101a
As	90 - 110 mg/l	±5 mg/l	SRM 3103a
B	90 - 110 mg/l	±5 mg/l	SRM 3107
Ba	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3104a
Be	90 - 110 mg/l	±5 mg/l	SRM 3105a
Bi	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3106
Ca	900 - 1100 mg/l	±20 mg/l	SRM 3109a
Cd	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3108
Co	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3113
Cr	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3112a
Cu	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3114
Fe	90 - 110 mg/l	±5 mg/l	SRM 3126a
Ga	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3119a
K	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3141a
Li	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3129a
Mg	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3131a
Mn	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3132
Mo	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3134
Na	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3152a
Ni	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3136
Pb	9.0 - 11.0 mg/l	±0.6 mg/l	SRM 3128
Rb	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3145a
Se	90 - 110 mg/l	±5 mg/l	SRM 3149
Sr	9.0 - 11.0 mg/l	±0.6 mg/l	SRM 3153a
Te	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3156
Tl	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3158
U	9.0 - 11.0 mg/l	±0.6 mg/l	SRM 3164
V	9.0 - 11.0 mg/l	±0.5 mg/l	SRM 3165
Zn	90 - 110 mg/l	±5 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 **calibration standard** for atomic absorption spectrometry. 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 $U_{\text{CRM}} = k \cdot u_{\text{CRM}}$ 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:

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

$u_{\text{characterisation}}$: 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.

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