Specification – Certified Reference Material

Certipur® ICP Multi element standard solution VIII

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 VIII**
Ord. No.: 1.04479.0100
Expiry date: 3 years
Storage: +15°C to +25°C tightly closed in the original container
Matrix: HNO_3 6%

Element	Specification	Associated uncertainty, $U=k\cdot u$ ($k=2$) as mass concentration	Traceable to NIST SRM®
Al	90 - 110 mg/l	±3 mg/l	SRM 3101a
B	90 - 110 mg/l	±3 mg/l	SRM 3107
Ba	90 - 110 mg/l	±3 mg/l	SRM 3104a
Be	90 - 110 mg/l	±3 mg/l	SRM 3105a
Bi	90 - 110 mg/l	±3 mg/l	SRM 3106
Ca	90 - 110 mg/l	±3 mg/l	SRM 3109a
Cd	90 - 110 mg/l	±3 mg/l	SRM 3108
Co	90 - 110 mg/l	±3 mg/l	SRM 3113
Cr	90 - 110 mg/l	±3 mg/l	SRM 3112a
Cu	90 - 110 mg/l	±3 mg/l	SRM 3114
Fe	90 - 110 mg/l	±3 mg/l	SRM 3126a
Ga	90 - 110 mg/l	±3 mg/l	SRM 3119a
K	90 - 110 mg/l	±3 mg/l	SRM 3141a
Li	90 - 110 mg/l	±3 mg/l	SRM 3129a
Mg	90 - 110 mg/l	±3 mg/l	SRM 3131a
Mn	90 - 110 mg/l	±3 mg/l	SRM 3132
Na	90 - 110 mg/l	±3 mg/l	SRM 3152a
Ni	90 - 110 mg/l	±3 mg/l	SRM 3136
Pb	90 - 110 mg/l	±3 mg/l	SRM 3128
Se	90 - 110 mg/l	±3 mg/l	SRM 3149
Sr	90 - 110 mg/l	±3 mg/l	SRM 3153a
Te	90 - 110 mg/l	±3 mg/l	SRM 3156
Tl	90 - 110 mg/l	±3 mg/l	SRM 3158
Zn	90 - 110 mg/l	±3 mg/l	SRM 3168a

Merck KGaA, Corporation with General Partners, Frankfurter Straße 250, 64293 Darmstadt, Germany
EMD Millipore Corporation, 400 Summit Drive, Burlington MA 01803, USA, Phone: +1-978-715-4321
MilliporeSigma Canada Ltd., 2149 Winston Park Dr, Oakville, Ontario, L6H 6J8, Canada,
Phone: +1 800-565-1400

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, 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:

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

$u_{characterisation}$: 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.

$u_{homogeneity}$: 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.

$u_{stability}$: 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.