

## **CERTIFICATE**

### **Aqueous calibration solution**

### **ASTASOL® AN9102MHIC**

This Certificate is designed in accordance with ISO Guide 31

**Category:** Certified reference material  
**Analytes:** Br<sup>-</sup>, Cl<sup>-</sup>, F<sup>-</sup>, NO<sub>3</sub><sup>-</sup>, PO<sub>4</sub><sup>3-</sup>, SO<sub>4</sub><sup>2-</sup>  
**Product code:** AN9102MHIC

#### **Starting primary compounds and their purities (%):**

KBr 99.999; KCl 99.997; NaF 99.995; NH<sub>4</sub>NO<sub>3</sub> 99.999; NH<sub>4</sub>H<sub>2</sub>PO<sub>4</sub> 99.999,  
(NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> 99.9999

#### **Matrix:**

Ultrapure demineralized water (resistivity  $\geq 18$  M $\Omega$ .cm, 0.22 $\mu$ m filtered).

The solution is filtered through a membrane ultrafilter 0.45  $\mu$ m to avoid clogging of a chromatography column.

**Density and its expanded uncertainty (k = 2):** 0.9989  $\pm$  0.0005 g/cm<sup>3</sup> (at 20 °C)

**Certified value of concentration and its expanded uncertainty (k = 2) at 20 °C**

**100.0  $\pm$  0.2 mg/l (each analyte)**

**100.1  $\pm$  0.3 mg/kg\* (each analyte)**

\*Mass fraction in mg/kg is derived from density

#### **Specification:**

**Batch No.:** 0007

**The date of production:** 06.10.2022

**Shelf life:** 3 years from the date of production

**The date of first opening of the aluminium bag:** .....

**Expiry date:**.....12 months from the first opening of the aluminium bag within shelf life period, which should be indicated on the label of the bottle as well.

Verze certifikátu / Version of the certificate: 01

1/3

Verze formuláře / Version of the form: 03

**Intended use:**

For calibration and validation of analytical methods analysing aqueous solutions such as atomic spectrometry (AAS, AES, ICP-OES, ICP-MS), molecular absorption spectrometry, ion chromatography and selected electroanalytical methods.

**Certification and traceability:**

This CRM is certified on the basis of gravimetric preparation. This procedure also ensures a direct traceability to SI unit – kg. Certified values, uncertainties and traceability were further verified by primary analytical methods (gravimetric, titrimetric) as well as by instrumental method (IC) calibrated with independent reference solutions (e.g. SRM NIST, in-house solid and liquid CRMs). Analytical methods and references used are listed in the following table.

Analyte	Methods	References
Br <sup>-</sup>	Argentometric titration	Analytika, CRM AN 90711H
Cl <sup>-</sup>	Argentometric titration	Analytika, CRM AN 90721H
F <sup>-</sup>	Complexometric titration	SRM NIST 928
NO <sub>3</sub> <sup>-</sup>	Gravimetric	SRM NIST 3185
PO <sub>4</sub> <sup>3-</sup>	Gravimetric	SRM NIST 3186
SO <sub>4</sub> <sup>2-</sup>	Gravimetric	SRM NIST 3181

**Trace impurities in bottled solution (in mg/l):**

Determination of trace impurities was performed by ion chromatography. Impurity levels are supplied only for information of the user and should not be used as calibration data.

Br <sup>-</sup>	Cl <sup>-</sup>	F <sup>-</sup>	I <sup>-</sup>	NO <sub>2</sub> <sup>-</sup>	NO <sub>3</sub> <sup>-</sup>	PO <sub>4</sub> <sup>3-</sup>	SO <sub>4</sub> <sup>2-</sup>
A	A	A	<0,02	<0,02	A	A	A

< x = below detection limit      A = analyte

**Homogeneity and stability:**

It has been demonstrated that this CRM is homogeneous and its stability is guaranteed during the whole shelf life provided the solution is kept under conditions presented below.

**Storing and instruction for use:**

This CRM must be stored in the original closed bottle between 5 – 30 °C. The producer guarantees a declared shelf life and expiration time provided the CRM is properly stored and professionally handled. The temperature of the solution must be 20 ± 0.5 °C before every use. It is necessary to indicate on this certificate and the label the expiration time, which depends on the date of the first time the aluminium bag was opened. After use, the bottle must be immediately tightly capped, and it is recommended to put it back into the reclosable aluminium bag. It is not recommended to use the standard solution when the bottle contains less than 10 % of the solution. Therefore, in case of non-transparent bottle, it is important to indicate the amount of the solution used, e.g. on the label. Do not pipette from the bottle. Do not return removed aliquots to bottle.

**Note:**


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Detailed information about the production, homogeneity, stability, coding, characterization and storing of this CRM are described in the document “Detailed information about the production of aqueous calibration solutions ASTASOL®“ which is available for download on the website [www.analytika.net](http://www.analytika.net).

**Producer:**


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**Quality management systems of company ANALYTIKA®, spol. s r.o.:**


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ČSN EN ISO 9001:2016  
 ČSN EN ISO/IEC 17025:2018  
 ČSN EN ISO 17034:2017

**Manager of Department of RM:**


Ing. Daniela Weissnerová

**Head of production department:**


Mgr. Mirka Petránková

Date of the first issue of certificate: 06.10.2022

Revision of certificate:

Certificate revision date:

Version of certificate: 01