ANALYTIKA®, spol. s r.o.
Khodlova 1297/47, CZ-193 00 Praha 9 – Horní Počernice
www.analytika.net

R 7501

Analytika, spol. s r.o., Oddělení RM, výrobce RM č. 7501, akreditovaný ČIA podle ČSN EN ISO 17034:2017
Analytika, spol. s r.o., Department of RM, Reference Materials Producer No. 7501 accredited by CAI according to ČSN EN ISO 17034:2017

CERTIFICATE

Aqueous calibration solution

ASTASOL® AN9098MN

This Certificate is designed in accordance with ISO Guide 31

Category: **Certified reference material**

Analytes: **As, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Ti, Tl, V, Zn**

Product code: **AN9098MN**

Starting primary compounds and theirs purities (%):

As 99.999; Be 99.95; $CaCO_3$ 99.999; Cd 99.999; Co 99.996; $Cr(NO_3)_3$. xH_2O 99.99; Cu 99.999; Fe 99.99+; Mg 99.99, Mn 99.98; $(NH_4)_6Mo_7O_{24}$. xH_2O 99.999; Ni 99.995, Pb 99.999; Se 99.999; Sb_2O_3 99.999; $TlNO_3$ 99.9995; $(NH_4)_2TiO(C_2O_4)_2$. xH_2O 99.998; NH_4VO_3 99.99; Zn 99.998.

Matrix:

5% HNO_3 (v/v), prepared from sub boil distilled HNO_3 (ANALPURE®) and ultrapure demineralized water (resistivity ≥18 MΩ.cm, 0.22µm filtered).

Density and its expanded uncertainty (k = 2): 1.0410 ± 0.0005 g/cm^3 (at 20 °C)

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

100.0 ± 0.2 mg/l (each)

96.1 ± 0.3 mg/kg* (each)

*Mass fraction in mg/kg is derived from density

Specification:

Batch No.: 0006

The date of production: 21.08.2023

Shelf life: 5 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.

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Ke Klíčovu 2a/816, CZ-190 00 Praha 9 – Vysočany, Tel/Fax: +420 286 589 616, sales@analytika.net, www.analytika.net

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 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 methods (AAS, AES, ICP-OES) 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.

Analyt	Metoda	Reference
As	gravimetric determination	SRM NIST 3103a
Be	gravimetric determination	SRM NIST 3105a
Ca	complexometric titration with EDTA	SRM NIST 928, NIST SRM 3109a
Cd	complexometric titration with EDTA	SRM NIST 928, NIST SRM 3108
Co	complexometric titration with EDTA	SRM NIST 928, NIST SRM 3113
Cr	ICP-OES	SRM NIST 3112a
Cu	complexometric titration with EDTA	SRM NIST 928, NIST SRM 3114
Fe	complexometric titration with EDTA	SRM NIST 928
Mg	complexometric titration with EDTA	SRM NIST 928, NIST SRM 3131a
Mn	complexometric titration with EDTA	SRM NIST 928, NIST SRM 3132
Mo	gravimetric determination	SRM NIST 3134
Ni	complexometric titration with EDTA	SRM NIST 928, NIST SRM 3136
Pb	complexometric titration with EDTA	SRM NIST 928, NIST SRM 3128
Sb	bromatometry titration	SRM NIST 3102a
Se	iodometric titration	SRM NIST 3149
Ti	gravimetric determination	in-house standard
Tl	complexometric titration with EDTA	SRM NIST 928, SRM NIST 3158
V	complexometric titration with EDTA	SRM NIST 928, SRM NIST 3165
Zn	complexometric titration with EDTA	SRM NIST 928, NIST SRM 3168a

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

Determination of trace impurities was performed by AAS, ICP-OES and ICP-MS. Impurity levels are supplied only for information of the user and should not be used as calibration data.

Li	Be											B	C	N	O	F
<0,01	A											< 0,1	N.A	M	M	N.A
Na	Mg											Al	Si	P	S	Cl
<0,05	A											<0,01	<0,1	<0,1	<0,5	N.A
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br
<0,02	A	<0,05	A	A	A	A	A	A	A	A	A	<0,1	<0,02	A	A	N.A
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I
<0,05	<0,01	<0,05	<0,01	<0,05	A	N.A	<0,05	<0,1	<0,02	<0,01	A	<0,05	<0,01	A	<0,1	N.A
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi		
<0,05	<0,01	<0,05	<0,1	<0,05	<0,05	<0,02	<0,1	<0,1	<0,02	<0,02	<0,001	A	A	<0,01		

Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
<0,5	<0,1	<0,05	<0,02	<0,01	<0,1	<0,05	<0,05	<0,1	<0,05	<0,01	<0,01	<0,02

Th	U
<0,1	<0,1

M = matrix N.A = not analysed < x = bellow 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 it 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:

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.

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

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

Manager of Department of RM:

Ing. Daniela Weisserová

Head of production department:

Mgr. Mirka Petránková

Date of the first issue of certificate: 23.08.2023

Revision of certificate:

Certificate revision date:

Version of certificate: 01