



National Institute of Standards & Technology

Certificate of Analysis Standard Reference Material 1084a

Wear-Metals in Lubricating Oil

This Standard Reference Material (SRM) is intended primarily for use in the calibration of apparatus and in the evaluation of methods used in the analysis of engine lubricating oils for metal content. SRM 1084a consists of a blend of fourteen constituent elements in a base oil (VB5167) at a nominal concentration of 100 $\mu\text{g/g}$.

A unit of this SRM consists of five 5-mL amber borosilicate ampoules each containing approximately 1.6 g of the oil blend. The certified values are given below and are based on a minimum sample size of 0.5 g.

Element	Certified Value ¹ $\mu\text{g/g}$	Methods Used	Element	Certified Value ¹ $\mu\text{g/g}$	Methods Used
Al	(104) ²	[a]	Ni	99.7 \pm 1.6	b, [d]
Ag	101.4 \pm 1.5	b,c	Pb	101.1 \pm 1.3	b, [d]
Cr	98.3 \pm 0.8	b,c	Sn	97.2 \pm 2.6	b, [c]
Cu	100.0 \pm 1.9	a,b	Ti	100.4 \pm 3.8	b, [c]
Fe	98.9 \pm 1.4	[a],b	V	95.9 \pm 9.4	a,c
Mg	99.5 \pm 1.7	[a],b	S	(1700) ²	[e]
Mo	100.3 \pm 1.4	b,c	Si	(103) ²	[e]

Methods

- a. Inductively Coupled Plasma (ICP)
- b. Inductively Coupled Plasma Mass Spectrometry (ICP-MS)
- c. Instrumental Neutron Activation Analysis (INAA)
- d. Flame Atomic Absorption Spectrometry (FAAS)
- e. X-ray Fluorescence Spectrometry (XRF)

¹ The certified value was determined using the indicated method(s) with the method in brackets used for confirmation and to estimate the systematic error. The uncertainty of the certified value is obtained from a 95% confidence interval plus an allowance for systematic error among the method(s) used.

² Value in parenthesis is not certified but provided for information only.

The material preparation was performed by P. Pei and Lin-Sien Lum of the NIST Ceramic Division.

Analyses for certification were performed in the Inorganic Analytical Research Division by E.S. Beary, R. Demiralp (guest scientist), M.S. Epstein, K.M. Garrity, K.E. Hehn, P.J. Paulsen, P.A. Pella, T.A. Rush, L.J. Wood, and R. Zeisler.

Certification analyses were coordinated through W.F. Koch of the Inorganic Analytical Research Division.

Statistical analysis was provided by S.B. Schiller of the Statistical Engineering Division.

The technical and support aspects involved in the preparation, certification, and issuance of this Standard Reference Material were coordinated through the Standard Reference Materials Program by T. E. Gills.

Gaithersburg, MD 20899
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William P. Reed, Chief
Standard Reference Materials Program

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NOTICE AND WARNING TO USERS

Stability: This SRM is considered to be stable when unopened ampoules are stored under normal laboratory conditions. NIST will monitor this material and will report any substantive changes in certification to the purchaser.

Expiration of Certification: This certification is valid within the specified uncertainty limits for five years from the date of purchase.

Use: The ampoules can be opened by scoring the neck with a file and applying pressure behind the scored mark. The SRM can be diluted using a mineral base oil of known concentrations of the elements of interest or using SRM 1083.