



# Certificate of Analysis

## Standard Reference Material<sup>®</sup> 3087a

### Metals on Filter Media

This Standard Reference Material (SRM) is intended primarily for use in evaluating and calibrating analytical methods and instruments used for the determination of toxic metals in industrial atmospheres. SRM 3087a consists of six membrane filters of a mixed cellulose ester type, each spiked with a composite standard solution containing twelve elements (As, Ba, Cd, Cr, Fe, Mg, Mn, Ni, Pb, Se, V, and Zn). Six additional blank filters are provided for use in assessing the analytical blank. Each filter is 37 mm in diameter and has a pore size of 0.8  $\mu\text{m}$ .

The certified values, given in Table 1, are based on gravimetric measurements made during the production of the composite solution used to impregnate the filters and on measurements of the amount of solution deposited on the filters. The composite solution was prepared gravimetrically by dissolving accurate masses of high purity metals or salts in a mixed acid solution of nitric and tartaric acids. The blank filters were prepared by adding a corresponding amount of the dilute mixed acid solution to each filter. The certified values were confirmed by analysis of a stratified randomly selected sampling of the filters using inductively coupled plasma mass spectrometry (ICPMS) and by analysis of the composite solution using inductively coupled plasma atomic emission spectrometry (ICPAES).

Table 1. Certified Values and Uncertainties

Element	$\mu\text{g}/\text{Filter}$	Source Material
As	50.48 $\pm$ 1.16	Arsenic Metal
Ba	25.24 $\pm$ 0.58	Barium Carbonate
Cd	15.14 $\pm$ 0.35	Cadmium Metal
Cr	10.10 $\pm$ 0.23	Chromium Metal
Fe	25.24 $\pm$ 0.58	Iron Metal
Mg	25.24 $\pm$ 0.58	Magnesium Metal
Mn	10.10 $\pm$ 0.23	Manganese Metal
Ni	25.24 $\pm$ 0.58	Nickel Metal
Pb	40.38 $\pm$ 0.92	Lead Metal
Se	25.24 $\pm$ 0.58	Selenium Metal
V	50.48 $\pm$ 1.16	Ammonium Vanadate
Zn	100.94 $\pm$ 2.31	Zinc Metal

The uncertainty for each analyte, computed according to the ISO and NIST Guides [1] is an expanded uncertainty at the 95 % level of confidence, which includes uncertainty due to measurement imprecision as well as uncertainty in mass delivered and the concentration of the stock solution. For each analyte, the certified value and expanded uncertainty define a range of values within which the true concentration is expected to lie with at least 95 % confidence.

**Expiration of Certification:** The certification of this SRM lot is valid until December, 2003, within the uncertainties specified, provided the SRM is handled and stored in accordance with the instructions given in the certificate (see Instructions for Use). However, the certification will be nullified if the SRM is damaged, contaminated, or modified. The SRM is considered to be stable during the period of its certification provided it is stored away from light in a cool and dry environment. Should there be any change in the certified values before the expiration of certification, purchasers will be notified by NIST. Return of the attached registration card will facilitate notification.

The support aspects involved in the certification and issuance of this SRM were coordinated through the Standard Reference Materials Program by B.S. MacDonald.

Gaithersburg, MD 20899  
Certificate Issue Date: January 15, 1997

Thomas E. Gills, Chief  
Standard Reference Materials Program

Inductively coupled plasma mass spectrometric analysis of the filters was performed by G.C. Turk and L.J. Wood of the NIST Analytical Chemistry Division and J.V. Lara-Manzano, guest researcher from Centro Nacional de Metrologia (CENAM), Quertaro, Mexico. Inductively coupled plasma atomic emission spectrometric analyses of the composite solution was performed by N.B. Buehler, M.F. Bullard, M.S. Epstein, and L.J. Wood of the NIST Analytical Chemistry Division.

Statistical assessment of the certification data was performed by S.D. Leigh of the NIST Statistical Engineering Division.

**Instructions For Use:** The spiked filters and blanks are packaged separately in plastic petri dishes. Each unit of SRM 3087a consists of three petri dishes: two petri dishes containing three spiked filters each and one petri dish containing six blank filters. The identification of the filter is printed on the outside of each petri dish. In all instances, an entire filter must be dissolved for each set of measurements as the metals may not be uniformly distributed on the filter. Blank values obtained by analysis of a dissolved blank filter must be subtracted from the results obtained from the spiked filters.

#### REFERENCE

- [1] *Guide to the Expression of Uncertainty in Measurement*, ISBN 92-67-10188-9 1st Ed. ISO, Geneva, Switzerland, (1993); see also Taylor, B.N. and Kuyatt, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results," NIST Technical Note 1297, U.S. Government Printing Office, Washington D.C., (1994).