

CERTIFICATE OF ANALYSIS

41X ZSb4 (batch A)

Reference Material Information

Type: ZINC-ANTIMONY BINARY (CAST)

Form and Size: Disc 40mm Diameter x 15mm Thickness

Produced by: Universal Scientific Laboratory Pty Ltd

Certified and supplied by: MBH Analytical Limited

Composition

Percentage element by weight

Element	Sb
Value ¹	3.78
Uncertainty ²	0.06

Definitions

- ¹ The values given above are the present best estimates of the true content for each element, as determined by this limited analytical programme. Each value is a panel consensus, based on the averaged results of an interlaboratory testing schedule, detailed on page 3.
- ² The uncertainty values are estimated from a statistical review of the wet analysis results, combined with the homogeneity test data. However, due to the small number of results involved in their derivation, all values herein should be treated with due caution.

Certified by:

MBH ANALYTICAL LIMITED _____
C Eveleigh

on 4th December 2005

Method of Preparation

This reference material was produced from commercial-purity metals only. The discs are the product of one melt poured by sequential transfer of aliquots into individual cast iron moulds.

At least 2mm was removed from the cast faces of the discs, to minimise surface effects.

Sampling

Samples for chemical analysis were taken from the working faces of the discs intended for final use.

Chemical Analysis

Analysis was carried out on millings taken from samples representative of the product. It was performed by a panel of laboratories mostly operating within the terms of EN ISO/IEC 17025 - 2000, using documented standard reference methods and validated wherever possible by appropriate reference materials.

The individual values listed overpage are the average of each analyst's results.

Traceability

Much of the analytical work performed to assess this material has been carried out by laboratories with proven competence, as indicated by their accreditation to a national authority. It is part of the requirement for this accreditation that analytical work should be performed with due traceability, via an unbroken chain of comparisons, each with stated uncertainty, to primary standards such as the mole, or to nationally- or internationally-recognised primary reference materials.

Usage

Intended use: With optical emission and X-ray fluorescence spectrometers.

Recommended method of use: Alloys of this type are generally prepared by turning. However, users are recommended to follow the calibration and sample preparation procedures specified by the relevant instrument manufacturer.

Preparation should be the same for reference materials and the samples for test.

A minimum of four consistent replicate analyses is recommended to provide the necessary sample size. Users are advised to check against possible bias between reference materials and production samples due to differences in metallurgical history.

Analytical Data

Percentage element by weight

Sample	Sb	Method
1	3.750	FAAS
2	3.78	ICP-AES
3	3.824	FAAS
Mean	3.78	
Std Dev	0.04	
C_(95%)	0.06	

FAAS: flame atomic absorption spectrometry

ICP-AES inductively-coupled plasma – atomic emission spectrometry

Notes: C_(95%) is the 95% half-width confidence interval derived from the equation:

$$C_{(95\%)} = (t \times SD) / \sqrt{n}$$

where n is the number of available values, t is the Student's t value for n-1 degrees of freedom, and SD is the standard deviation of the test results.

Statistical analysis of data sets with few values should be treated with due caution.

Participating Laboratories

Universal Scientific Laboratory Pty Ltd	Milperra, NSW, Australia	NATA accreditation 492
Sargam Metals Pvt Ltd	Chennai, India	NABL accreditation 0025
Coleshill Laboratories Ltd	Birmingham, England	

Note: to achieve National Accreditation (eg NATA, NABL), test houses must demonstrate conformity to the general requirements of EN ISO/IEC 17025.

Notes

The unidirectional solidification effects associated with semi-chill casting have led to the formation of inhomogeneous segregates in the rear portion of the disc. The above certification is therefore only applicable from the front face of the disc to a depth of 10mm. Material to the rear of the disc, to a depth of ~5mm, is not certified.

This material will remain stable provided adequate precautions are taken to protect it from cross-contamination, extremes of temperature and atmospheric moisture. All production records will be retained for a period of 20 years from the date of this certificate. This certification will therefore expire in December 2025, although we reserve the right to make changes as issue revisions, in the intervening period.

The manufacture, analysis and certification of this product were supervised by C Eveleigh, PhD, Technical Director, MBH Analytical Ltd.

The material to which this certificate of analysis refers is supplied subject to our general conditions of sale.