

U. S. DEPARTMENT OF COMMERCE

National Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE 63A

PHOSPHOR BRONZE BEARING METAL

| ANALYST* | Cu | Pb | Sn | Zn | P | | IRON | ANTIMONY | NICKEL Weighed as nickel dimethylglyoxime | SULFUR Gravimetric, weighed as BaSO ₄ | ARSENIC | ALUMINUM Colorimetric ^b |
|-------------------------|--------------------|------------------------------|---------------------------|------------------|---|-------------------------------|-------------------|-------------------|--|---|--------------------|---------------------------------------|
| | Electrolytic | Weighed as PbSO ₄ | SnCl ₂ -Iodine | ZnS-ZnO | Gravimetric (weighed as Mg ₂ P ₂ O ₇) | Alkali-molybdate ^a | | | | | | |
| 1..... | ^c 78.50 | ^d 8.91 | ^e 9.77 | 0.61 | 0.59 | | ^f 0.52 | ^g 0.50 | 0.32 | 0.11 | ^h 0.026 | < 0.001 |
| 2..... | ⁱ 78.49 | 8.92 | ^j 9.77 | .63 | .58 | | ^k .53 | ^l .49 | .32 | .10 | ^b .026 | .002 |
| 3..... | ^m 78.48 | 8.95 | ⁿ 9.76 | .63 | | 0.59 | ^o .52 | ^p .47 | .32 | .12 | ^b .025 | Not detected. |
| 4..... | ^c 78.50 | 8.91 | ^p 9.81 | ^q .60 | .57 | .59 | ^r .52 | ^s .50 | .32 | .11 | ^t .029 | .001 |
| | ^m 78.45 | 8.91 | ^u 9.70 | .63 | .58 | .60 | ^r .53 | ^s .47 | .32 | .11 | ^t .030 | < .001 |
| 6..... | 78.46 | 8.95 | ^v 9.77 | .61 | | .61 | .53 | ^l .50 | .33 | .11 | .028 | |
| 7..... | ⁱ 78.49 | 8.90 | ^w 9.76 | .61 | | .56 | ^r .54 | ^x .46 | .33 | .10 | ^b .028 | |
| Averages..... | 78.48 | 8.92 | 9.76 | 0.62 | 0.58 | 0.59 | 0.53 | 0.48 | 0.32 | 0.11 | 0.027 | |
| Recommended values..... | 78.48 | 8.92 | 9.76 | 0.61 | 0.58 | | 0.52 | 0.49 | 0.32 | 0.11 | 0.027 | < 0.001 |

^a Alkali standardized by the use of a standard phosphor bronze.

^b Aurin tricarboxylic acid method.

^c Five-gram sample dissolved in 55 ml of HNO₃ (1:1). Solution digested and filtered. Filtrate diluted to 350 ml, 2 drops of 0.1 N HCl added, and solution electrolyzed overnight, using a current density of 0.5 amp/dm². Metastannic acid precipitate and paper treated with HNO₃-H₂SO₄. Tin, antimony, and arsenic volatilized by HBr-Br₂ and residual copper ultimately determined by electrolysis.

^d First anode deposit (footnote e) dissolved in nitric acid and a little alcohol. Solution combined with the first electrolyte and lead determined as PbSO₄.

^e Tin separated by distillation from a 1-gram sample as described in J. Research NBS 21, 95 (1938)

RP1116. Tin precipitated with cupferron and ignited to SnO₂.

^f Weighed as Fe₂O₃.

^g Five-gram sample dissolved, and the antimony distilled and titrated with KMnO₄ as described in J. Research NBS 21, 95 (1938) RP1116.

^h Ten-gram sample dissolved, and the arsenic distilled and titrated with iodine as described in J. Research NBS 21, 95 (1938) RP1116.

ⁱ Copper deposited in presence of tin from an HNO₃-HF solution.

^j Tin reduced with an iron coil, and titrated with KIO₃.

^k Iron reduced with H₂S, and titrated with KMnO₄.

^l Antimony reduced by fuming a sulfuric acid solution with tartaric acid, and Sb₂(SO₄)₃ titrated with KMnO₄.

^m Copper, lead and the like in the metastannic acid precipitate recovered by the NaOH-Na₂S method.

ⁿ Tin reduced with antimony.

^o Iron reduced in a Jones reductor and titrated with KMnO₄.

^p Tin reduced with nickel and titrated with KIO₃.

^q Same value obtained by polarographic method.

^r Iron reduced with SnCl₂ and FeCl₃ titrated with K₂Cr₂O₇.

^s Antimony reduced with hydrazine, and SbCl₃ titrated with KBrO₃ using methyl orange indicator.

^t Arsenic distilled and titrated with KBrO₃.

^u Tin reduced with lead and titrated with KIO₃.

^v Tin reduced with iron.

^w Tin reduced with aluminum.

^x Same as (g) except SbCl₃ distillate boiled to remove excess HCl, and titrated with iodine using starch indicator.

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The bronze for the preparation of this standard was furnished by the Federated Metals Division, American Smelting & Refining Co.

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