

U. S. DEPARTMENT OF COMMERCE

National Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE 62 B

MANGANESE BRONZE

ANALYST*	Cu	Zn	Mn	Al	Sn	Fe	LEAD	NICKEL Weighed as nickel dimethylglyoxime	SILICON Sulfuric acid dehydration	ANTIMONY	ARSENIC	SILVER Internal electrolysis
	Electrolytic	ZnS-ZnO	Bismuthate		SnCl ₂ -Iodine							
1.....	^a 57.40	37.97	1.29	^b 0.97	^c 0.97	^d 0.81	^e 0.27	0.27	0.047	^f 0.005	^g 0.004	0.003
2.....	^h 57.40	37.99	1.28	^b .97	ⁱ .96	^j .83	^k .28	.27				
3.....	57.41	38.02	^l 1.26	^m .94	ⁿ .95	^o .79	^p .28	^q .28	.046			
4.....	^r 57.40	37.94	1.28	^b .97	^s .96	^o .84	^e .28	.27				
5.....	^t 57.38	37.96	1.28	^u .98	ⁿ .97	^j .82	^v .28	.26	^w .047			
6.....	^r 57.38	37.96	^x 1.31	^b .95	^y .97	.84	^e ^v .28	.27				
7.....	^h 57.40	37.94	^z 1.30	^b .98	^z .94	^d .83	^z .29	^z .29	^z .049			
8.....	57.38	37.97	^x 1.31	.96	ⁱ .97	^d .81	^z .26	.27				
9.....	^z 57.40	38.03	^x 1.29	^b .95	^s .97	^d .82	^p .27	.27	.049	< .01	^z .004	.006
10.....	^h 57.39	37.92	1.29	^z .98	^e .96	^d .83	^v ^z .28	.27	.050			
Averages.....	57.39	37.97	1.29	0.97	0.96	0.82	0.28	0.27	0.048	0.005	0.004	0.005

^a Five-gram sample dissolved in 110 ml of HNO₃ (1+4). Solution digested for 3 hours or more and filtered. Filtrate diluted to 350 ml, 2 drops of 0.1 N HCl added and solution electrolyzed overnight, by 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 determined by electrolysis.

^b Five-gram sample electrolyzed in mercury cathode cell. Electrolyte treated with H₂S and filtered. Aluminum precipitated in the filtrate with NH₄OH and ignited to Al₂O₃.

^c Tin separated by distillation from a 5-g sample as described in J. Research NBS 21, 95 (1938) RP1116, precipitated with cupferron, and ignited to SnO₂.

^d Iron reduced with SnCl₂ and FeCl₂ titrated with K₂Cr₂O₇, by using sodium diphenylamine sulfonate indicator.

^e First anode deposit (footnote a) dissolved in HNO₃ and a little alcohol. Lead determined as PbSO₄.

^f After completion of arsenic distillation (footnote g), antimony distilled from the same sample and titrated with KMnO₄ as described in J. Research NBS 21, 95 (1938) RP1116.

^g Arsenic distilled from a 50-g sample as described in J. Research NBS 21, 95 (1938) RP1116 and determined as As₂S₃.

^h Copper deposited in the presence of tin from an HNO₃-HF solution.

ⁱ Tin reduced with an iron coil in presence of added antimony.

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

^k Lead determined as PbO₂ by electrolysis in HNO₃-HF solution.

^l MnO₂ precipitated in nitric acid solution with KClO₃. Precipitate dissolved in diluted H₂SO₄ containing a weighed amount of Na₂C₂O₄. Excess Na₂C₂O₄ titrated with KMnO₄.

^m Aluminum precipitated with 8-hydroxyquinoline. Precipitate dissolved in HCl, oxidized with KBrO₃, KI added and solution titrated with Na₂S₂O₈.

ⁿ Tin reduced with iron wire in presence of added antimony, and SnCl₂ titrated with KIO₃.

^o Iron reduced with H₂S, and FeSO₄ titrated with KMnO₄.

^p Lead separated as PbO₂ by electrolysis, and reprecipitated in HNO₃ (8+92).

^q Glyoxime precipitate titrated with KCN.

^r Same as footnote a, except impurities recovered from metastannic-acid precipitate by treatment with ammonium iodide.

^s Tin reduced with lead.

^t Same as footnote a, except impurities recovered from the metastannic-acid precipitate by the NaOH-Na₂S method.

^u Aluminum precipitated with phenylhydrazine and ignited to Al₂O₃.

^v Lead deposited as PbO₂ and corrected for impurities.

^w Hydrochloric acid dehydration.

^x Persulfate-arsenite method.

^y Same as footnote s, except antimony added.

^z MnO₂ precipitated with KBrO₃. Precipitate dissolved in Fe(NH₄)₂(SO₄)₆, and excess titrated with KMnO₄.

^{aa} Tin reduced with aluminum in presence of added antimony.

^{ab} Lead separated as PbSO₄. Precipitate dissolved in NH₄C₂H₃O₂, and lead determined as PbO₂ by electrolysis.

^{ac} Dimethylglyoxime-electrolysis method.

^{ad} A value of 0.051% silicon was obtained by silicomolybdate colorimetric method. See Ind. Eng. Chem., Anal. Ed. 16, 309 (1944).

^{ae} Same as footnote k, except deposit replated.

^{af} Four-gram sample dissolved in HNO₃-H₂SO₄. PbSO₄ removed by filtration and filtrate electrolyzed in presence of H₂O₂. Residual copper determined by internal electrolysis.

^{ag} Arsenic reduced with hydrazine and distilled. AsCl₃ titrated with 0.01 N KBrO₃.

^{ah} Aluminum precipitated as basic succinate and ignited to Al₂O₃.

^{ai} A value of 0.005 percent silver, obtained by fire assay, was reported by Ledoux & Co., New York, N. Y.

* LIST OF ANALYSTS

- | | |
|---|---|
| 1. William D. Mogerman, National Bureau of Standards, Washington 25, D. C. | 6. U. S. Navy Yard, Philadelphia, Pa. |
| 2. John Long and George James, The Ajax Metal Co., Philadelphia, Pa. | 7. R. P. Nevers and E. A. Schroeder, The American Brass Co., Waterbury, Conn. |
| 3. A. B. Shapiro, H. Kramer & Co., Chicago, Ill. | 8. C. A. Ray, Nassau Smelting & Refining Co., Inc., Tottenville, N. Y. |
| 4. Vincent Schwarz, Magnus Metal Division of National Lead Co., Chicago, Ill. | 9. D. R. Evans and T. Moffat, Western Electric Co., Inc., Kearny, N. J. |
| Walter M. Kay, Bohn Aluminum & Brass Corporation, Detroit, Mich. | 10. F. M. Barry and J. D. Kopp, Scovill Manufacturing Co., Waterbury, Conn. |

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

WASHINGTON, June 30, 1944.

LYMAN J. BRIGGS, *Director*.