U. S. DEPARTMENT OF COMMERCE

National Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE 52B

CAST BRONZE

ANALYST*	Cu	Sn	Zn	Ni					
	Electrolytic	*$SnCl_2$-Iodate*	*ZnS-ZnO*	*Weighed as nickel dimethylglyoxime*	*IRON*	*LEAD Weighed as PbO_2*	*MANGANESE*	*PHOSPHORUS Colorimetric*	
1	[a] 88.28	[b] 7.98	2.95	0.72	[c] 0.031	[d] 0.012	[e] 0.004	[f] 0.002	
2	88.23	[g] 7.99	2.96	[h] .72	[i] .035	.011		.002	
3	[j] 88.26	[k] 8.00	2.97	.72	[l] .035	[m] .008	[n] .005		
4	[o] 88.24	[p] 8.02	2.96	.72	[c] .035	.012	[q] .004		
5	[o,r] 88.26	[s] 8.02	2.97	.71	[c] .032	.011	[n] .005		
6	[t] 88.25	[u] 7.99	2.95	.72	[c] .029	.011	[n] .005	[v] .002	
7	[a] 88.25	[u] 8.01	2.93	.72	[w] .028				
Averages	**88.25**	**8.00**	**2.96**	**0.72**	**0.032**	**0.011**	**0.005**	**0.002**	

[a] Five-gram sample dissolved in 110 ml of HNO_3 (1+4). Solution digested on a steam bath overnight, filtered, and the precipitate washed with hot HNO_3 (1:99). Filtrate diluted to 350 ml, 2 drops of 0.1-*N* HCl added, and solution electrolyzed overnight by the use of a current density of 0.5 amp/dm². Metastannic-acid precipitate and paper treated with HNO_3–H_2SO_4. Tin, antimony, and arsenic volatilized by HBr–Br_2, and residual copper determined by electrolysis. (The silver content of this alloy is less than 0.001 percent.)

[b] Determined by W. D. Mogerman by the distillation-cupferron method. See J. Research NBS **33**, 307 (1944) RP1610.

[c] H_2SO_4 added to the electrolyte from the copper determination (footnote a) and solution evaporated to fumes. Zinc precipitated with H_2S in 0.01-*N* acid. Filtrate boiled to remove H_2S. Iron oxidized and precipitated with NH_4OH. Precipitate dissolved and iron determined by the $SnCl_2$-$K_2Cr_2O_7$ method.

[d] Ten-gram sample dissolved in 80 ml of HNO_3 (1+1). Solution digested overnight, filtered, and the precipitate washed with hot HNO_3 (1:99). Filtrate reserved. Metastannic-acid precipitate ignited at 500° C, leached with dilute HNO_3 and filtered. Filtrate combined with the reserved filtrate and electrolyzed for 6 hours by the use of a current density of 0.1 amp/dm².

[e] Copper separated electrolytically from a 10-g sample. Anode deposit dissolved and combined with the electrolyte. Manganese determined by the bismuthate method.

[f] Phosphorus precipitated with molybdate. Phosphomolybdate dissolved in NaOH and determined by the molybdenum-blue photometric method. See J. Research NBS **26**, 405 (1941) RP1386.

[g] Tin reduced with an iron coil in presence of added antimony.

[h] Dimethylglyoxime-photometric method.

[i] NH_4CNS-photometric method.

[j] Copper in metastannic-acid precipitate recovered by the NaOH–Na_2S method.

[k] Tin reduced with lead and titrated with iodine.

[l] $SnCl_2$-$KMnO_4$ method.

[m] Dithizone-colorimetric method.

[n] Persulfate-arsenite method.

[o] Same as footnote (a) except metastannic-acid precipitate treated with HNO_3-$HClO_4$.

[p] Tin reduced with aluminum.

[q] KIO_4-photometric method.

[r] Same value obtained by depositing copper in the presence of tin from an HNO_3-HF solution of a 2-g sample.

[s] Tin reduced with aluminum and titrated with iodine.

[t] Five-gram sample dissolved in 100 ml of diluted HNO_3 (1+3). Copper in metastannic-acid precipitate recovered by the HNO_3-$HClO_4$-HBr method and added to main solution before electrolyzing. (See Chemical analysis of metals, Am. Soc. Testing Materials, p. 183, 1943).

[u] Tin reduced with nickel.

[v] Tin removed from the metastannic-acid precipitate from a 5-g sample by treatment with HBr. Phosphorus in the nonvolatile residual solution determined by the phosphovanadomolybdate-photometric method.

[w] Orthophenanthroline-colorimetric method.

*LIST OF ANALYSTS

1. R. K. Bell, National Bureau of Standards, Washington 25, D. C.
2. C. A. Ray, Nassau Smelting & Refining Co. Inc., Tottenville, N. Y.
3. U. S. Navy Yard, Philadelphia, Pa.
4. F. M. Barry and J. D. Kopp, Scovill Manufacturing Co., Waterbury, Conn.
5. R. P. Nevers and E. A. Schroeder, The American Brass Co., Waterbury, Conn.
6. T. Moffat, Western Electric Co. Inc., Kearny, N. J.
7. W. C. Bowden, Jr., Ledoux & Co. Inc., New York, N. Y.

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LYMAN J. BRIGGS, *Director.*

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