UNITED STATES DEPARTMENT OF COMMERCE
WASHINGTON 25, D. C.

National Bureau of Standards
Certificate of Analysis

Standard Sample 37 E
Sheet Brass

ANALYST	COPPER Electrolytic	ZINC ZnS–ZnO	LEAD Weighed as PbO_2	TIN $SnCl_2$–KIO_3	NICKEL Photometric	IRON
1	[a] 69.59	27.82	1.00	[b] 0.99	[c] 0.53	[d] 0.003
2	[e] 69.62	[f] 27.83	1.02	[g] 1.00	[h] .53	[i] .004
3	[j,k] 69.62	27.87	0.99	[l] 0.99	[c] .54 [h] .54	[i] .003
4	[m] 69.59	27.89	[n] 1.01 [n] 1.01	[o] 1.02 [p] 1.01	[c] .52	[q] .005
5	[r] 69.58	27.86	1.01	[s] 1.01	[c] .53	[d] .003
6	[t] 69.65	[u] 27.81	1.02	[v] 0.98	[c] .55	[w] .004
7	[x] 69.58	[y] 27.86	1.00	[x] .99	[h] .52	[i] .004
8	[z1] 69.62	27.87	0.98	[z2] .99	[h] .53	[i] .004
Average	69.61	27.85	1.00	1.00	0.53	0.004

[a] Five-gram sample dissolved in 60 ml of HNO_3 (1+2). Solution digested on a steam bath overnight, filtered, and the precipitate washed with hot HNO_3 (1+99). Metastannic-acid precipitate treated with HNO_3–$HClO_4$–HBr and the residual solution combined with the first filtrate. Two drops of 0.1*N* HCl added, solution diluted to 300 ml and electrolyzed overnight, using a current density of 0.5 amp/dm.^{2} Residual copper and lead in the electrolyte precipitated with H_2S and determined by electrolysis.

[b] Five-gram sample dissolved in HCl–HNO_3, 20 mg of ingot iron as $FeCl_3$ and 5 g of NH_4Cl added, and tin precipitated twice with NH_4OH. Precipitate dissolved in HCl, tin reduced with test lead and titrated with KIO_3 standardized with high-purity tin.

[c] Dimethylglyoxime-gravimetric method.

[d] Orthophenanthroline-photometric method.

[e] Two-gram sample dissolved in HNO_3 (1+1). Metastannic-acid precipitate treated with HNO_3–$HClO_4$–HBr and the residual solution combined with the first filtrate. The acid solution containing sulfamic acid, electrolyzed for copper and lead.

[f] Ethylenediaminetetraacetic acid (Versene) titration method.

[g] Tin reduced with aluminum in the presence of added antimony and titrated with iodine standardized with high-purity tin.

[h] Dimethylglyoxime-photometric method.

[i] NH_4CNS-photometric method.

[j] Two-gram sample dissolved in HNO_3–H_2SO_4, lead sulfate filtered off, and filtrate electrolyzed for copper in the presence of the tin.

[k] Same value obtained by electrolytic deposition of copper in the presence of the tin in an HNO_3-tartaric acid solution.

[l] Tin reduced with aluminum and titrated with KIO_3 standardized with high-purity tin.

[m] One-gram sample dissolved in HNO_3–H_2SO_4, lead sulfate filtered off, and filtrate electrolyzed for copper in the presence of the tin, either at 7 amp for 20 min, or at 4 amp for 40 min, with magnetic stirring.

[n] Weighed as $PbCrO_4$.

[o] Tin reduced with iron and zinc, and titrated with KIO_3.

[p] Tin reduced with iron-antimony alloy and titrated with KIO_3.

[q] Metastannic-acid precipitate separated from a nitric acid solution of a 10-g sample and tin volatilized with HBr. The residual solution combined with the first filtrate and iron titrated with $Ti_2(SO_4)_3$.

[r] As in (a), but using a 2-g sample.

[s] Tin reduced with nickel and titrated with KIO_3.

[t] One-gram sample dissolved in HNO_3–HF, electrolyzed 10 min, H_2SO_4 added, and electrolysis completed for copper.

[u] $Zn(NH_4)PO_4$ method.

[v] SnO_2-gravimetric method.

[w] Spectrographic determination.

[x] As in (e), with the addition of urea near the end of the electrodeposition.

[y] Zinc precipitated with H_2S and titrated with $K_4Fe(CN)_6$. See ASTM Method E54–49.

[z] Tin reduced with lead in the presence of added antimony and titrated with iodine.

[z1] Copper deposited in the presence of the tin in an HNO_3–HF solution.

[z2] Tin reduced with iron in the presence of added antimony and titrated with KIO_3.

Analyst 2 reported 0.002 percent phosphorus by ASTM photometric method E62–56.

List of Analysts

1. Nonferrous Laboratory, National Bureau of Standards, R. K. Bell, in charge. Analysis by E. E. Maczkowske.
2. O. P. Case and Kathleen M. O'Brien, The American Brass Co., Waterbury, Conn.
3. B. H. McGar, E. L. Smith, H. J. Smith, and R. C. Burnham, Chase Brass & Copper Co., Waterbury, Conn.
4. O. W. DeJarnett, Olin Mathieson Chemical Corp., East Alton, Ill.
5. William A. Eddie and John T. Krantz, National Bearing Division, American Brake Shoe Co., St. Louis, Mo.
6. A. W. Young Bridgeport Brass Co., Bridgeport, Conn.
7. Otto O. Knopf, Janney Cylinder Co., Philadelphia, Pa.
8. H. E. Kurg, Nassau Smelting & Refining Co., Tottenville, N. Y.

WASHINGTON, D. C., August 28, 1958.

A. V. ASTIN, *Director.*

U. S. GOVERNMENT PRINTING OFFICE 478488