UNITED STATES DEPARTMENT OF COMMERCE
WASHINGTON

National Bureau of Standards
Certificate of Analyses

Standard Sample 63c
Phosphor Bronze Bearing Metal

ANALYST	COPPER Electrolytic	LEAD Weighed as $PbSO_4$	TIN $SnCl_2$–KIO_3	ANTIMONY	NICKEL Weighed as nickel dimethylglyoxime	PHOSPHORUS Weighed as $Mg_2P_2O_7$	ZINC ZnS–ZnO	SULFUR	ARSENIC	IRON
1	[a] 80.46	[h] 9.35	[e] 9.03	[d] 0.50	0.32	0.145	0.090	[e] 0.059	[f] 0.025	[g] 0.0010
2	80.43	9.33	[h] 9.04	[i] .54	.32	{[q] .148 / [j] .15}	.088	[k] .056	[l] .017	[g] .002
3	80.49	9.34	[m] 9.06	[n] .53	.31	[j] .150	.084	[o] .065	[f] .029	.0015
4	[p] 80.52	{9.38 / [q] 9.36}	[r] 8.96	[s] .52	[t, u] .31	.144	.096	[k] .056	[v] .022	[w] .0015
5	80.48	9.32	[x] 9.05	[y] .52	.32	[j] .138	.098	[z] .062	[z1] .022	[z2] .0012
6	80.47	9.35	[z3] 9.04	.50	[z4] .31	[j] .143	[z5] .102	[k] .063	[l] .021	[z2] .0009
Average	80.48	9.35	9.03	0.52	0.32	0.145	0.093	0.060	0.023	0.0013

[a] Five-gram sample dissolved in 55 ml of HNO_3 (1+1). 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, using a current density of 0.5 amp/dm². Metastannic-acid precipitate treated with HNO_3–$HClO_4$–HBr and the residual solution combined with the first electrolyte. Residual copper in the filtrate from $PbSO_4$ (footnote b) precipitated with H_2S and determined by electrolysis.

[b] First anode deposit (footnote a) dissolved in nitric acid and a little ethanol. Solution combined with the first electrolyte and lead determined as $PbSO_4$.

[c] Two-gram sample dissolved in HCl–HNO_3, 15 mg of ingot iron as $FeCl_3$ added, and tin precipitated twice with NH_4OH. Precipitate dissolved in HCl, tin reduced with nickel and titrated with KIO_3 standardized with pure tin.

[d] Antimony separated by distillation from a 5-g sample, precipitated with H_2S, and titrated with $KMnO_4$ as described in J. Research NBS **21**, 95 (1938) RP1116. $KMnO_4$ standardized with NBS standard sodium oxalate.

[e] Combustion-iodate method. Determination made by R. E. McIntyre.

[f] Distillation-As_2S_3 method.

[g] Orthophenanthroline-photometric method.

[h] Tin reduced with nickel in the presence of antimony and titrated with KIO_3.

[i] Metastannic-acid precipitate separated and treated with Na_2SO_4 and H_2SO_4. Antimony reduced with Na_2SO_3 and titrated with $KBrO_3$. Correction made for arsenic.

[j] Molybdivanadophosphoric acid-photometric method. See ASTM method E62–50T.

[k] Combustion-iodate method.

[l] Molybdenum-blue photometric method.

[m] Tin reduced with iron in the presence of antimony and titrated with iodine standardized with tin and NBS standard 127a.

[n] Antimony titrated with $KBrO_3$ after separation of arsenic by distillation.

[o] HBr evolution, weighed as $BaSO_4$.

[p] Copper deposited in the presence of tin in an HNO_3–HF solution of a 3-g sample.

[q] Metastannic-acid precipitate from a 1-gram sample separated and lead determined electrolytically as PbO_2.

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

[s] Metastannic-acid precipitate separated and digested in H_2SO_4. Arsenic separated as $AsCl_3$ and antimony in residual solution titrated with $KBrO_3$.

[t] Dimethylglyoxime precipitate titrated with cyanide.

[u] Same value obtained by the dimethylglyoxime-photometric method.

[v] Arsenic distilled from a 5-g sample and titrated with $KBrO_3$.

[w] Thioglycolic acid-photometric method.

[x] Tin reduced with aluminum and titrated with KIO_3.

[y] Iodide-photometric method. See Anal. Chem. **19**, 353 (1947).

[z] Solution in nitric acid. Sulfur weighed as $BaSO_4$.

[z1] Distillation-iodimetric method.

[z2] NH_4CNS-photometric method.

[z3] Tin reduced with aluminum and titrated with iodine.

[z4] Dimethylglyoxime-photometric method.

[z5] Zinc separated from the copper electrolyte with H_2S, and determined by electrolysis.

List of Analysts

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The metal for the preparation of this standard was furnished by National Bearing Division of American Brake Shoe Co.

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A. V. ASTIN, *Director*.

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