UNITED STATES DEPARTMENT OF COMMERCE
WASHINGTON

National Bureau of Standards
Certificate of Analyses

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Standard Sample 53 d
Lead-Base Bearing Metal

ANALYST	ANTIMONY	TIN	COPPER	BISMUTH	ARSENIC	NICKEL Colorimetric	
1	[a] 9.88 [b] 9.92	[c] 4.93 [d] 4.94	[e] 0.266 [f] .268	[g] 0.140	[h] 0.047	0.002_3	
2	[i] 9.94	[j] 4.92	[k] .274	[l] .143	[m] .050	.002	
3	10.00	[j] 5.00	[n] .28	[o] .12	[p] .044	.001	
4	[q] 9.87	[d] 4.93	[r] .253	[s] .143	[t] .044	$.002_3$	
5	[q] 9.90	[d] 4.98	[n] .267	[l] .137	[u] .044	$.002_4$	
6	[q] 9.92	[v] 4.94	[w] .268 [n] .271	[l] .121		$.002_2$	
7	[q] 9.94	[d] 4.92	[n] .267	[l] .138	[u] .042	$.002_9$	
Average	9.92	4.94	0.268	0.135	0.045	0.002_2	

[a] 2-g sample treated with HNO_3-HF. Lead separated as $PbSO_4$ HF in the filtrate volatilized by heating to fumes of H_2SO_4. Antimony reduced with sulfur and titrated with $KMnO_4$ standardized on $Na_2C_2O_4$. Correction made for arsenic.

[b] Antimony separated by distillation from a 1-g sample, precipitated with H_2S, and titrated with $KMnO_4$. $KMnO_4$ standardized on $Na_2C_2O_4$. See J. Research NBS **21**, 95 (1938) RP1116.

[c] Tin separated by distillation from a 4-g sample, precipitated with cupferron, and ignited to SnO_2. See J. Research NBS **33**, 339 (1944) RP1610.

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

[e] 1-g sample treated with HBr-Br_2-$HClO_4$. Bismuth separated as BiOCl, and lead as $PbSO_4$. Copper determined by the cupric bromide-photometric method.

[f] 5-g sample treated with HBr-Br_2-$HClO_4$. Bismuth separated as BiOCl, and lead as $PbSO_4$. Copper determined by electrolysis.

[g] Bismuth in BiOCl separation (footnote f) determined photometrically with thiourea. See J. Research NBS **47**, 252 (1951) RP2250.

[h] Arsenic precipitated with hypophosphorous acid and determined by the molybdenum blue-photometric method. See Anal. Chem. **20**, 902 (1948).

[i] Arsenic removed by distillation and antimony titrated with $KMnO_4$.

[j] Tin reduced with nickel and titrated with iodine.

[k] Lead precipitated as $PbCl_2$. Copper and antimony precipitated with H_2S in ammonium oxalate and oxalic acid solution, and antimony separated with K_2S. Residual lead separated as $PbSO_4$ and copper determined by titration with cyanide.

[l] Thiourea-photometric method.

[m] Distillation-As_2S_3 method.

[n] Cupric bromide-photometric method.

[o] Bismuth determined as BiOCl.

[p] Distillation-KIO_3 method.

[q] H_2SO_4-H_2SO_3-$KBrO_3$ method. See ASTM method E57–50T.

[r] Copper separated by internal electrolysis and determined by the iodide-thiosulfate method.

[s] Bismuth separated by internal electrolysis and determined photometrically with thiourea.

[t] Arsenic separated by double distillation and titrated with $KBrO_3$. See ASTM method E57–50T.

[u] Molybdenum blue-photometric method.

[v] Tin reduced with iron and titrated with KIO_3.

[w] 5-g sample treated with HBr-Br_2 and lead separated as $PbSO_4$. Copper deposited electrolytically, dissolved in HNO_3, and the solution containing added iron treated with excess NH_4OH. Copper in the filtrate determined electrolytically.

Analysts 2 and 6 reported 84.6 percent lead by the $PbCrO_4$ method. Iron is less than 0.001 percent, but is not certified because of uncertainty as to homogeneous distribution of this element.

List of Analysts

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The metal for the preparation of this standard was furnished by the National Lead Co. and atomized by the Metals Disintegrating Co.

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