

National Bureau of Standards

Certificate of Analysis

Standard Reference Material 184

Leaded Tin Bronze

ANALYST	COPPER Electrolytic	TIN SnCl ₂ -KIO ₃	ZINC ZnS-ZnO	LEAD Weighed as PbO ₂	NICKEL Photometric	PHOSPHORUS	IRON	SULFUR Combustion Titration
1.....	▪ 88.97	• 6.38	2.69	1.43	° 0.51	• 0.009	• 0.005	0.0020
2.....	88.97	† 6.37	2.69	▪ 1.40	° .51	b .009	† .004	
3.....	88.96	‡ 6.43	2.70	1.43	{ .50 k .51}	† .007	m .005	.002
4.....	{ 88.95 ▪ 88.96}	° 6.38	2.68	1.48	° .48	p .012	q .005	
5.....	† 88.94	‡ 6.37	2.70	1.45	.48	† .008	† .006	
6.....	88.95	‡ 6.38	2.69	▪ 1.45	.49	b .008	† .005	
7.....								.0020
Average.....	88.96	6.38	2.69	1.44	0.50	0.009	0.005	0.0020

• Two-gram sample dissolved in 25 ml of HNO₃ (1+1). Solution digested on a steam bath overnight, filtered, and the precipitate washed with hot HNO₃ (1+99). Metastannic-acid precipitate treated with HNO₃-HClO₄-HBr and the residual solution combined with the first filtrate. Two drops of 0.1N HCl added, solution diluted to 325 ml and electrolyzed overnight, using a current density of 0.3 amp/dm². Residual copper in the electrolyte precipitated as CuS and determined by the diethylthiocarbamate-photometric method.

† Two-gram sample dissolved in HCl-HNO₃, 15 mg of ingot iron as FeCl₃ added, and tin precipitated twice with NH₄OH. Precipitate dissolved in HCl, tin reduced with nickel and titrated with KIO₃ standardized with pure tin.

° Dimethylglyoxime-gravimetric method.

‡ Molybdenum-blue photometric method. See J. Research NBS **24**, 405 (1941) RP1386.

• Orthophenanthroline-photometric method.

† Tin reduced with aluminum and titrated with KIO₃.

▪ Weighed as PbSO₄.

‡ Molybdivanadophosphoric acid-photometric method. See ASTM Method E62-50T.

† Thiocyanate-photometric method.

† Tin reduced with iron in the presence of antimony and titrated with KIO₃.

‡ Dimethylglyoxime precipitate titrated with cyanide.

† Molybdivanadophosphoric acid-photometric method.

▪ Thioglycolic acid-photometric method.

• Copper deposited in the presence of tin in an HNO₃-H₂SO₄-HF solution of a 2-g sample.

• Tin reduced with iron in the presence of added zinc and titrated with KIO₃.

• Phosphomolybdate-alkalimetric method.

• Metastannic acid precipitate separated from a nitric acid solution of a 10-g sample. Tin volatilized with HBr, and residual iron plus iron in filtrate titrated with Ti₂(SO₄)₃.

† Copper deposited in the presence of tin in an HNO₃-HF solution.

• Same value obtained by the PbCrO₄ method.

List of Analysts

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| <p>1. Nonferrous Laboratory, National Bureau of Standards, R. K. Bell, in charge. Analysis by E. E. Maczkowske.</p> <p>2. J. D. Kopp, Scovill Manufacturing Co., Waterbury, Conn.</p> <p>3. A. B. Shapiro, H. Kramer and Co., Chicago, Ill.</p> | <p>4. E. P. Buxton and O. W. DeJarnett, Olin-Mathieson Chemical Corp., East Alton, Ill.</p> <p>5. H. E. Kurg and C. K. Toth, Nassau Smelting & Refining Co., Tottenville, N. Y.</p> <p>6. J. P. Brull, North American Smelting Co., Wilmington, Del.</p> <p>7. A. A. DeLeonardi, Kennecott Refining Corp. Baltimore, Md.</p> |
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J. Paul Cali, Chief
 Office of Standard Reference Materials

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