

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

National Bureau of Standards
Certificate of Analyses

Standard Sample 157A
Copper-Nickel-Zinc Alloy

ANALYST	COPPER Electrolytic	ZINC ZnS-ZnO	NICKEL Weighed as nickel dimethylglyoxime	MANGANESE Photometric	IRON	LEAD Weighed as PbO ₂	TIN SnCl ₂ -KIO ₃	COBALT Photometric	PHOSPHORUS Photometric
1.....	58.60	29.03	11.80	^a 0.175	^b 0.174	0.034	^c 0.022	^d 0.026	^e 0.008
2.....	58.59	29.08	^f 11.83	^g .175	^h .17	.043	.02		ⁱ .011
3.....	58.58	29.11	11.84	.171	^j .178	.034	^k .018	.022	^l .009
	58.62	^m 29.09	{ ⁿ 11.85 ^o 11.84}	.178	{ ^p .174 ^q .172 ^r .17 ^s .177}	^t .032	^u .021	^v .025	^w .007
	58.62	29.14	11.79	.17		.029	^x .026	.019	^y .009
6.....	58.66	29.13	11.81	^z .179	^{aa} .179	^{ab} .031	^{ac} .022	.021	^{ad} .010
7.....	^{ae} 58.61	^{af} 29.02	^{ag} 11.83	^{ah} .173	^{ai} .174	^{aj} .036	^{ak} .016	^{al} .022	.011
Average.....	58.61	29.09	11.82	0.174	0.174	0.034	0.021	0.022	0.009

^a Persulfate oxidation and potentiometric titration with sodium arsenite standardized with high-purity manganese.
^b SnCl₂-K₂Cr₂O₇ method.
^c Ten-gram sample dissolved in HCl-HNO₃, 5 g of NH₄Cl added, and tin precipitated twice with NH₄OH. Precipitate dissolved in HCl, tin reduced with test lead and titrated with 0.02 N KIO₃ standardized with high-purity tin.
^d Tin removed from a 10-g sample as metastannic acid, copper and lead by electrolysis, and iron with cupferron. Cobalt precipitated with α -nitroso- β -naphthol and weighed as Co₂O₃.
^e Molybdenum-blue photometric method. See J. Research NBS 26, 405 (1941) RP 1386.
^f Dimethylglyoxime precipitate titrated with cyanide.
^g Manganese dioxide precipitated in HNO₃ solution with KClO₄. Solution filtered and MnO₂ titrated with Na₂C₂O₄-KMnO₄.

^h Iron reduced with zinc and titrated with K₂Cr₂O₇.
ⁱ Phosphomolybdate-alkalimetric method.
^j SnCl₂-KMnO₄ method.
^k Tin reduced with aluminum in the presence of added antimony and titrated with KIO₃ standardized with high-purity tin.
^l Molybdivanadophosphoric acid method.
^m Copper deposited electrolytically. Electrolyte converted to chlorides and transferred to an ion exchange column of Dowex I. See J. Research NBS, 53, 353 (1954) RP2552. After selective elution of nickel, cobalt, and iron (footnotes n, s, o) zinc eluted with HNO₃ (1+4) and determined as Zn₂P₂O₇.
ⁿ Nickel eluted from an ion exchange column with 9N HCl and determined by electrolysis in an ammoniacal chloride solution.
^o Iron eluted from an ion exchange column with 1 N HCl and determined by the thiocyanate-photometric method.
^p Orthophenanthroline-photometric method.

^q Lead in a 10-g sample collected on Fe⁺⁺⁺ with NH₄OH and determined polarographically in NH₄Cl medium.
^r Tin in a 10-g sample collected on Fe⁺⁺⁺ with NH₄OH, distilled with HBr, and determined polarographically in HBr-NH₄Cl medium.
^s Cobalt eluted from an ion exchange column with 4N HCl and determined by the nitroso-R salt-photometric method.
^t K₂Cr₂O₇ titration.
^u Tin reduced with nickel and titrated with KIO₃.
^v Persulfate-arsenite method.
^w Iron precipitated twice with NH₄OH and titrated with Ti₂(SO₄)₃.
^x Dithizone-photometric method.
^y Tin reduced with iron and titrated with KIO₃.
^z American Society for Testing Materials, Method E75-56, Chemical Analysis of Copper-Nickel-Zinc Alloys.
^{aa} Tin separated as metastannic acid and weighed as SnO₂. See ASTM Method E36-45.

List of Analysts

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The rolled metal used in the preparation of this standard was furnished by Western Electric Co., Inc.

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A. V. ASTIN, *Director*.