

U. S. DEPARTMENT OF COMMERCE

National Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE 62A

MANGANESE BRONZE

Analyst *	Copper (electrolytic)	Zinc (sulfide-oxide)	Manganese (bismuthate method)	Iron	Aluminum	Tin	Nickel (dimethyl- glyoxime)	Lead (electrolytic)
1	^a 61.51	33.03	1.50	^b 1.02	^c 0.93	^d 0.85	0.62	{ 0.50 e. 50 }
2	^f 61.50	33.06	1.49	^g 1.04	^h .92	ⁱ .83	.62	.52
3	^j 61.50	33.09	1.52	^k 1.04	^l .91	^m .85	ⁿ .61	e. 49
4	^o 61.56	33.00	^p 1.52	^q 1.02	^r .95	^s .84	.63	e. 52
5	^t 61.45	33.08	1.51	^u 1.06	^v .91	^w .83	.60	e. 50
6	^x 61.50	33.07	1.51	^y 1.04	^z .91	^{aa} .83	.61	.50
7	61.54		1.51	^{ab} 1.03	^{ac} .92	^{ad} .84	.60	.49
AVERAGE	61.51	33.05	1.51	1.04	0.92	0.84	0.61	0.50

^a Five-gram sample dissolved in 110 ml. of diluted HNO₃ (1+2) and solution digested overnight. Impurities in the metastannic acid recovered by NH₄I treatment (Caley and Burford, Ind. Eng. Chem., Anal. Ed. 8, 114 (1936)), and added to the nitric acid filtrate. Two drops of 0.1N HCl added, solution diluted to 350 ml., and electrolyzed overnight, using a current density of 0.5 amp./dm².

^b Weighed as Fe₂O₃.

^c Five-gram sample dissolved as in (a). Tin separated as metastannic acid. Copper and lead removed from the filtrate by electrolysis. Sulfuric acid and the metastannic acid and paper added to the electrolyte. Solution fumed, diluted, and electrolyzed in a mercury cathode cell. Electrolyte treated with H₂S and filtered. Aluminum precipitated with NH₄OH and ignited to Al₂O₃.

^d Five-gram sample dissolved in diluted HNO₃, and stannic hydroxide precipitated with NH₄OH. Solution filtered and precipitate digested in H₂SO₄-HNO₃. Tin distilled with HBr-HCl, essentially as directed in J. Research NBS 2195 (1938) RP1116. Tin distillate diluted, chilled, and tin precipitated with cupperon and ignited to SnO₂ in a porcelain crucible.

^e Determined as PbSO₄.

^f Copper deposited in the presence of tin from an HNO₃-HF solution.

^g Reduced in a Jones reductor and titrated with KMnO₄.

^h Sample dissolved in HNO₃-H₂SO₄. Solution fumed, diluted, and electrolyzed in a mercury cathode cell. Aluminum precipitated with NH₄OH and ignited to Al₂O₃.

ⁱ Copper and lead removed by electrolysis. Electrolyte evaporated to fumes of H₂SO₄, and diluted. Tin reduced with an iron coil, and SnCl₂ titrated with iodine.

^j Copper, lead, and the like, in the metastannic acid precipitate recovered by the NaOH-Na₂S method.

^k Reduced with H₂S and titrated with KMnO₄.

^l Four-gram sample dissolved in aqua regia. Copper, lead, and the like separated in NaOH-Na₂S solution and filtered. Filtrate diluted to 1,000 ml. and a 250-ml. aliquot portion acidified, digested, and filtered. Aluminum precipitated in the filtrate with 8-hydroxyquinoline. Aluminum quinolate dissolved in HCl and treated with a measured excess of a standard solution of KBrO₃. KI added and the excess KBrO₃ titrated with standard Na₂S₂O₃.

^m Sample dissolved in aqua regia, treated with NH₄OH and filtered. Precipitate digested in H₂SO₄-HNO₃, solution fumed, and diluted. Tin reduced with iron wire and titrated with KIO₃.

ⁿ Nickel precipitated with dimethylglyoxime. Precipitate dissolved in HNO₃-H₂SO₄ and solution

fumed. Solution diluted, treated with an excess of NH₄OH, and nickel determined by electrolytic deposition.

^o Titrated with sodium arsenite.

^p Reduced with SnCl₂ and titrated with KMnO₄.

^q As in (m) except tin reduced with lead, and SnCl₂ titrated with iodine.

^r Copper and lead removed by electrolysis. Electrolyte further electrolyzed in a sulfuric acid solution in a mercury cathode cell. Resulting solution treated with H₂S and filtered. Aluminum precipitated with NH₄OH and ignited to Al₂O₃.

^s Electrolytic deposit of lead peroxide dissolved in HCl, lead precipitated and weighed as PbCrO₄.

^t Sample dissolved in HNO₃-HCl. H₂SO₄ added and solution fumed, diluted, and aluminum determined as in (h).

^u As in (p) except iron titrated with K₂Cr₂O₇ solution using diphenylamine indicator.

^v Aluminum and iron precipitated with NH₄OH. Precipitate ignited and weighed. Oxides fused with KHSO₄, iron reduced with SnCl₂, and titrated with K₂Cr₂O₇. Aluminum determined by difference.

^w Five-gram sample dissolved in diluted HNO₃ and 0.10 gram of sodium pyrophosphate added. Precipitate separated and digested in H₂SO₄-HNO₃. Solution diluted, tin reduced with Swedish iron and antimony, and SnCl₂ titrated with iodine.

* LIST OF ANALYSTS

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