U. S. DEPARTMENT OF COMMERCE

National Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE 63B

PHOSPHOR BRONZE BEARING METAL

ANALYST*	COPPER Electrolytic	TIN	LEAD Weighed as $PbSO_4$	ZINC ZnS–ZnO	ANTIMONY	IRON	PHOSPHORUS Weighed as $Mg_2P_2O_7$	NICKEL Weighed as nickel dimethylglyoxime	SULFUR	SILICON	ALUMINUM	SILVER Weighed as AgCl	ARSENIC	
1	[a] 77. 90	[b] 9. 78	[c] 9. 35	0. 71	[d] 0. 55	[e] 0. 47	0. 44	[f] 0. 33	[g] 0. 17 [h] 16	[i] 0. 13	[j] 0. 05	0. 04	[k] 0. 014	
2	77. 95	[l] 9. 79	9. 35	. 71	[m]. 55	[e]. 48	[n]. 44	. 33	[h]. 17	[o]. 13	[p]. 05	. 04	[q]. 015	
3	77. 92	[r] 9. 76	[s] 9. 40	[t]. 71	[u]. 54	[v]. 47	. 44	. 33	[h]. 16	[o]. 11	[w]. 05	. 04	[x]. 014	
4	77. 96	[y] 9. 79	9. 34 [z9] 9. 36	[z1]. 72	[z2]. 52	[z3]. 45	. 44	. 33	[z4]. 16	. 13		. 05	[z5]. 016	
5	77. 96	[l] 9. 78	9. 33	. 70	[m]. 53	[e]. 48	[z6]. 44	. 33	[z4]. 16	[i]. 12	[z7]. 06	[z8]. 04	[z9]. 016	
Averages	**77. 94**	**9. 78**	**9. 36**	**0. 71**	**0. 54**	**0. 47**	**0. 44**	**0. 33**	**0. 16**	**0. 12**	**0. 05**	**0. 04**	**0. 015**	

[a] Five-gram sample dissolved with 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 by the use of a current density of 0.5 amp/dm². Metastannic acid precipitate and paper treated with HNO_3—H_2SO_4. Tin, antimony, and arsenic volatilized by HBr—Br_2. Residual solution combined with the first electrolyte and lead separated as $PbSO_4$. Residual copper in filtrate from $PbSO_4$ precipitated with H_2S and determined by electrolysis. Correction made for silver in cathode deposit.

[b] Tin separated by distillation from a 1-g sample, precipitated with cupferron, and ignited to SnO_2. (See J. Research NBS **33**, 307 (1944) RP1610).

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

[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 on high-purity antimony.

[e] $SnCl_2$—$K_2Cr_2O_7$ method.

[f] Dimethylglyoxime-photometric method.

[g] Weighed as $BaSO_4$.

[h] Combustion-iodate method.

[i] Tin, antimony, and arsenic volatilized by HBr—$HClO_4$ treatment. Double dehydration with $HClO_4$ with intervening filtration.

[j] Weighed as $AlPO_4$.

[k] Molybdenum-blue photometric method. See J. Research NBS **24**, 7 (1940) RP1267.

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

[m] Metastannic acid precipitate separated and antimony titrated with $KBrO_3$.

[n] Alkali-molybdate method.

[o] Sulfuric acid dehydration.

[p] Mercury cathode-phenylhydrazine method.

[q] Distillation—As_2S_3 method.

[r] Tin reduced with iron in the presence of added antimony and titrated with $KBrO_3$.

[s] Same value obtained by electrodeposition and weighing as PbO_2.

[t] Same value obtained by 8-hydroxyquinoline—$KBrO_3$ method.

[u] Metastannic acid precipitate separated and digested in H_2SO_4, $(NH_4)_2S_2O_8$. Tartaric acid solution added and solution treated with H_2S. Sulfides separated and dissolved in HNO_3-H_2SO_4. Antimony reduced with tartaric acid, and titrated with $KMnO_4$ standardized on $Na_2C_2O_4$.

[v] Iron reduced with granular zinc. Precipitated copper and tin removed, and $FeCl_2$ titrated with $Ce(SO_4)_2$.

[w] Mercury cathode-8-hydroxyquinoline-$KBrO_3$ method.

[x] Arsenic distilled from a 10-g sample and titrated with iodine.

[y] Tin reduced with iron and titrated with iodine.

[z] $PbCrO_4$ method.

[z1] $K_4Fe(CN)_6$ method.

[z2] Metastannic acid precipitate separated, and digested in H_2SO_4. Antimony reduced and titrated with $KMnO_4$. Same value obtained by pyridine-iodide-colorimetric method.

[z3] $SnCl_2$—$KMnO_4$ method.

[z4] HBr evolution method.

[z5] Spectrographic determination.

[z6] Molybdivanadophosphoric-photometric method. See ASTM method E-62.

[z7] Mercury cathode-aluminum oxyquinolate.

[z8] Internal electrolysis. See ASTM method E-37.

[z9] Arsenic distilled from a 5-g sample and titrated with $KBrO_3$.

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