U. S. DEPARTMENT OF COMMERCE

National Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE 122

CAST IRON

(CAR-WHEEL)

ANALYST*	C			Mn	P		S		Si							
	1. Total	2. Graphitic	3. Combined	Bismuthate ($FeSO_4$-$KMnO_4$)	1. Gravimetric (weighed as $Mg_2P_2O_7$ after removal of arsenic)	2. Alkali-Molybdate[a]	1. Gravimetric (direct oxidation and final precipitation in reduced solution)	2. Evolution with HCl (1:1) ZnS-Iodine[b] (theoretical[c] sulfur titre)	Sulfuric acid dehydration	COPPER H_2S-CuS-CuO	NICKEL Weighed as nickel dimethylglyoxime	CHROMIUM $FeSO_4$-$KMnO_4$ titration	VANADIUM	MOLYBDENUM Colorimetric by developing color with KCNS and $SnCl_2$	TITANIUM Determined colorimetrically in residue after HCl (sp. gr. 1.10) attack	ARSENIC
1	3. 06	2. 30	0. 76	0. 510	0. 318	0. 316	0. 135	0. 132	0. 590	0. 044	0. 022	0. 033[d]	0. 015[d]	0. 002	0. 009	0. 018
2	3. 08	2. 30	. 78	. 51	-------	. 31	. 138	. 135	. 58	. 04	. 02	. 03	. 02	<. 005	. 01	. 02
3	3. 07	2. 31	. 76	. 51	-------	. 305	. 136	. 136	. 58	. 044	-------	. 031	-------	-------	-------	-------
4	3. 03	2. 30	. 73	. 511	. 307	. 306	. 133	. 132	. 584	. 040[e]	. 019	. 033	. 016	-------	. 009	-------
-------	3. 09	2. 33	. 76	. 51[f]	-------	. 313	. 136	. 136	. 58[g]	-------	-------	-------	-------	-------	-------	-------
-------	3. 06	2. 32	. 74	. 52[f]	. 308	. 307	. 134	. 122	. 59[g]	-------	-------	-------	-------	-------	-------	-------
7	3. 08	2. 33	. 75	. 510[h]	. 307	. 317[i]	. 131	. 128	. 589	. 043	. 016	. 035	. 014	-------	. 007	. 015
8	3. 04	2. 30	. 74	. 514[j]	. 313	. 316	. 131	. 134	. 588[g]	-------	-------	-------	-------	-------	-------	-------
9	3. 05	2. 32	. 73	. 509[h]	. 311	. 312[k]	. 135	. 132[l]	. 58[g]	. 044	. 022	-------	-------	-------	-------	-------
10	3. 04	2. 33	. 71	. 507	-------	. 302[k]	. 134	. 133[k]	. 580	-------	-------	-------	-------	-------	-------	-------
11	3. 06	2. 32	. 74	. 51[h]	. 305	. 303	. 134	. 132	. 597[g]	-------	. 026	. 030	-------	-------	-------	. 021
12	3. 06	2. 30	. 76	. 51[f]	-------	. 302[k]	. 134	. 135[k]	. 58[g]	-------	-------	-------	-------	-------	-------	-------
13	3. 03	2. 33	. 70	. 505[f]	. 32	. 32[k]	. 130	. 128[k]	. 584[g]	-------	. 028	. 030	. 015	-------	. 006	. 024
14	3. 08	2. 30	. 78	. 51	. 308	. 309	. 130	. 129	. 584[m]	-------	-------	-------	-------	-------	-------	-------
15	3. 07	2. 31	. 76	. 52[f]	. 306	. 305[k]	. 136	. 134	. 586	-------	. 032	. 034	-------	-------	. 012	. 018
16	3. 03	2. 33	. 70	. 516[f]	. 307	. 305[k]	. 134	. 134[k]	. 58	-------	-------	-------	-------	-------	-------	-------
17	3. 10	2. 34	. 76	. 503	. 308	. 306	. 138	. 135	. 594	-------	-------	-------	-------	-------	-------	-------
Averages	**3. 06**	**2. 32**	**. 74**	**. 511**	**. 310**	**. 309**	**. 134**	**. 132**	**. 585**	**. 043**	**. 023**	**. 032**	**. 016**	**. 002**	**. 009**	**. 019**
General Averages	**3. 06**	**2. 32**	**0. 74**	**0. 511**	**0. 310**		**0. 134**		**0. 585**	**0. 043**	**0. 023**	**0. 032**	**0. 016**	**0. 002**	**0. 009**	**0. 019**

[a] Precipitated at 40° C, washed with a 1-percent solution of KNO_3 and titrated with alkali standardized by using the National Bureau of Standards standard sample of acid potassium phthalate and the ratio of 23 NaOH:1P.
[b] Sample annealed by covering with a layer of graphite, and heating for 20 minutes at 685° C.
[c] Value obtained by standardizing the titrating solution by means of sodium oxalate through $KMnO_4$ and $Na_2S_2O_3$.
[d] Potentiometric titration.
[e] Finished by electrolysis.
[f] Persulfate-arsenite.
[g] Nitric-sulfuric acid dehydration.
[h] Bismuthate-arsenite.
[i] Phosphomolybdate dissolved, solution passed through a Jones reductor, and titrated with a standard solution of $KMnO_4$ standardized with sodium oxalate.
[j] Ford-Williams method.
[k] Titrating solution standardized by means of a standard steel.
[l] H_2S absorbed in ammoniacal $CdCl_2$ solution.
[m] Hydrochloric-sulfuric acid dehydration.

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