SUPPLEMENT TO
NBS CIRCULAR 398

Standard Samples and Reference Standards Issued by the National Bureau of Standards

UNITED STATES DEPARTMENT OF COMMERCE

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CONTENTS

Standard Samples and Reference Standards Issued by the National Bureau of Standards

This Supplement consists of a descriptive listing of the various Standard Samples issued by the National Bureau of Standards. A schedule of weights and fees, as well as directions for ordering, is included. Summarized tables of analyses are presented, to indicate the type of standards of composition presently available. Announcements of new standards will be made in scientific and trade journals, and the current status of the various standards will be indicated by a mimeographed insert.

1. Purchase Procedure

1.1. Identification of Samples

The samples are listed by groups; the sample numbers represent the order of issuance of the first representative of each kind. Renewals of an analyzed sample are indicated by the original number, with an added letter to denote its intended relation. Thus, 10a is the first, 10b the second, and 10c the third renewal of No. 10 Bessemer 0.4 C steel. In this way a given number will always represent a material of fixed or approximately fixed composition. Numbers missing from the series in the following table represent samples of which the supply has become exhausted and which it is not the present intention to replace.

1.2. Ordering

Orders should give both the *number and name* of the sample wanted. Example: No. 22c, steel, Bessemer, 0.6 C. The list of standard samples, their numbers, prices, and analyses are to be found in the succeeding pages. No samples of smaller size than those listed are distributed.

For oils and hydrocarbons see special order procedure indicated on page 12.

1.3. Terms and Shipping

(a) Domestic Shipments

Shipments of material (other than hydrocarbons or organic sulfur compounds) intended for the United States, its possessions, Mexico, Canada, and Cuba are normally shipped prepaid parcel post unless the purchaser requests a different mode of shipment, in which case the shipment will be sent collect. Hydrocarbons and organic sulfur compounds are shipped express collect. (See page 12).

(b) Foreign Shipments

Small shipments will be forwarded as a United States Government shipment via International Parcel Post (providing that the parcel does not exceed the weight limits as prescribed by Postal Laws and Regulations to foreign countries). Shipments exceeding the parcel post weight limit must be handled through an agent (shipping or brokerage firm) located in the United States as designated by the purchaser. Parcels will be packed for overseas shipment and forwarded via express collect to the United States firm designated as agent.

(c) Payment for Foreign Orders

Remittances in payment of foreign orders must be made payable to the Treasurer of the United States, and are required in advance. These remittances must be drawn on a bank in the United States and payable at the standard rate of United States currency.

2. Standard Samples, With Schedule of Weights and Fees

2.1. Descriptive List

[For detailed information on compositions and properties certified, see pp. 15 to 22, as indicated in the table of contents, p. II. (*See mimeographed insert for standards out of stock, renewals, and new standards*)]

Standards of Chemical Composition

Sample No.	Name	Approximate weight of sample in grams	Price per sample	Sample No.	Name	Approximate weight of sample in grams	Price per sample
	STEELS (CHEMICAL STANDARDS)						
8g	Bessemer, 0.1 C	150	$3.00	33c	Nickel (SAE 2335)	150	$3.00
10e	Bessemer, 0.4 C	150	3.00	32d	Cr-Ni (SAE 3140)	150	3.00
22c	Bessemer, 0.6 C (aluminum-bearing)	150	3.00	72d	Cr-Mo (SAE X4130)	150	3.00
170	B. O. H., 0.03 C, 0.2 Ti	150	4.00	111b	Ni-Mo (SAE 4620)	150	3.00
15d	B. O. H., 0.1 C	150	3.00	30d	Cr-V (SAE 6135)	150	3.00
11f	B. O. H., 0.2 C	150	3.00	36	Cr2-Mo1	150	3.00
12e	B. O. H., 0.4 C	150	3.00	106a	Cr-Mo-Al (Nitralloy G)	150	3.00
152	B. O. H., 0.5 C, 0.04 Sn	150	3.00	135	Cr5-Mo0.5	150	3.00
13e	B. O. H., 0.6 C	150	3.00	139	Cr-Ni-Mo (NE 8637)	150	3.00
14c	B. O. H., 0.8 C	150	3.00	156	Cr-Ni-Mo (NE 9450)	150	3.00
16c	B. O. H., 1.0 C	150	3.00	159	Cr1-Mo0.4-Ag 0.1	150	3.00
19e	A. O. H., 0.2 C	150	3.00	50b	W18-Cr4-V1	150	4.00
20e	A. O. H., 0.4 C	150	3.00	132	Mo7-W6-Cr4-V1.5	150	4.00
21d	A. O. H., 0.6 C, 0.08 Sn	150	3.00	134	Mo9-W2-Cr4-V1	150	4.00
34a	A. O. H., 0.8 C	150	3.00	153	Mo8-W1.5-Cr4-V2-Co8	150	4.00
				155	Cr0.5-W0.5	150	4.00
51a	Electric furnace, 1.2 C	150	3.00				
65c	Basic electric, 0.3 C	150	3.00	73a	Stainless (Cr14)	150	4.00
100a	Manganese (SAE T1345)	150	3.00	133	Stainless (Cr14-Mo0.6-S0.4)	150	4.00
105	High-sulfur, 0.2 C (carbon only)	150	2.00	101c	Cr18-Ni9 (SAE 30905)	150	4.00
125	High-silicon, 5.0 Si	150	3.00				
129a	High-sulfur (SAE X1112)	150	3.00	121b	Cr18-Ni10 (Ti-bearing)	150	4.00
130	Lead-bearing, 0.2 Pb	150	3.00	123a	Cr18-Ni11 (Cb-bearing)	150	4.00
151	Boron-bearing, 0.003 B	150	3.00	123b	Cr-Ni-Cb 0.7-Ta 0.2	150	4.50
				160	Cr19-Ni9-Mo3	150	4.00
				166	Cr19-Ni9 (carbon only)	100	3.00
				126a	High-nickel (Ni36)	150	4.00
				161	Casting alloy (Ni64-Cr17-Fe15)	150	4.00
	IRONS						
4g	Cast iron	150	$4.00	82a	Nickel-chromium cast iron	150	$4.00
5i	Cast iron	150	4.00	107a	Nickel-molybdenum cast iron	150	4.00
6e	Cast iron	150	4.00	115	Nickel - chromium - copper cast iron	150	4.00
7e	Cast iron	150	4.00	122b	Cast iron (car wheel)	150	4.00
55c	Ingot iron	150	4.00				
	STEEL-MAKING ALLOYS						
57	Refined silicon	60	$4.00	66a	Spiegeleisen	100	$4.00
58	Ferrosilicon (75% Si)	75	4.00	68a	Ferromanganese	100	4.00
59	Ferrosilicon (50% Si)	75	4.00	71	Calcium molybdate	60	4.00
61a	Ferrovanadium (high carbon)	100	4.00	90	Ferrophosphorus	75	4.00
64a	Ferrochromium (high carbon)	100	4.00	116a	Ferrotitanium (low carbon)	100	4.00

Descriptive List—Continued

Standards of Chemical Composition—Continued

Sample No.	Name	Approximate weight of sample in grams	Price per sample	Sample No.	Name	Approximate weight of sample in grams	Price per sample
	NONFERROUS ALLOYS						
85a	Aluminum alloy, wrought	65	$3.50	53c	Lead-base bearing metal	200	$4.50
86c	Aluminum-base casting alloy	65	3.50	54c	Tin-base bearing metal	200	4.50
87	Aluminum-silicon alloy	65	3.50	127	Solder (Pb65–Sn35)	200	4.50
				157	Nickel silver (Cu72–Ni18–Zn10)	125	4.50
37d	Brass, sheet	150	4.50	161	Nickel-base casting alloy	150	4.00
164	Brass, aluminum	150	4.50	162	Monel type (Ni66–Cu29)	150	4.50
52b	Bronze, cast	150	4.50	171	Magnesium-base alloy	100	4.00
62b	Bronze, manganese	150	4.50				
63b	Bronze, phosphorus	150	4.50	94a	Zinc-base die-casting alloy	150	4.50
124b	Bronze (Cu85–Pb5–Sn5–Zn5)	150	4.50	108	Zinc spelter	200	4.50
158	Bronze, silicon	150	4.50	109	Zinc spelter	200	4.50
				110	Zinc spelter	200	4.50
	ORES						
25b	Manganese ore	100	$3.00	56b	Phosphate rock (Tennessee)	45	$3.00
27c	Iron ore, Mesabi	125	3.00	120	Phosphate rock (Florida)	45	3.00
28a	Iron ore, Norrie	50	2.00	113	Zinc ore (Tri-State concentrate)	50	3.00
29a	Iron ore, Magnetite	75	3.00	137	Tin ore (Bolivian concentrate)	50	3.00
				138	Tin ore (N. E. I. concentrate)	50	3.00
69a	Bauxite	60	3.00				
	CERAMIC MATERIALS						
76	Burned refractory (40% Al_2O_3)	60	$3.00	81	Glass sand	60	$3.00
77	Burned refractory (60% Al_2O_3)	60	3.00	165	Glass sand (low iron)	60	3.00
78	Burned refractory (70% Al_2O_3)	60	3.00				
				1a	Limestone, argillaceous	50	3.00
79	Fluorspar	60	3.00	88	Limestone, dolomitic	50	3.00
97	Clay, flint	60	3.00				
98	Clay, plastic	60	3.00	102	Silica brick	60	3.00
99	Feldspar, soda	40	3.00	103	Chrome refractory	60	3.00
				104	Burned magnesite	60	3.00
80	Glass, soda-lime	45	3.00	112	Silicon carbide	85	3.00
89	Glass, lead-barium	45	3.00				
91	Glass, opal	45	3.00	154	Titanium dioxide	40	3.00
92	Glass, low boron	45	3.00				
93	Glass, high boron	45	3.00				
128	Glass, soda-lime (B_2O_3, BaO)	45	3.00				

Standards of Chemical Composition—Continued

MICROCHEMICAL STANDARDS

Sample No.	Name	Constituents determined or intended use	Approximate weight of sample in grams	Price per sample
140	Benzoic acid	C, H	2	$3.00
141	Acetanilide	N, C, H	2	3.00
142	Anisic acid	Methoxyl	2	3.00
143	Cystine	S, C, H, N	2	3.00
144	2-chlorobenzoic acid	Cl	2	3.00
145	2-iodobenzoic acid	I	2	3.00
146	Trialphanapthyl phosphate	P	2	3.00
	Chemicals			
84d	Acid potassium phthalate	Acidimetric value	60	$3.00
39g	Benzoic acid	Acidimetric and calorimetric values	30	3.00
40e	Sodium oxalate	Oxidimetric value	60	3.00
83a	Arsenic trioxide	Oxidimetric value	75	3.00
136	Potassium dichromate	Oxidimetric value	75	3.00
17	Sucrose (cane-sugar)	Calorimetric and saccharimetric values	60	3.00
41	Dextrose (glucose)	Reducing value	70	3.00
	pH Standards			
185	Acid potassium phthalate	pH (approx.) 4.0	60	$2.50
186Ib 186IIb	Potassium dihydrogen phosphate Disodium hydrogen phosphate	pH (approx.) 6.8 [1]	[2] 60	5.00
187a	Borax	pH (approx.) 9.2	30	2.50
188	Potassium hydrogen tartrate	pH (approx.) 3.6	60	2.50
	Melting-Point Standards			
44d	Aluminum	659.7° C	200	$2.50
45b	Copper	1083.2° C	450	2.50
49c	Lead	327.31° C	1,000	2.50
42e	Tin	231.90° C	350	2.50
43f	Zinc	419.50° C	350	2.50
	Turbidimetric and Fineness Standards			
47i	Cement	No. 200 sieve residue, 9.4%	160	$2.50
114g	Cement	No. 325 sieve residue, 9.6% Surface area, 1780 sq. cm. per gram Air permeability, 3230 sq. cm. per gram	12	2.50
	Thermoelectric Standards			
118	Alumel wire, No. 8 gage	emf vs. NBS Pt No. 27, 0° to 1,300° C	3 ft	$2.00
119	Chromel wire, No. 8 gage	emf vs. NBS Pt No. 27, 0° to 1,300° C	3 ft	2.00

[1] 2 phosphates are to be used together in equal molar proportions.
[2] 30 g of each phosphate are furnished.

Spectrographic Standards

Sample Nos.[1]		Name	Price[2] per sample	Sample Nos.[1]		Name	Price[2] per sample
STEELS—(SPECTROGRAPHIC STANDARDS)							
401	801	B. O. H., 0.4 C	$5.00	415a	815a	Bessemer, 0.5 C	$5.00
402	802	B. O. H., 0.8 C	5.00				
403	(3)	A. O. H., 0.4 C	5.00	416a	816a	Nitralloy G	5.00
404a	804a	Basic electric	5.00	417	(3)	A. O. H., 0.4 C	5.00
405a	805a	Medium manganese	5.00	417a	817a	B. O. H., 0.4 C	5.00
				418	818	Cr-Mo (SAE X4130)	5.00
406	(3)	Chromium-vanadium	5.00	419	819	Ni-Mo (SAE 4620)	5.00
(3)	807	Chromium-vanadium	5.00	420	820	Ingot iron, 0.01 C	5.00
408	808	Chromium-nickel	5.00				
(3)	809a	Nickel	5.00	421	821	Cr-W, 0.9 C	5.00
410a	810a	2 Cr-1 Mo	5.00				
				425	825	Mn-Ni-Cr (N.E. 9450) (boron only)	5.00
411	(3)	Cr-Mo (SAE X4130)	5.00	426	826	Cr-Mo (SAE 4150) (boron only)	5.00
411a	811a	Cr-Mo (SAE X4130)	5.00	427	827	Cr-Mo (SAE 4150) (boron only)	5.00
412	(3)	Cr-Mo (SAE 4130)	5.00	428	828	Mn-Cr (boron only)	5.00
412a	812a	Cr-Ni-Mo (NE8637)	5.00	429	829	Ni-Cr-B (boron only)	5.00
413	813	A. O. H., 0.4 C	5.00	430	830	Ni-Cr-B (boron only)	5.00
414	(3)	Cr-Mo (SAE 4140)	5.00				

[1] Sizes are 400 series, rods 7/32 in. in diameter, 4 in. long (20 g); 800 series rods ½ in. in diameter, 2 in. long (50 g).

[2] For each sample in the 400 and 800 series.

[3] This standard is available in only one size.

Sample No.	Name	Approximate weight of sample in grams	Price per sample	Sample No.	Name	Approximate weight of sample in grams	Price per sample
ALUMINUM ALLOYS[1]—(SPECTROGRAPHIC STANDARDS)							
601	Aluminum alloy, wrought (14S)	160	$8.00	604	Aluminum-base casting alloy (142).	160	$8.00
602	Aluminum alloy, wrought (24S)	160	8.00				
603	Aluminum alloy, wrought (61S)	160	8.00				

[1] Aluminum standards are disks 2½ in. in diameter, ¾ in. thick.

Sample No.	Name	Approximate weight of sample in grams	Price per sample	Sample No.	Name	Approximate weight of sample in grams	Price per sample
TIN METAL (SPECTROGRAPHIC STANDARDS)							
431[1]	Tin A	25	$8.00	831[1]	Tin A	45	$14.00
432	Tin B	25	8.00	832	Tin B	45	14.00
433	Tin C	25	8.00	833	Tin C	45	14.00
434	Tin D	25	8.00	834	Tin D	45	14.00
435	Tin E	25	8.00	835	Tin E	45	14.00

[1] Sizes are: 400 series, rods ¼ in. in diameter, 4 in. long; 800 series, rods, ½ in. in diameter, 2 in. long.

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Sample No.	Name	Approximate weight of sample in grams	Price per sample	Sample No.	Name	Approximate weight of sample in grams	Price per sample
Paint-Pigment Standards for Color and Tinting Strength Only							
300	Toluidine red toner	40	$3.00	314	Yellow iron oxide, light lemon	20	$3.00
301	Yellow ocher	45	3.00	315	Yellow iron oxide, lemon	20	3.00
302	Raw sienna	45	3.00	316	Yellow iron oxide, orange	25	3.00
303	Burnt sienna	50	3.00	317	Yellow iron oxide, dark orange	40	3.00
304	Raw umber	45	3.00	318	Lampblack	15	3.00
305	Burnt umber	50	3.00	319	Primrose chrome yellow	65	3.00
306	Venetian red	60	3.00	320	Lemon chrome yellow	60	3.00
				321	Medium chrome yellow	65	3.00
307	Metallic brown	60	3.00				
308	Indian red	50	3.00	322	Light chrome orange	100	3.00
309	Mineral red	65	3.00	323	Dark chrome orange	100	3.00
310	Bright red oxide	50	3.00	324	Ultramarine blue	37	3.00
311	Carbon black (high color)	10	3.00	325	Iron blue	25	3.00
312	Carbon black (all-purpose)	20	3.00	326	Light chrome green	60	3.00
313	Black iron oxide	42	3.00	327	Medium chrome green	50	3.00
				328	Dark chrome green	45	3.00
Standards for Rubber Compounding [1]							
370	Zinc oxide	2,000	$1.65	374	Tetramethylthiuram-disulfide	500	$2.25
371	Sulfur	1,000	.60	375	Channel black	8,000	3.50
372	Stearic acid	600	1.20	376	Light magnesia	140	.85
373	Benzothiazyl-disulfide	600	1.20				

[1] Normally, samples are shipped railway express, express charges collect.

Hydrocarbons and Organic Sulfur Compounds

Sample No.[1]	Compound		Amount of impurity [2]	Volume per sample [3]	Price per sample
	Formula	Name			
PARAFFINS					
			Mole percent	*ml*	
201a–5	C_5H_{12}	*n*-Pentane	0.15±0.07	5	$10
201a–8S	C_5H_{12}	*n*-Pentane	.15±0.07	8	18
201a–25	C_5H_{12}	*n*-Pentane	.15±0.07	25	35
202a–8S	C_5H_{12}	2-Methylbutane (isopentane)	.09±0.06	8	18
299–5S	C_5H_{12}	2,2-Dimethylpropane (neopentane)	.04±0.02	5	25
203b–5	C_6H_{14}	*n*-Hexane	.020±0.010	5	10
203a–8S	C_6H_{14}	*n*-Hexane	.10±0.05	8	18
203b–25	C_6H_{14}	*n*-Hexane	.020±0.010	25	35
204a–8S	C_6H_{14}	2-Methylpentane	.16±0.08	8	18
205a–8S	C_6H_{14}	3-Methylpentane	[4] .20±0.15	8	18
206a–8S	C_6H_{14}	2,2-Dimethylbutane	.10±0.04	8	18
207a–8S	C_6H_{14}	2,3-Dimethylbutane	.11±0.06	8	18
216–5	C_7H_{16}	*n*-Heptane	.10±0.05	5	10
216–8S	C_7H_{16}	*n*-Heptane	.10±0.05	8	18
216–25	C_7H_{16}	*n*-Heptane	.10±0.05	25	35
223–5S	C_7H_{16}	2-Methylhexane	.23±0.07	5	18
224–5S	C_7H_{16}	3-Methylhexane	[4] .25±0.15	5	18
225–5S	C_7H_{16}	3-Ethylpentane	.13±0.03	5	18
226–5S	C_7H_{16}	2,2-Dimethylpentane	.21±0.06	5	18
227–5S	C_7H_{16}	2,3-Dimethylpentane	[4] .25±0.15	5	18
228–5S	C_7H_{16}	2,4-Dimethylpentane	.17±0.05	5	18
229–5S	C_7H_{16}	3,3-Dimethylpentane	.20±0.15	5	18
222–5S	C_7H_{16}	2,2,3-Trimethylbutane	.06±0.03	5	18

See footnotes at end of tables.

Hydrocarbons and Organic Sulfur Compounds—Continued

Sample No.[1]	Compound		Amount of impurity [2]	Volume per sample [3]	Price per sample
	Formula	Name			
		PARAFFINS—Continued			
			Mole percent	*ml*	
230–5S	C_8H_{18}	*n*-Octane	0. 06±0. 04	5	$25
231–5S	C_8H_{18}	2-Methylheptane	. 41±0. 18	5	25
232–5S	C_8H_{18}	3-Methylheptane	. 50±0. 23	5	25
233–5S	C_8H_{18}	4-Methylheptane	. 12±0. 07	5	25
234–5S	C_8H_{18}	3-Ethylhexane	[4] . 30±0. 20	5	25
235–5S	C_8H_{18}	2,2-Dimethylhexane	. 29±0. 11	5	25
236–5S	C_8H_{18}	2,3-Dimethylhexane	[4] . 30±0. 20	5	25
237–5S	C_8H_{18}	2,4-Dimethylhexane	[4] . 30±0. 20	5	25
238–5S	C_8H_{18}	2,5-Dimethylhexane	. 30±0. 09	5	25
239–5S	C_8H_{18}	3,3-Dimethylhexane	[4] . 30±0. 20	5	25
240–5S	C_8H_{18}	3,4-Dimethylhexane	[4] . 30±0. 20	5	25
241–5S	C_8H_{18}	2-Methyl-3-ethylpentane	. 23±0. 11	5	25
242–5S	C_8H_{18}	3-Methyl-3-ethylpentane	. 08±0. 04	5	25
243–5S	C_8H_{18}	2,2,3-Trimethylpentane	. 42±0. 20	5	25
217–5	C_8H_{18}	2,2,4-Trimethylpentane [5,6]	. 12±0. 05	5	10
217–8S	C_8H_{18}	2,2,4-Trimethylpentane [5,6]	. 12±0. 05	8	18
217–25	C_8H_{18}	2,2,4-Trimethylpentane [5,6]	. 12±0. 05	25	35
217–50	C_8H_{18}	2,2,4-Trimethylpentane [5,6]	. 12±0. 05	50	60
244–5S	C_8H_{18}	2,3,3-Trimethylpentane	. 40±0. 08	5	25
245–5S	C_8H_{18}	2,3,4-Trimethylpentane	. 19±0. 06	5	25
252–5S	C_9H_{20}	*n*-Nonane	. 08±0. 06	5	35
541–5S	C_9H_{20}	2,2,3-Trimethylhexane	[4] . 30±0. 20	5	35
253–5S	C_9H_{20}	2,2,4-Trimethylhexane	. 30±0. 20	5	35
254–5S	C_9H_{20}	2,2,5-Trimethylhexane	. 20±0. 04	5	35
542–5S	C_9H_{20}	2,3,3-Trimethylhexane	. 13±0. 06	5	35
255–5S	C_9H_{20}	2,3,5-Trimethylhexane	[4] . 30±0. 20	5	35
256–5S	C_9H_{20}	2,4,4-Trimethylhexane	. 29±0. 11	5	35
544–5S	C_9H_{20}	3,3,4-Trimethylhexane	. 23±0. 10	5	35
289–5S	C_9H_{20}	3,3-Diethylpentane	. 018±0. 011	5	35
296–5S	C_9H_{20}	2,2,3,3-Tetramethylpentane	. 064±0. 020	5	35
297–5S	C_9H_{20}	2,2,3,4-Tetramethylpentane	. 035±0. 014	5	35
257–5S	C_9H_{20}	2,2,4,4-Tetramethylpentane	. 16±0. 08	5	35
298–5S	C_9H_{20}	2,3,3,4-Tetramethylpentane	. 051±0. 037	5	35
505–5S	$C_{10}H_{22}$	*n*-Decane	. 04±0. 02	5	35
562–5S	$C_{11}H_{24}$	*n*-Undecane	. 04±0. 03	5	35
559–5S	$C_{12}H_{26}$	*n*-Dodecane	. 031±0. 025	5	35
554–5S	$C_{12}H_{26}$	2,2,4,6,6-Pentamethylheptane	. 06±0. 04	5	35
573–5S	$C_{13}H_{28}$	*n*-Tridecane	. 09±0. 06	5	35
580–5S	$C_{14}H_{30}$	*n*-Tetradecane	. 07±0. 06	5	35
581–5S	$C_{15}H_{32}$	*n*-Pentadecane	. 07±0. 05	5	35
568–5S	$C_{16}H_{34}$	*n*-Hexadecane	. 06±0. 04	5	35

See footnotes at end of tables.

Hydrocarbons and Organic Sulfur Compounds—Continued

Sample No.[1]	Compound		Amount of impurity [2]	Volume per sample [3]	Price per sample
	Formula	Name			
		ALKYL CYCLOPENTANES			
			Mole percent	*ml*	
219–5S	C_5H_{10}	Cyclopentane	0. 05±0. 02	5	$18
208a–5	C_6H_{12}	Methylcyclopentane	. 11±0. 06	5	10
208a–8S	C_6H_{12}	Methylcyclopentane	. 11±0. 06	8	18
208a–25	C_6H_{12}	Methylcyclopentane	. 11±0. 06	25	35
266–5S	C_7H_{14}	Ethylcyclopentane	. 06±0. 03	5	25
267–5S	C_7H_{14}	1,1-Dimethylcyclopentane	. 03±0. 02	5	35
268–5S	C_7H_{14}	1, *cis*-2-Dimethylcyclopentane	. 031±0. 016	5	35
269–5S	C_7H_{14}	1,*trans*-2-Dimethylcyclopentane	. 19±0. 10	5	35
270–5S	C_7H_{14}	1,*cis*-3-Dimethylcyclopentane	. 65±0. 23	5	35
271–5S	C_7H_{14}	1,*trans*-3-Dimethylcyclopentane	. 39±0. 09	5	35
272–5S	C_8H_{16}	*n*-Propylcyclopentane	. 20±0. 10	5	25
273–5S	C_8H_{16}	Isopropylcyclopentane	. 20±0. 07	5	25
274–5S	C_8H_{16}	1-Methyl-1-ethylcyclopentane	. 13±0. 08	5	50
275–5S	C_8H_{16}	1-Methyl-*cis*-2-ethylcyclopentane	. 48±0. 24	5	50
279–5S	C_8H_{16}	1,1,2-Trimethylcyclopentane	. 015±0. 009	5	50
280–5S	C_8H_{16}	1,1,3-Trimethylcyclopentane	. 48±0. 32	5	50
290–5S	C_8H_{16}	1,*cis*-2,*cis*-3-Trimethylcyclopentane	. 10±0. 06	5	50
292–5S	C_8H_{16}	1,*trans*-2,*cis*-3-Trimethylcyclopentane	. 11±0. 04	5	50
294–5S	C_8H_{16}	1,*cis*-2,*trans*-4-Trimethylcyclopentane	. 42±0. 23	5	50
295–5S	C_8H_{16}	1,*trans*-2,*cis*-4-Trimethylcyclopentane	. 24±0. 10	5	50
517–5S	C_9H_{18}	*n*-Butylcyclopentane	. 034±0. 025	5	35
518–5S	C_9H_{18}	Isobutylcyclopentane	. 16±0. 08	5	35
583–5S	$C_{10}H_{18}$	Cyclopentylcyclopentane	. 05±0. 03	5	35
588–5S	$C_{15}H_{30}$	*n*-Decylcyclopentane	. 20±0. 18	5	35
		ALKYL CYCLOHEXANES			
209a–5	C_6H_{12}	Cyclohexane	0. 010±0. 006	5	$10
209a–8S	C_6H_{12}	Cyclohexane	. 010±0. 006	8	18
209a–25	C_6H_{12}	Cyclohexane	. 010±0. 006	25	35
218–5	C_7H_{14}	Methylcyclohexane [5]	. 10±0. 05	5	10
218–8S	C_7H_{14}	Methylcyclohexane [5]	. 10±0. 05	8	18
218–25	C_7H_{14}	Methylcyclohexane [5]	. 10±0. 05	25	35
258–5S	C_8H_{16}	Ethylcyclohexane	. 13±0. 08	5	25
259–5S	C_8H_{16}	1,1-Dimethylcyclohexane	. 19±0. 03	5	35
260–5S	C_8H_{16}	1,*cis*-2-Dimethylcyclohexane	. 024±0. 015	5	35
261–5S	C_8H_{16}	1,*trans*-2-Dimethylcyclohexane	. 08±0. 07	5	35
263–5S	C_8H_{16}	1,*cis*-3-Dimethylcyclohexane [7]	. 09±0. 05	5	35
262–5S	C_8H_{16}	1,*trans*-3-Dimethylcyclohexane [8]	. 16±0. 07	5	35
264–5S	C_8H_{16}	1,*cis*-4-Dimethylcyclohexane	. 06±0. 04	5	35
265–5S	C_8H_{16}	1,*trans*-4-Dimethylcyclohexane	. 14±0. 08	5	35
506–5S	C_9H_{18}	*n*-Propylcyclohexane	. 08±0. 05	5	25
507–5S	C_9H_{18}	Isopropylcyclohexane	. 16±0. 07	5	25
516–5S	C_9H_{18}	1,1,3-Trimethylcyclohexane	. 21±0. 05	5	50
508–5S	$C_{10}H_{20}$	*n*-Butylcyclohexane	. 08±0. 04	5	35
509–5S	$C_{10}H_{20}$	Isobutylcyclohexane	. 17±0. 09	5	35
510–5S	$C_{10}H_{20}$	*sec*-Butylcyclohexane	[4] . 30±0. 20	5	35
511–5S	$C_{10}H_{20}$	*tert*-Butylcyclohexane	. 05±0. 03	5	35
591–5S	$C_{16}H_{32}$	*n*-Decylcyclohexane	. 14±0. 11	5	35

See footnotes at end of tables.

Hydrocarbons and Organic Sulfur Compounds—Continued

Sample No.[1]	Compound		Amount of impurity [2]	Volume per sample [3]	Price per sample
	Formula	Name			
		MONOOLEFINS			
			Mole percent	*ml*	
281-5S	C_5H_{10}	1-Pentene	0. 66±0. 40	5	$25
282b-5S	C_5H_{10}	*cis*-2-Pentene	. 30±0. 10	5	25
283-5S	C_5H_{10}	*trans*-2-Pentene	. 09±0. 05	5	25
284-5S	C_5H_{10}	2-Methyl-1-butene	. 14±0. 08	5	25
285-5S	C_5H_{10}	3-Methyl-1-butene	. 24±0. 12	5	25
286-5S	C_5H_{10}	2-Methyl-2-butene	. 06±0. 04	5	25
519-5S	C_6H_{12}	1-Hexene	. 14±0. 08	5	35
526-5S	C_6H_{12}	*cis*-2-Hexene	. 30±0. 10	5	35
527-5S	C_6H_{12}	*trans*-2-Hexene	. 17±0. 11	5	35
528-5S	C_6H_{12}	*cis*-3-Hexene	. 13±0. 08	5	35
529-5S	C_6H_{12}	*trans*-3-Hexene	. 06±0. 03	5	35
530-5S	C_6H_{12}	2-Methyl-1-pentene	. 19±0. 09	5	35
531-5S	C_6H_{12}	3-Methyl-1-pentene	. 30±0. 20	5	35
532-5S	C_6H_{12}	4-Methyl-1-pentene	. 18±0. 12	5	35
533-5S	C_6H_{12}	2-Methyl-2-pentene	. 09±0. 05	5	35
534-5S	C_6H_{12}	3-Methyl-*cis*-2-pentene	. 15±0. 08	5	35
535-5S	C_6H_{12}	3-Methyl-*trans*-2-pentene	. 14±0. 09	5	35
537-5S	C_6H_{12}	4-Methyl-*cis*-2-pentene	. 08±0. 07	5	35
536-5S	C_6H_{12}	4-Methyl-*trans*-2-pentene	. 25±0. 07	5	35
538-5S	C_6H_{12}	2-Ethyl-1-butene	. 10±0. 04	5	35
539-5S	C_6H_{12}	2, 3-Dimethyl-1-butene	. 14±0. 13	5	35
287-5S	C_6H_{12}	3, 3-Dimethyl-1-butene	. 09±0. 06	5	35
540-5S	C_6H_{12}	2, 3-Dimethyl-2-butene	. 10±0. 05	5	35
520-5S	C_7H_{14}	1-Heptene	. 20±0. 10	5	35
589-5S	C_7H_{14}	4-Methyl-1-hexene	. 22±0. 16	5	35
547-5S	C_7H_{14}	4-4-Dimethyl-1-pentene	. 15±0. 08	5	35
582-5S	C_7H_{14}	4-4-Dimethyl-*cis*-2-pentene	. 21±0. 11	5	35
574-5S	C_7H_{14}	4-4-Dimethyl-*trans*-2-pentene	. 09±0. 03	5	35
550-5S	C_7H_{14}	2, 3, 3-Trimethyl-1-butene	. 06±0. 04	5	35
521-5S	C_8H_{16}	1-Octene	. 24±0. 13	5	35
548-5S	C_8H_{16}	*trans*-4-Octene	. 16±0. 11	5	35
545-5S	C_8H_{16}	2,4,4-Trimethyl-1-pentene	. 09±0. 03	5	35
546-5S	C_8H_{16}	2,4,4-Trimethyl-2-pentene	. 08±0. 05	5	35
551-5S	C_9H_{18}	1-Nonene	. 24±0. 18	5	35
552-5S	$C_{10}H_{20}$	1-Decene	. 11±0. 07	5	35
555-5S	$C_{11}H_{22}$	1-Undecene	. 09±0. 08	5	35
584-5S	$C_{12}H_{24}$	1-Dodecene	. 13±0. 07	5	35
590-5S	$C_{16}H_{32}$	1-Hexadecene	. 16±0. 07	5	35
		DIOLEFINS			
512-5S	C_4H_6	1,2-Butadiene	0. 08±0. 05	5	$25
513-5S	C_4H_6	1,3-Butadiene	[9]. 08±0. 04	5	25
569-5S	C_5H_8	1,2-Pentadiene	[9]. 34±0. 15	5	35
563-5S	C_5H_8	1-*cis*-3-Pentadiene	[9]. 08±0. 04	5	35
564-5S	C_5H_8	1-*trasn*-3-Pentadiene	[9]. 08±0. 04	5	35
565-5S	C_5H_8	1,4-Pentadiene	[9]. 07±0. 05	5	35
558-5S	C_5H_8	2,3-Pentadiene	[9]. 15±0. 07	5	35
549-5S	C_5H_8	2-Methyl-1, 3-butadiene (isoprene)	[9]. 04±0. 03	5	35
553-5S	C_6H_{10}	1,5-Hexadiene	[9]. 11±0. 08	5	35
570-5S	C_6H_{10}	2,3-Dimethyl-1, 3-butadiene	[9]. 06±0. 04	5	35

See footnotes at end of tables.

Hydrocarbons and Organic Sulfur Compounds—Continued

Sample No.[1]	Compound		Amount of impurity [2]	Volume per sample [3]	Price per sample
	Formula	Name			
		CYCLOMONOOLEFINS			
			Mole percent	*ml*	
288–5S	C_5H_8	Cyclopentene	0. 034 ± 0. 021	5	$25
522–5S	C_6H_{10}	Cyclohexene	. 023 ± 0. 020	5	35
557–5S	C_8H_{12}	4-Ethenyl-1-cyclohexene (4-vinyl-1-cyclohexene)	[9]. 10 ± 0. 07	5	35
		ACETYLENES			
514–5S	C_4H_6	1-Butyne	0. 13 ± 0. 07	5	$25
515–5S	C_4H_6	2-Butyne	. 069 ± 0. 038	5	25
		ALKYL BENZENES			
210a–5	C_6H_6	Benzene	0. 03 ± 0. 02	5	$10
210a–8S	C_6H_6	Benzene	. 03 ± 0. 02	8	18
210a–25	C_6H_6	Benzene	. 03 ± 0. 02	25	35
211a–5	C_7H_8	Methylbenzene (toluene)[5]	. 04 ± 0. 02	5	10
211a–8S	C_7H_8	Methylbenzene (toluene)[5]	. 04 ± 0. 02	8	18
211a–25	C_7H_8	Methylbenzene (toluene)[5]	. 04 ± 0. 02	25	35
211a–50	C_7H_8	Methylbenzene (toluene)[5]	. 04 ± 0. 02	50	60
212a–5	C_8H_{10}	Ethylbenzene	. 04 ± 0. 02	5	10
212a–8S	C_8H_{10}	Ethylbenzene	. 04 ± 0. 02	8	18
212a–25	C_8H_{10}	Ethylbenzene	. 04 ± 0. 02	25	35
213a–5	C_8H_{10}	1,2-Dimethylbenzene (*o*-xylene)	. 010 ± 0. 007	5	10
213a–8S	C_8H_{10}	1,2-Dimethylbenzene (*o*-xylene)	. 010 ± 0. 007	8	18
213a–25	C_8H_{10}	1,2-Dimethylbenzene (*o*-xylene)	. 010 ± 0. 007	25	35
214a–5	C_8H_{10}	1,3-Dimethylbenzene (*m*-xylene)	. 06 ± 0. 04	5	10
214a–8S	C_8H_{10}	1,3-Dimethylbenzene (*m*-xylene)	. 06 ± 0. 04	8	18
214a–25	C_8H_{10}	1,3-Dimethylbenzene (*m*-xylene)	. 06 ± 0. 04	25	35
215a–5	C_8H_{10}	1,4-Dimethylbenzene (*p*-xylene)	. 06 ± 0. 03	5	10
215a–8S	C_8H_{10}	1,4-Dimethylbenzene (*p*-xylene)	. 06 ± 0. 03	8	18
215a–25	C_8H_{10}	1,4-Dimethylbenzene (*p*-xylene)	. 06 ± 0. 03	25	35
221–5S	C_9H_{12}	*n*-Propylbenzene	. 25 ± 0. 08	5	25
220–5	C_9H_{12}	Isopropylbenzene	. 07 ± 0. 03	5	10
220–8S	C_9H_{12}	Isopropylbenzene	. 07 ± 0. 03	8	18
220–25	C_9H_{12}	Isopropylbenzene	. 07 ± 0. 03	25	35
246–5S	C_9H_{12}	1-Methyl-2-ethylbenzene	. 27 ± 0. 07	5	35
247–5S	C_9H_{12}	1-Methyl-3-ethylbenzene	. 43 ± 0. 15	5	35
248–5S	C_9H_{12}	1-Methyl-4-ethylbenzene	. 13 ± 0. 03	5	35
249–5S	C_9H_{12}	1,2,3-Trimethylbenzene	. 018 ± 0. 012	5	35
250–5S	C_9H_{12}	1,2,4-Trimethylbenzene	. 33 ± 0. 20	5	35
251–5S	C_9H_{12}	1,3,5-Trimethylbenzene	. 05 ± 0. 02	5	35
501–5S	$C_{10}H_{14}$	*n*-Butylbenzene	. 12 ± 0. 08	5	35
502–5S	$C_{10}H_{14}$	Isobutylbenzene	. 13 ± 0. 09	5	35
503–5S	$C_{10}H_{14}$	*sec*-Butylbenzene	. 12 ± 0. 06	5	35
504–5S	$C_{10}H_{14}$	*tert*-Butylbenzene	. 06 ± 0. 03	5	35
560–5S	$C_{10}H_{14}$	1-Methyl-3-isopropylbenzene	. 064 ± 0. 038	5	35
571–5S	$C_{10}H_{14}$	1-Methyl-4-isopropylbenzene	. 05 ± 0. 03	5	35
523–5S	$C_{10}H_{14}$	1,2-Diethylbenzene	. 05 ± 0. 03	5	35
524–5S	$C_{10}H_{14}$	1,3-Diethylbenzene	. 07 ± 0. 04	5	35
525–5S	$C_{10}H_{14}$	1,4-Diethylbenzene	. 07 ± 0. 02	5	35
566–5S	$C_{10}H_{14}$	1,3-Dimethyl-5-ethylbenzene	. 11 ± 0. 06	5	35
585–5S	$C_{10}H_{14}$	1,2,4,5-Tetramethylbenzene	. 14 ± 0. 04	5	35
572–5S	$C_{11}H_{16}$	1-Methyl-3-*tert*-butylbenzene	. 08 ± 0. 05	5	35
576–5S	$C_{11}H_{16}$	1-Methyl-4-*tert*-butylbenzene	. 05 ± 0. 03	5	35
586–5S	$C_{16}H_{26}$	*n*-Decylbenzene	. 20 ± 0. 16	5	35

See footnotes at end of tables.

Descriptive List—Continued

Hydrocarbons and Organic Sulfur Compounds—Continued

Sample No.[1]	Compound: Formula	Compound: Name	Amount of impurity[2]	Volume per sample[3]	Price per sample
		NAPHTHALENES			
			Mole percent	*ml*	
577–5S	$C_{10}H_8$	Naphthalene	0.04 ± 0.03	5	$35
587–5S	$C_{10}H_{12}$	1,2,3,4-Tetrahydronaphthalene	.14 ± 0.06	5	35
578–5S	$C_{11}H_{14}$	1-Methylnaphthalene	.08 ± 0.03	5	35
579–5S	$C_{11}H_{14}$	2-Methylnaphthalene	.09 ± 0.06	5	35
		POLYCYCLIC AROMATIC HYDROCARBONS			
556–5S	C_9H_{10}	2,3-Dihydroindene (Indan)	0.06 ± 0.02	5	$35
567–5S	$C_{10}H_{10}$	*cis*-Decahydronaphthalene (*cis*-Bicyclo [4.4.0] decane)	.11 ± 0.05	5	35
561–5S	$C_{10}H_{10}$	*trans*-Decahydronaphthalene (*trans*-Bicyclo [4.4.0] decane)	.04 ± 0.03	5	35
		ORGANIC SULFUR COMPOUNDS[10]			
904–5S	C_2H_6S	Ethanethiol (ethyl mercaptan)	0.05 ± 0.04	5	$35
907–5S	$C_2H_6S_2$	Methyldithiomethane (dimethyl disulfide)[11]	.03 ± 0.02	5	35
902–5S	C_3H_8S	Methylthioethane (methyl ethyl sulfide)[11]	.04 ± 0.04	5	35
901–5S	C_4H_4S	Thiophene	.013 ± 0.011	5	35
903–5S	$C_4H_{10}S$	Ethylthioethane (diethyl sulfide)[11]	.06 ± 0.04	5	35
905–5S	$C_4H_{10}S$	2-Methyl-2-propanethiol (*tert*-butyl mercaptan)	.08 ± 0.04	5	35
908–5S	$C_4H_{10}S_2$	Ethyldithiodisulfide (diethyl disulfide)[11]	.10 ± 0.08	5	35
906–5S	$C_5H_{10}S$	1-Pentanethiol (*n*-pentyl mercaptan)	.08 ± 0.05	5	35

[1] The designations following the sample numbers indicate the following: "–5S" or "–8S", a sample of 5 ml or 8 ml sealed "in vacuum" in a special Pyrex-glass ampoule with internal "break-off" tip: "–5", "–25", or "-50", a sample of 5, 25, or 50 ml sealed "in vacuum" in a plain-glass ampule.

[2] Unless otherwise indicated, the purity has been evaluated from measurements of freezing points. See J. Research NBS **35**, 355 (1945) RP1676.

[3] Tolerance approximately ±10 percent. All volumes have been estimated in the liquid state, including those of compounds normally solid.

[4] Estimated by analogy with isomers subjected to similar purification.

[5] Certified with regard to density and refractive index.

[6] Certified with regard to calorimetric heat of combustion.

[7] This isomer, formerly known as "*trans*", see Science **105**, 647 (1947), has the following properties: Boiling point at one atmosphere, 120.09° C; refractive index, n_D at 25° C, 1.4206; density at 25° C, 0.7620 g/ml. See NBS Circular 461, p. 45 (1947).

[8] This isomer, formerly known as "*cis*", see Science **105**, 647 (1947), has the following properties: Boiling point at one atmosphere, 124.45° C; refractive index, n_D at 25° C, 1.4284; density at 25° C, 0.7806 g/ml. See NBS Circular 461, p. 45 (1947).

[9] When sealed. Polymer formed may be removed as residue by simple vaporization of the sample "in vacuum" at an appropriate temperature.

[10] In the determination of the purity of these compounds an apparatus providing no connection with the atmosphere was employed. See Anal. Chem. **22**, 1521 (1950).

[11] These compounds are here named in accordance with the recommendations of the International Union of Pure and Applied Chemistry. The samples themselves bear labels in accordance with recommendations made for the naming of sulfur compounds in petroleum. See Chem. and Eng. News **24**, 2765 (1946). The samples are labeled as follows: 907–5S, 2,3-dithiabutane; 902–5S, 2-thiabutane; 903–5S, 3-thiapentane; and 908–5S, 3,4-dithiahexane.

SAMPLES CERTIFIED FOR DENSITY AND REFRACTIVE INDEX

The following three compounds of the original NBS list are certified with respect to values of density, for air-saturated material at 1 atm, at 20°, 25°, and 30° C, to ±0.00002 g/ml, and also with respect to values of refractive index, for each of seven wavelengths (helium 668 and 502, hydrogen 656 (C) and 486 (F), mercury 546 (e) and 436 (g), and sodium 589 (D_1, D_2) at 20°, 25°, and 30° C, to ±0.00002):

No. 217	2,2,4-Trimethylpentane.
No. 218	Methylcyclohexane.
No. 211a	Toluene.

These standards may be used to calibrate refractometers, picnometers, and density balances, as well as spectrometers. A certificate is supplied with each of these samples.

SAMPLES CERTIFIED FOR CALORIMETRIC HEAT OF COMBUSTION

Standard Sample 217, 2,2,4-Trimethylpentane, is also certified with regard to the value for calorimetric heat of combustion, primarily for calibrating apparatus for determining the heating value of gasoline and other liquid fuels.

INSTRUCTIONS AND CONNECTING TUBES

A set of instructions for transferring standard samples of hydrocarbons "in vacuum" may be obtained on request.

The unsaturated hydrocarbons are usually sealed in ampoules of Pyrex Red glass. In order to facilitate the handling of these ampoules, each laboratory obtaining one or more samples in such ampoules will be supplied gratis one special graded glass connecting tube of appropriate diameter, consisting of Pyrex Red to Pyrex Uranium to Pyrex Clear glass.

ORDERS

The above standard samples of hydrocarbons were prepared through a cooperative undertaking between the American Petroleum Institute and the National Bureau of Standards. One hundred and seventy-nine different hydrocarbon compounds are available as standard samples.

Standard Samples 201 to 218, inclusive, and 220, are obtainable only from the National Bureau of Standards and orders for these samples should be sent to:

National Bureau of Standards,
Washington 25, D. C.

All other hydrocarbon samples (No. 219 and those numbered 221 and above) are obtainable either from the National Bureau of Standards or the American Petroleum Institute. Orders for these samples from member laboratories of the American Petroleum Institute should be sent, in duplicate, with payment in advance, to the American Petroleum Institute, 50 West Fiftieth Street, New York 20, N. Y. All other orders should be sent to the National Bureau of Standards.

The standard samples of organic sulfur compounds were prepared through a cooperative undertaking of the American Petroleum Institute, the Bureau of Mines at Laramie, Wyo., and the National Bureau of Standards. These standards can be obtained from the National Bureau of Standards or the American Petroleum Institute as indicated above for the hydrocarbons.

In all cases, compounds should be specified by both name and sample number.

SHIPMENTS

All orders for hydrocarbons or organic sulfur compounds are shipped express collect.

Oils for Use as Viscometer Calibrating Liquids

These oils are not intended for use as permanent viscosity standards. They are not suitable for stockroom items and should be ordered only for immediate use. More than a 1-pint sample of any given oil is not supplied unless it is established that this quantity is inadequate. All available liquids are hydrocarbon oils and are listed in the following tables.

A. For use with viscometers calibrated in units of absolute or kinematic viscosity. Price covers the sample and a report containing accurate values at time of shipment, for absolute viscosity, kinematic viscosity, and density at the following temperatures:

Approximate Viscosities [1]

Oil	Absolute, in poises at—						Kinematic, in stokes at—						Price [2] per sample f. o. b. Washington, D. C.
	20° C	25° C	30° C	37.78° C (100° F)	40° C	50° C	20° C	25° C	30° C	37.78° C (100° F)	40° C	50° C	
D	0.020	0.018	------	0.014	------	------	0.026	0.023	------	0.019	------	------	$10
H	.074	.063	------	.044	------	------	.091	.078	------	.055	------	------	10
I	.12	.10	------	.066	------	------	.14	.12	------	.081	------	------	10
J	.21	.17	------	.11	------	------	.25	.21	------	.13	------	------	10
K	.41	.32	------	.18	------	------	.48	.38	------	.22	------	------	10
L	1.0	.74	------	.37	------	------	1.1	.84	------	.43	------	------	10
M	2.2	1.6	------	.80	------	------	2.6	1.9	------	.93	------	------	10
N	14	9.6	------	4.0	------	------	16	11	------	4.6	------	------	10
OB	360	225	------	--------	65	------	400	260	------	--------	75	------	25
P	--------	--------	460	--------	200	90	--------	--------	490	--------	220	100	25

[1] Viscosity values can be supplied, as a special service, for other temperatures in the range 20° to 100° C, except that values for oil P can be supplied only for temperatures in the range 30° to 100° C. An extra charge is made for these special services. For oils D through N, the charge is $10 per sample per temperature in addition to the charge of $10 per sample listed in the table. For oils OB and P, the charge is $16 per sample per temperature in addition to the charge of $25 per sample listed in the table.

[2] Normally, samples are shipped via railway express, express charges collect. Requests for shipment by other methods usually will be disregarded.

B. For use with Saybolt viscometers. Price covers the sample and a report containing an accurate value at the time of shipment, for the viscosity at the indicated temperature.

Approximate Viscosity [1]

Oil	Temperature, ° F	Viscosity	Price [2] per sample, f. o. b. Washington, D. C.
SB	100	370 seconds, Saybolt Universal	$5
SC	130	350 seconds, Saybolt Universal	5
SF	122	200 seconds, Saybolt Furol	5

[1] Viscosity values at other temperatures or in other units are not supplied.

[2] Normally samples are shipped via railway express, express charges collect. Requests for shipment by other methods usually will be disregarded.

Descriptive List—Continued

Radioactivity Standards

RADON

Sample No.	Radium content	Volume per sample [1] (in ml)	Price per sample
750	10^{-9} gram	100	$2
751	10^{-11} gram	100	2
752	Blank solution	100	2

[1] Samples are sealed in glass containers.

RADIUM GAMMA-RAY

Sample No.	Radium content (in grams)	Volume per sample [1] (in ml)	Price per sample
755	0.1×10^{-6}	5	$3
756	0.2	5	3
757	0.5	5	3
758	1.0	5	3
759	2.0	5	3
760	5.0	5	3
761	10.0	5	3
762	20.0	5	3
763	50.0	5	4
764	100.0	5	5

[1] Samples are sealed in glass containers.

COBALT [60] GAMMA-RAY

Sample No.	Total disintegrations per second [1]	Volume per sample [2] (in ml)	Price per sample
770	10^6 (approx.)	5	$5
771	10^5 (approx.)	5	5

[1] The exact disintegration rate as of the date of calibration is indicated on the certificate accompanying the standard.
[2] Samples are sealed in glass containers.

BETA-RAY

Sample No.	Description	Activity	Price per sample
775	RaD+E [a]	Approx. 200 disintegrations per second	$10
776	RaD+E [a]	Approx. 500 disintegrations per second	10
777	RaD+E [a]	Approx. 1,000 disintegrations per second	10
778	P^{32} [b]	Approx. 100,000 disintegrations per second per milliliter	5
779	I^{131} [b]	Approx. 100,000 disintegrations per second per milliliter	5
780	C^{14} [c]	Approx. 1,280 disintegrations per second per milliliter	10

[a] Samples consist of RaD+E in equilibrium, deposited on a silver disk 1 in. in diameter and faced with 0.002 in. of palladium. The exact disintegration rate as of the date of calibration is indicated on the certificate accompanying the standard.
[b] Samples are approximately 3 ml. of carrier solution sealed in a glass container. The exact disintegration rate per milliliter, as of the reference date, is indicated on a label on the glass container. These standards are distributed periodically at announced intervals. (AEC authorization for their procurement is not required.)
[c] Samples are 25 ml of solution in sealed glass containers. Additional information is given on certificate accompanying the standard.

ROCK AND ORE SAMPLES [1]

Sample No.	Name	Average radium content of Ra/g of rock (in grams)	Price per sample
785	Dunite	$0.009\pm0.004\times10^{-12}$	$3
786	Carthage limestone	0.15 ± 0.03	3
787	Berea sandstone	0.24 ± 0.02	3
788	Columbia River basalt	0.33 ± 9.03	3
789	Chelmsford granite	2.96 ± 0.08	3

[1] Each sample consists of 100 grams of pulverized rock analyzed for radium content with petrographic data and chemical analysis.

Descriptive List—Continued

Radioactivity Standards—Continued

ROCK AND ORE SAMPLES[1]—Continued

Sample No.	Name	Average radium content of Ra/g of rock (in grams)	Price per sample
790	Quartzite	0.06 ± 0.01	$3
791	Graniteville granite	3.3 ± 0.2	3
792	Gabbo-diorite	0.18 ± 0.02	3
793	Milford granite	0.23 ± 0.02	3
794	Triassic diabase	0.18 ± 0.03	3
795	Deccan trap	0.21 ± 0.04	3
796	Kimberlite	0.59 ± 0.04	3

[1] Each sample consists of 100 grams of pulverized rock analyzed for radium content with petrographic data and chemical analysis.

Standard Colors for Kitchen and Bathroom Accessories[1]

Sample No.	Item	Unit of issue	Price per set
1000	Enameled iron placques, 3 by 5 inches, in accordance with Commercial Standards CS62–38 and CS63–38.	Set of 10	$10

[1] Calibration of these standards for use with three-filter reflectometers may be obtained by ordering under Fee Schedule 215.508 as listed in National Bureau of Standards Test Fee Circular 483 (obtainable from the Superintendent of Documents, Washington 25, D. C., price 25 cents).

Limestone Slabs for Calking Compound Tests

Sample No.	Description	Unit of issue	Price per set
1005	Limestone slabs, as required by Federal Specification TT–C–598, "Compound, Calking: Plastic".	Set of 12 slabs	$9

Resolution Test Charts

Sample No.	Description [1]	Unit of issue	Price per sample
1010	Resolution chart, for testing the resolving power of microcopying cameras	Each	$0. 20

[1] These charts are made photographically, and consist of a series of line-patterns, the lines and spaces being of equal width. Each pattern contains two sets of lines, one set at right angles to the other. The patterns range from 1 to 10 lines per millimeter. Instructions for the use of these charts are furnished with each order.

Standards of Reference

In addition to the standards already enumerated, this Bureau distributes the following standards of reference that have been compared with master standards at the Bureau or measured for compliance with an arbitrary standard. Detailed information and prices concerning these standards of reference are contained in National Bureau of Standards Test Fee Circular 483, which may be purchased from the Superintendent of Documents, Washington 25, D. C., price 25 cents:

Standards of thermal radiation (incandescent electric lamps) for calibrating thermopiles. (Fee Schedule 204.201.)

Lamp standards of candlepower or luminous flux. (Fee Schedule 215.501.)

Spectrophotometric standards. (Fee Schedule 215.505.)

Lamp standards of color temperature. (Fee Schedule 215.507.)

Reflectance standards. (Fee Schedule 215.508.)

Glass opacity standards for the paper industry. (Fee Schedule 215.509.)

Gloss standards. (Fee Schedule 215.510.)

The following standard is issued free of charge and may be obtained by submitting a written request to this Bureau:

Dyed paper for standardization of light-fastness tests.

The standard listed below, formerly issued by this Bureau, is now issued by the Commodity Standards Division, Office of Industry and Commerce, U. S. Department of Commerce, Washington 25, D. C., and further information and prices may be obtained from that division:

Standard finish samples for builders' hardware.

3. Summary of Analyses

The values given in the following sections are listed primarily as a guide to purchasers. In some cases provisional values are given which may differ slightly from those given on the certificates. For this reason *the certificates issued with the standards should always be consulted to obtain the proper values.*

3.1 Averaged Analyses

ALUMINUM-BASE ALLOYS

No.	Cu	Mn	Si	Mg	Fe	Ti	Zn	Pb	Sn	Ga	Ni	Cr
85a	2. 48	0. 66	0. 114	1. 58	0. 208	0. 016	0. 019	0. 002	<0. 001	0. 01	0. 41	0. 231
86c	7. 92	. 041	. 68	0. 002	. 90	. 035	1. 50	. 031	---	---	. 030	. 029
87	0. 30	. 30	6. 21	. 39	. 46	. 16	0. 077	. 068	. 063	---	. 59	. 17

COPPER-BASE ALLOYS

No.	Kind	Cu	Zn	Sn	Pb	Ni	Fe	Al	Mn
37d	Sheet brass	70. 78	26. 65	0. 97	0. 94	0. 58	0. 076	---	---
164	Aluminum brass	63. 77	21. 88	. 63	. 21	. 046	2. 52	6. 22	4. 68
52b	Cast bronze	88. 25	2. 96	8. 00	. 011	. 72	0. 032	---	0. 005
62b	Manganese bronze	57. 39	37. 97	0. 96	. 28	. 27	. 82	0. 97	1. 29
63b	Phosphor-bronze	77. 94	0. 71	9. 78	9. 36	. 33	. 47	. 05	---
158	Silicon bronze	90. 85	2. 07	. 07	. 003	. 006	1. 48	. 54	1. 31
157	Nickel silver	72. 14	9. 69	---	. 023	17. 90	0. 053	---	0. 020
124b	Ounce metal	83. 69	5. 40	4. 93	4. 64	. 76	. 26	. 003	---
		Sb	As	Ag	Si	S	P	Co	
164	Aluminum brass	---	---	---	---	---	---	---	
52b	Cast bronze	---	---	---	---	---	0. 002	---	
62b	Manganese bronze	0. 005	0. 004	0. 005	0. 048	---	---	---	
63b	Phosphor-bronze	. 54	. 015	. 04	. 12	0. 16	. 44	---	
158	Silicon bronze	---	---	---	2. 72	---	---	---	
157	Nickel silver	---	---	---	---	---	---	0. 136	
124b	Ounce metal	. 20	---	---	0. 012	. 041	. 015	---	

LEAD- AND TIN-BASE ALLOYS

No.	Kind	Pb	Sn	Sb	Bi	Cu	Fe	As	Ag	Ni	Al
53c	Lead-base	---	5. 17	10. 19	0. 095	0. 215	---	0. 042	---	---	---
127	Solder	---	34. 88	0. 75	. 041	. 014	---	. 118	---	---	---
54c	Tin-base	1. 99	86. 29	7. 28	. 028	4. 30	0. 033	. 049	0. 020	0. 012	---

MAGNESIUM-BASE ALLOY

No.	Al	Zn	Mn	Si	Cu	Pb	Fe	Ni
171	2. 97	1. 05	0. 45	0. 012	0. 011	0. 003	0. 002	0. 0009

NICKEL-BASE ALLOYS

No.	Kind	Ni	Cu	Mn	Si	Co	Fe	Cr	Al	Ti	C	S	P
162	Monel	66. 38	28. 93	2. 34	0. 67	0. 54	0. 34	0. 23	0. 23	0. 20	0. 11	0. 003	---
161	Ni-base casting	64. 3	. 04	1. 29	1. 56	. 47	15. 0	16. 9	---	---	. 34	. 005	0. 012

Averaged Analyses—Continued

ZINC-BASE DIE-CASTING ALLOY

No.	Al	Cu	Mg	Fe	Mn	Pb	Ni	Sn	Cd
94a	3. 90	1. 08	0. 042	0. 015	0. 015	0. 006	0. 005	0. 005	0. 002

ZINC SPELTERS

No.	Pb	Cd	Fe	Cu	Sn	Ag	Mn	Ga	As	Sb	Ge	In
108	0. 047	0. 092	0. 031	0. 0004	0. 0008	<0. 00005	0. 0002	0. 0003	0. 0001	0. 0003	0. 0001	------
109	. 0020	. 0018	. 0006	. 0005	. 0002	. 00008	------	------	------	------	------	------
110	. 53	. 56	. 014	. 0031	. 0005	<. 0001	. 00004	. 0002	------	------	------	0. 001

STEELS (SPECTROGRAPHIC STANDARDS)

Nos.[1]		Kind	Mn	Si	Cu	Ni	Cr	V	Mo	Al	Sn	B
401	801	B. O. H., 0.4 C [2]	0. 34	0. 015	0. 015	0. 005	0. 015	------	------	------	------	------
402	802	B. O. H., 0.8 C	. 46	. 060	. 025	. 010	. 025	------	------	------	------	------
403	(3)	A. O. H., 0.4 C	. 89	. 25	. 16	. 23	. 28	0. 045	0. 060	0. 005	------	------
404a	804a	Basic electric	. 88	. 44	. 050	. 040	. 025	. 002	. 007	------	------	------
405a	805a	Medium manganese	1. 90	. 27	. 032	. 065	. 037	------	. 005	. 058	------	------
406	(3)	Chromium-vanadium	. 71	. 24	. 10	. 080	. 97	. 23	. 005	. 023	------	------
407	807	Chromium-vanadium	. 79	. 29	. 090	. 15	1. 15	. 19	. 035	. 055	------	------
408	808	Chromium-nickel	. 62	. 22	. 12	1. 21	. 64	------	------	------	------	------
409	(3)	Nickel	. 45	. 13	. 080	3. 24	. 20	------	------	------	------	------
410a	810a	2 Cr-1 Mo	------	. 36	. 11	. 24	2. 39	------	. 91	------	------	------
411	(3)	Cr-Mo (SAE X4130)	. 65	. 14	. 065	. 29	. 91	. 003	. 15	------		------
411a	811a	Cr-Mo (SAE X4130)	------	. 29	. 105	. 24	. 93	. 002	. 22	------	------	------
412	(3)	Cr-Mo (SAE 4130)	. 60	. 22	------	------	. 66	------	. 20	------	0. 026	------
412a	812a	Cr-Ni-Mo (NE 8637)	. 87	. 30	. 090	. 56	. 55	------	. 18	------	------	------
413	813	A. O. H., 0.4 C	. 67	. 22	. 25	. 18	. 055	. 007	. 006	------	------	------
414	(3)	Cr-Mo (SAE 4140)	. 67	. 26	. 11	. 080	. 99	. 003	. 32	. 020	. 014	------
415a	815a	Bessemer, 0.5 C	------	. 10	. 012	. 006	. 008	. 006	------	. 11	------	------
416a	816a	Nitralloy G	. 54	. 25	. 15	. 28	1. 14	------	. 20	1. 08	. 011	------
417	(3)	A. O. H., 0.4 C	. 64	. 18	------	. 105	. 028	. 004	------	0. 013	. 020	------
417a	817a	B. O. H., 0.4 C	. 78	------	. 13	. 062	. 050	------	. 013	------	. 036	------
418	818	Cr-Mo (SAE X4130)	. 52	. 28	------	. 11	. 96	------	. 22	------		------
419	819	Ni-Mo (SAE 4620)	. 72	. 27	. 080	1. 71	. 24	------	. 22	------	. 009	------
420	820	Ingot iron, 0.01 C	. 020	Cobalt 0. 007	. 050	. 020	. 006	------	. 002	. 002	. 005	------
421	821	Cr-W, 0.9 C	1. 24	------	. 080	. 10	. 49	. 012	. 040	Tungsten 0. 52	------	------
425	825	Mn-Ni-Cr-(N. E. 9450)	------	------	------	------	------	------	------	------	------	0. 0006
426	826	Cr-Mo (SAE 4150)	------	------	------	------	------	------	------	------	------	. 0011
427	827	Cr-Mo (SAE 4150)	------	------	------	------	------	------	------	------	------	. 0027
428	828	Mn-Cr	------	------	------	------	------	------	------	------	------	. 0059
429	829	Ni-Cr-B	------	------	------	------	------	------	------	------	------	. 0091
430	830	Ni-Cr-B	------	------	------	------	------	------	------	------	------	. 019

[1] Sizes are: 400 series, rods 7/32 in. in diameter, 4 in. long; 800 series, rods ½ in. in diameter, 2 in. long
[2] The carbon contents of the first 19 standards lie between 0.1 and 0.8 percent.
[3] This standard is available in only one size.

Averaged Analyses—Continued

TIN METAL (SPECTROGRAPHIC STANDARDS)

Nos.[1]		Cu	Pb	As	Sb	Ni	Zn	Ag	Bi	Cd	Co
431	831	0. 19	0. 19	0. 16	0. 19	0. 038	0. 041	0. 015	0. 020	0. 020	0. 021
432	832	. 097	. 094	. 075	. 095	. 020	. 020	. 0095	. 0098	. 0095	. 011
433	833	. 055	. 055	. 047	. 050	. 0095	. 0095	. 0055	. 0052	. 0053	. 0045
434	834	. 019	. 022	. 019	. 019	. 0044	. 0046	. 0018	. 0020	. 0020	. 0020
435	835	. 0077	. 015	. 0090	. 010	. 0024	. 0020	. 0010	. 0011	. 0011	. 0011

[1] Sizes are 400 series, rods 1/4 in. in diameter, 4 in. long; 800 series, rods 1/2 in. in diameter, 2 in. long.

ALUMINUM ALLOYS (SPECTROGRAPHIC STANDARDS) [1]

No.	Kind	Cu	Mg	Si	Mn	Fe	Ni	Cr	Ti	Zn
601	Aluminum alloy, wrought (14S)	4. 38	0. 39	0. 88	0. 81	0. 52	------	0. 020	0. 015	------
602	Aluminum alloy, wrought (24S)	4. 44	1. 49	. 130	. 63	. 28	------	. 007	. 012	------
603	Aluminum alloy, wrought (61S)	. 29	1. 01	. 52	------	. 21	------	. 24	. 037	------
604	Aluminum-base casting alloy (142)	3. 98	1. 56	. 27	------	. 45	2. 00	------	. 100	0. 029

[1] Aluminum standards are disks 2 1/2 in. in diameter, 3/4 in. thick.

Averaged Analyses—Continued

IRONS AND STEELS (CHEMICAL STANDARDS)

No.	Kind	C		Mn	P	S		Si	Cu	Ni
		Total	Graphitic			By oxidation	Evolved as H_2S			
4g	Cast iron	2.47	1.81	0.843	0.122	0.071	0.070	1.33	0.240	0.065
5i	Cast iron	2.52	2.04	.696	.241	.101	.100	2.44	1.00	.016
6e	Cast iron	2.61	1.96	1.36	.431	.079	.078	2.33	0.254	.062
7e	Cast iron	2.93	2.55	0.44	.88	.080	.079	1.89	.022	.012
82a	Nickel-chromium cast iron	2.24	1.71	.649	.053	.102	.094	2.07	.076	1.07
107a	Nickel-molybdenum cast iron	2.72	1.84	.582	.278	.095	------	1.35	.103	0.968
115	Nickel-chromium-copper cast iron	2.42	1.85	1.01	.113	.032	.031	1.60	6.44	15.89
122b	Cast iron (car-wheel)	3.14	2.41	0.561	.29	.115	------	0.65	0.047	0.025
55c	Ingot iron	0.010	------	.016	.003	.020	.020	.001	.040	.016
8g	Bessemer steel	.069	------	.427	.093	.025	.026	.013	.019	.011
10e	Bessemer steel	.406	------	.634	.083	.047	.047	.067	.032	.020
22c	Bessemer steel (aluminum-bearing)	.482	------	.746	.083	.079	.076	.098	.011	.004
170	B.O.H. steel (Ti-bearing)	.035	------	.23	.013	.033	------	.061	.102	.041
15d	B.O.H. steel	.100	------	.393	.018	.033	.034	.079	.054	.024
11f	B.O.H. steel	.203	------	.646	.015	.033	.033	.173	.098	.049
12e	B.O.H. steel	.371	------	.706	.014	.025	.027	.278	.142	.058
152	B.O.H. steel (tin-bearing)	.466	------	.782	.019	.027	.027	.244	.127	.062
13e	B.O.H. steel	.64	------	.89	.02	.016	.015	.24	.10	.11
14c	B.O.H. steel	.791	------	.462	.012	.030	.029	.058	.025	.010
16c	B.O.H. steel	1.01	------	.385	.032	.044	.042	.168	.060	.023
19e	A.O.H. steel	0.197	------	.491	.033	.031	.029	.173	.166	.093
20e	A.O.H. steel	.346	------	.816	.055	.078	.076	.257	.111	.094
21d	A.O.H. steel (tin-bearing)	.651	------	1.03	.041	.044	.042	.332	.107	.190
34a	A.O.H. steel	.762	------	0.501	.028	.026	.026	.276	.222	.232
51a	Electric steel	1.27	------	.233	.010	.010	.010	.308	.082	.063
65c	Basic electric steel	0.339	------	.878	.023	.031	.031	.440	.050	.040
100a	Manganese steel (SAE T1345)	.447	------	1.66	.020	.027	.027	.243	.050	.032
105	High-sulfur steel	.193	------	------	------	------	------	------	------	------
125	High-silicon steel	.058	------	0.103	.008	.005	.004	4.97	.066	.047
129a	High-sulfur steel (SAE X1112)	.097	------	.806	.094	.272	------	0.021	.021	.027
130	Lead-bearing steel	.454	------	.688	.025	.021	.022	.237	.017	.009
151	Boron steel	------	{Boron 0.0027}	------	------	------	------	------	------	------
33c	Nickel steel (SAE 2335)	.368	------	.733	.017	.030	.030	.283	.031	3.28
32d	Cr-Ni steel (SAE 3140)	.396	------	.795	.012	.027	.027	.301	.096	1.19
72d	Cr-Mo steel (SAE X4130)	.310	------	.537	.017	.010	.011	.276	.041	0.125
111b	Ni-Mo steel (SAE 4620)	.19	------	.71	.012	.014	.012	.30	.028	1.81
30d	Cr-V steel (SAE 6135)	.363	------	.786	.031	.031	.031	.286	.092	0.150
139	Cr-Ni-Mo steel (NE 8637)	.394	------	.867	.019	.024	.024	.292	.089	.563
156	Cr-Ni-Mo steel (NE 9450)	.515	------	1.40	.032	.017	.017	.226	.053	.475
106a	Cr-Mo-Al steel (Nitralloy G)	.355	------	0.546	.016	.018	.017	.254	.156	.277
36a	2 Cr-1; Mo steel	.120	------	.432	.014	.016	------	.356	.114	.243
135	5 Cr-0.5 Mo steel	.094	------	.458	.017	.010	.010	.383	.076	.083
159	1 Cr-0.4 Mo-0.1 Ag	.521	------	.807	.036	.027	.026	.258	.181	.137
50b	W-Cr-V steel	.728	------	.325	.029	.007	------	.294	.110	.089
132	Mo-W-Cr-V steel	.803	------	.252	.027	.004	------	.239	.149	.094
134	Mo-W-Cr-V steel	.810	------	.155	.016	.006	------	.323	.114	.077
153	Mo-W-Cr-V-Co steel	.864	------	.219	.025	.008	------	.187	.099	.107
155	Cr-W steel	.905	------	1.24	.015	.010	------	.322	.083	.100
73a	14 Cr steel	.349	------	0.249	.015	.031	.029	.311	.080	.159
133	14 Cr-0.6 Mo steel	.118	------	.799	.022	.355	------	.433	.061	.286
101c	Cr-Ni (18-9) steel	.072	------	.640	.023	.017	.016	.589	.124	9.27
121b	Cr-Ni (18-10 Ti) steel	------	------	------	------	------	------	------	------	------
123a	Cr-Ni-Cb steel	------	------	------	.035	------	------	.46	------	------
123b	Cr-Ni-Cb-Ta steel	------	------	------	------	------	------	------	------	------
160	19 Cr-9 Ni-3 Mo steel	.044	------	0.68	.012	.010	------	1.13	.053	8.91
166	19 Cr-9 Ni	.027	------	------	------	------	------	------	------	------
126a	36 Ni steel	.056	------	.414	------	------	------	0.194	.092	35.89
161	Casting alloy (64 Ni-17 Cr-15 Fe)	.34	------	1.29	.012	.005	------	1.56	.04	64.3

Averaged Analyses—Continued

IRONS AND STEELS (CHEMICAL STANDARDS)—Continued

No.	Cr	V	Mo	W	Co	Ti	As	Sn	Al (total)	Al_2O_3	N	Pb	Cb	Ta
4g	0. 118	0. 011	0. 017			0. 024	0. 012							
5i	. 020	. 015	. 005			. 044	. 025							
6e	. 074	. 024	. 016			. 025								
7e	. 016	. 044	. 003			. 064								
82a	. 323	. 019	. 008			. 065								
107a	. 479	. 028	. 771			. 035								
115	2. 17	. 009	. 002		0. 08	. 021	. 007							
122b	0. 034	. 013	. 003											
55c	. 003	<. 001	. 004		. 006			0. 006	0. 003					
8g	. 009	. 002	. 003					. 002			0. 021			
10e	. 023	. 004	. 010				. 004				. 010			
22c	. 007	. 006	. 001						. 116		. 010			
170	. 038	. 003	. 007			. 23		. 019	. 027					
15d	. 060	. 001	. 007											
11f	. 041	. 002	. 019											
12e	. 050	. 002	. 016											
152	. 050	. 001	. 013					. 036			. 004			
13e	. 13	. 003	. 032											
14c	. 025	. 003	. 002						. 025	0. 006				
16c	. 045	. 003	. 001				. 007							
19e	. 038	. 009	. 012					. 010						
20e	. 331	. 006	. 017					. 013						
21d	. 100	. 005	. 035				. 010	. 077						
34a	. 275	. 007	. 003				. 009							
51a	. 056	. 002	. 002					. 011						
65c	. 025	. 002	. 007					. 008						
100a	. 051	. 003	. 008						. 040					
105														
125	. 017	. 001	. 003			. 006		. 007	. 261					
129a	. 021	. 004	. 007				. 007							
130	. 029		. 003									0. 204		
151														
33c	. 052	. 002	. 032					. 003	. 032		. 003			
32d	. 710	. 003	. 038								. 010			
72d	1. 03	. 005	. 210											
111b	0. 071	. 002	. 256						. 04					
30d	1. 15	. 190	. 034											
139	0. 549	. 002	. 178											
156	. 429	. 002	. 138											
106a	1. 15	. 002	. 203						1. 08	. 011				
36a	2. 41	. 006	. 920					. 011						
135	5. 15	. 010	. 575								. 024			
159	1. 00	. 054	. 414							Silver 0. 090				
50b	4. 08	1. 02	. 401	18. 05			. 041	. 025						
132	4. 11	1. 64	7. 07	6. 29										
134	3. 73	1. 13	8. 68	1. 82										
153	4. 14	2. 04	8. 38	1. 58	8. 45									
155	0. 485	0. 014	0. 039	0. 517										
73a	14. 09	. 028	. 069	. 091							. 036			
133	13. 59	. 020	. 559								. 046			
101c	18. 21	. 049	. 095		0. 084			. 008			. 035		0. 106	
121b														
123a		. 037	. 12	. 11		. 002							. 75	0. 02
123b														
160	19. 12	. 038	2. 95		. 059						. 028			
166														
126a	0. 054				. 30									
161	16. 9	. 03	0. 005		. 47									

Averaged Analyses—Continued

STEEL-MAKING ALLOYS

No.	Kind	C	Mn	P	S	Si	V	Ti	Al	Ca	Fe	Cr
57	Refined silicon	0.087	0.034	0.008	0.005	96.8	------	0.10	0.67	0.73	0.65	0.025
58	Ferrosilicon (75% Si)	.033	.165	.016	.01	75.6	0.004	.085	.77	.45	22.5	.07
59	Ferrosilicon (50% Si)	.015	.310	.035	.008	50.0	.04	.105	.93	.04	48.4	.08
116a	Ferrotitanium	.023	------	.18	------	3.12	.33	25.12	3.25	------	------	.23

No.	Kind	C	Mn	P	S	Si	Ni	Cr	V	Al	Fe
61a	Ferrovanadium	1.06	1.78	0.119	0.005	5.12	------	0.68	50.19	0.02	------
64a	Ferrochromium	4.41	.27	.018	.120	2.02	------	66.01	0.154	------	------
66a	Spiegeleisen	4.39	19.77	.049	.021	2.26	------	------	------	------	------
68a	Ferromanganese	6.83	80.07	.294	.014	.81	------	.025	.045	------	------

No.	Kind	C	Mn	P	S	Si	W	Cu	Sn	As	Sb
90	Ferrophosphorus	------	------	26.2	------	------	------	------	------	------	------
71	Calcium molybdate	Mo=35.3; Fe=1.92; Ti=0.06.									

BAUXITE AND ALUMINA REFRACTORIES

No.		Total Al_2O_3	Total Fe_2O_3	Loss on ignition	SiO_2	TiO_2	ZrO_2	MnO
69a	------	------	------	------	------	------	------	------
76	------	37.7	2.4	0.22	54.7	2.2	0.07	------
77	------	59.4	0.90	.21	32.4	2.9	.09	------
78	------	70.0	.79	.26	20.7	3.4	.12	------

IRON ORES

No.	Name	SiO_2	TiO_2	P	Al_2O_3	Fe	Mn	CaO	MgO
27c	Mesabi	------	------	------	------	------	------	------	------
28a	Norrie	------	------	------	------	------	0.435	------	------

MAGNETITE IRON ORE

No.	SiO_2	Al_2O_3	TiO_2	Total Fe	FeO	Fe_2O_3	Cr_2O_3	V_2O_3	MnO	CaO	MgO	P_2O_5
29a	2.86	0.46	0.15	69.54	28.10	68.20	0.002	0.002	0.03	0.096	0.095	0.007

MANGANESE ORE

No.		Total manganese	Available oxygen	Calculated MnO
25b	------	58.35	16.67	90.59

ZINC ORE

No.	Name	Zn
113	Tri-State concentrate	61.1

Averaged Analyses—Continued

PHOSPHATE ROCKS

No.	Kind	P_2O_5	Fe_2O_3	Al_2O_3	CaO	MgO	F
56b	Tennessee brown	31.55			44.06		3.4
120	Florida land pebble	35.33	0.89	0.87	49.62	0.14	3.76
		SiO_2	MnO	Na_2O	K_2O	Total S as SO_3	TiO_2
56b	Tennessee brown	10.1					
120	Florida land pebble	7.40	0.033	0.14	0.09	0.32	0.07

TIN ORES

No.	Kind	Sn
137	Bolivian concentrate	56.6
138	N. E. I. concentrate	74.8

CHROME REFRACTORY

No.	Cr_2O_3	SiO_2	FeO	Al_2O_3	CaO	MgO	TiO_2
103	36.97	8.24	14.39	20.83	0.79	16.27	0.93

FLUORSPAR

No.	CaF_2	CO_2	SiO_2	Zn	Pb	S	Fe_2O_3	Al_2O_3	P_2O_5	TiO_2	K_2O	Na_2O	MgO	BaO	MnO
79	94.83	0.99	1.88	0.35	0.23	0.13	0.15	0.02	0.005	0.003	0.01	0.06	0.13	0.07	0.003

CLAYS

No.	Kind	SiO_2	Al_2O_3	TiO_2	ZrO_2	Fe_2O_3	P_2O_5	V_2O_5	Cr_2O_3	K_2O
97	Flint clay	42.87	38.77	2.38	0.25	0.98	0.08	0.04	0.079	0.54
98	Plastic clay	59.11	25.54	1.43	.04	2.05	.08	.025	.021	3.17
		Li_2O	Na_2O	CaO	MgO	BaO	SO_3	MnO	CuO	MoO_3	Loss on ignition
97	Flint clay	0.22	0.12	0.10	0.26	0.015	0.042	0.002	0.003	0.0002	13.35
98	Plastic clay		.28	.21	.72	.06	.07	.005	.009	.0001	7.28

FELDSPAR

No.	Kind	K_2O	Na_2O	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	TiO_2	Ignition loss
99	Soda	0.41	10.73	68.66	19.06	0.067	0.36	0.053	0.017	0.52

GLASS SANDS

No.		Fe_2O_3	Al_2O_3	TiO_2	ZrO_2	CaO	MgO
81		0.073	0.265	0.095	0.031	0.029	0.016
165		.019					

Averaged Analyses—Continued

GLASSES

No.	Kind	SiO_2	PbO	Al_2O_3	Fe_2O_3	ZnO	MnO	TiO_2	ZrO_2	CaO	BaO
89	Lead-barium	65.35	17.50	0.18	0.049	-------	0.088	0.01	0.005	0.21	1.40
91	Opal	67.53	0.097	6.01	.081	0.08	.008	.019	.01	10.48	------
92	Low-boron	-------	-------	-------	-------	-------	-------	------	------	------	------
93	High-boron	80.60	-------	1.94	.076	-------	-------	.027	.013	(1)	------
80	Soda-lime	74.1	-------	.33	.065	-------	.003	.02	.003	4.65	------
128	Soda-lime (B_2O_3, BaO)	69.51	-------	1.89	.039	-------	-------	.017	------	4.76	.49

No.	Kind	MgO	K_2O	Na_2O	B_2O_3	P_2O_5	As_2O_5	As_2O_3	SO_3	Cl	F	Ignition loss
89	Lead-barium	0.03	8.40	5.70	------	0.23	0.36	0.03	0.03	0.05	------	0.32
91	Opal	.008	3.25	8.48	------	.022	.102	.091	------	.014	5.72	------
92	Low-boron	------	------	------	0.70	------	------	------	------	------	------	------
93	High-boron	0.026	0.16	4.16	12.76	(1)	.14	.085	.009	.036	------	------
80	Soda-lime	3.23	.04	16.65	------	------	.07	.03	.41	.047	------	.30
128	Soda-lime (B_2O_3, BaO)	3.33	.99	16.83	1.52	.01	------	------	.35	.04	------	.18

[1] Not detected.

LIMESTONE, DOLOMITE, SILICA BRICK, BURNED MAGNESITE, AND TITANIUM DIOXIDE

No.	Kind	SiO_2	Fe_2O_3	Al_2O_3	TiO_2	MnO	CaO	SrO	MgO	Na_2O
1a	Limestone	14.11	1.63	4.16	0.16	0.038	41.32	0.12	2.19	0.39
88	Dolomite	.31	.084	.067	.005	.006	30.49	<.01	21.48	.08
102	Silica brick [1]	93.94	.66	1.96	.16	.005	2.29	--------	.21	.06
104	Burned magnesite	2.54	7.07	.84	.03	.43	3.35	--------	85.67	.04
154	Titanium dioxide	-------	-------	-------	98.7	-------	-------	--------	-------	-------

No.	Kind	K_2O	SO_3	S	P_2O_5	CO_2	C	H_2	Ignition loss
1a	Limestone	0.71	0.04	0.25	0.15	33.53	0.61	--------	34.55
88	Dolomite	.03	.035	.013	.003	47.25	.08	0.008	47.52
102	Silica brick	.29	--------	--------	.025	--------	--------	--------	.38
104	Burned magnesite	<.01	--------	--------	.057	--------	--------	--------	--------

[1] Density 2.33 g/cm³ at 25° C.

SILICON CARBIDE

No.		Total Si	Total C	Free C	SiC	Fe	Al	Ti	Zr	Ca	Mg
112	---------------	69.11	29.10	0.09	96.85	0.45	0.23	0.025	0.027	0.03	0.02

3.2 Chemicals

No.	Name	Purity on basis of titration	Heat of combustion
84d	Acid potassium phthalate	100. 04	
39g	Benzoic acid	99. 99	26.4338 international kilojoules per gram mass (wt in vacuum).
40e	Sodium oxalate	99. 96	
83a	Arsenious oxide	99. 99	
136	Potassium dichromate	100. 00	

SUGARS

No.	Kind	Moisture	Reducing substances	Ash	Heat of combustion
17	Sucrose	<0.003	<0.002	<0.003	16.476 international kilojoules per gram mass (wt in vacuum).
41	Dextrose	$<.01$		$<.003$	

4. General Information

4.1. Literature

Detailed certificates of analyses are sent under separate cover to the same destination as the samples. In the case of new or renewed samples provisional typewritten certificates will be supplied until the printed certificates and labels are available.

4.2. Samples Out of Stock

The preparation of "renewal" samples is intended to be completed at the time each kind of sample becomes exhausted, but owing to delays encountered in obtaining a proper grade of material and for other reasons, this is not always possible. If orders are received for samples that are out of stock, notice will be mailed to that effect. The "renewal" of an analyzed sample will have a composition more or less different from that of its predecessor, but, as regards the characteristic constituent or constituents, will pattern after it closely.

4.3. New Samples

When new samples or renewals of old ones are issued, announcement will be made in the Federal Register and in scientific and trade journals.

E. U. Condon,
Director, National Bureau of Standards.

Approved:

Charles Sawyer,
Secretary of Commerce.

DEPARTMENT OF COMMERCE

UNITED STATES OF AMERICA