DEPARTMENT OF COMMERCE

R. P. LAMONT, Secretary

BUREAU OF STANDARDS

GEORGE K. BURGESS, Director

SUPPLEMENT TO CIRCULAR NO. 25

July 1, 1929

STANDARD SAMPLES ISSUED OR IN PREPARATION

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.

ORDERING.—Orders should give both the number and name of the sample wanted. Example: No. 9c, steel, Bessemer, 0.2 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.

TERMS AND SHIPPING.—(*a*) *Domestic.*—Samples may be paid for in advance with order. If the remittance does not accompany the order, all samples will be sent under Government frank by parcel post C. O. D. in the United States and its possessions. It is therefore important that firms with branch laboratories send remittance with the order if the laboratories can not receive C. O. D. packages. Both the central office and branch laboratory will be notified when shipment is made. No discounts are allowed on any orders.

(*b*) *Foreign.*—All foreign shipments require prepayment. With the exception of Mexico and Canada, 30 cents postage must be added for every 300 grams of sample or fraction thereof. Shipments intended for Mexico and Canada will be sent under Government frank, but not C. O. D.

(*c*) *Money orders, etc.*, should be payable to the Bureau of Standards. Payment for foreign orders should be by an international money order or by a check payable through the New York Clearing House or a bank in the United States.

65517—29

DESCRIPTIVE LIST OF STANDARD SAMPLES, WITH SCHEDULE OF WEIGHTS AND FEES

Sample number	Name	Constituents determined or intended use	Weight of sample in grams	Fee per sample
88	Dolomite	Complete analysis	50	$2.00
70	Feldspar	do	40	2.00
79	Fluorspar	do	60	2.50
80	Glass, soda-lime	do	45	2.00
89	Glass, lead-barium	do	45	2.00
91	Glass, opal	do	45	2.00
76	Burnt refractory, (40% Al_2O_3)	do	60	2.00
77	Burnt refractory, (60% Al_2O_3)	do	60	2.00
78	Burnt refractory, (70% Al_2O_3)	do	60	2.00
81	Glass sand	Fe_2O_3, Al_2O_3, TiO_2, ZrO_2, CaO, MgO	60	2.00
2	Zinc ore D	Zinc	50	1.00
25b	Manganese ore	Manganese, available oxygen	100	2.00
26	Crescent iron ore	Al_2O_3, CaO, MgO	100	2.00
27a	Sibley iron ore	SiO_2, P, Fe	125	2.00
28	Norrie iron ore	Mn (low)	50	1.00
29	Magnetite iron ore, (titaniferous)	Complete analysis	50	1.00
56	Phosphate rock	P_2O^5, Fe_2O_3, Al_2O_3, etc	60	2.00
69	Bauxite	Complete analysis	60	2.00
71	Calcium molybdate	Mo, Fe, Ti	60	2.50
4d	Cast iron	C, Mn, P, S, Si, Ti, (Cu, Ni, Cr, V)	150	2.50
5f	Cast iron	C, Mn, P, S, Si, Ti, (Cu, Ni, Cr, V)	150	2.50
6d	Cast iron	C, Mn, P, S, Si, Ti, (Cu, Ni, Cr, V)	150	2.50
7b	Cast iron	C, Mn, P, S, Si, Ti, (Cu, Ni, Cr, V)	150	2.50
55	Ingot iron	C, Mn, P, S, Si, Cu, Ni	150	2.00
74	Cast iron	C, Mn, P, S, Si, Ti, (Cu, Ni, Cr, V)	150	2.50
82	Nickel-chromium cast iron	C, Mn, P, S, Si, Cr, Ni, (Ti, Cu, V)	150	2.50
8d	Steel, Bessemer, 0.1 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
9c	Steel, Bessemer, 0.2 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
10d	Steel, Bessemer, 0.4 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
22b	Steel, Bessemer, 0.6 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
23a	Steel, Bessemer, 0.8 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
15b	Steel, B. O. H., 0.1 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V, As)	150	2.00
11d	Steel, B. O. H., 0.2 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V, As)	150	2.00
12c	Steel, B. O. H., 0.4 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V, As)	150	2.00
13c	Steel, B. O. H., 0.6 C	C, Mn, P, S, Si, (Cu, Ni, Cr)	150	2.00
14b	Steel, B. O. H., 0.8 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
16b	Steel, B. O. H., 1.0 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V, As)	150	2.00
19c	Steel, A. O. H., 0.2 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
20c	Steel, A. O. H., 0.4 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
21c	Steel, A. O. H., 0.6 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
34a	Steel, A. O. H., 0.8 C	C, Mn, P, S, Si, (Cu, Cr, Mo)	150	2.00
35a	Steel, A. O. H., 1.0 C	C, Mn, P, S, Si, (Cu, Cr)	150	2.00
51	Steel, electric furnace, 1.2 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
65	Steel, acid electric	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
30c	Steel, chrome-vanadium	C, Mn, P, S, Si, Cr, V, (Cu, Ni)	150	3.00
32b	Steel, chrome-nickel	C, Mn, P, S, Si, Cr, Ni, (Cu)	150	3.00
33b	Steel, nickel	C, Mn, P, S, Si, Ni, (Cu, Cr, V)	150	3.00
50a	Steel, chrome-tungsten-vanadium	C, Mn, P, S, Si, W, Cr, V, (Cu, Mo)	150	3.50
72	Steel, chrome-molybdenum	C, Mn, P, S, Si, Cr, Mo, (Cu, V)	150	3.00
73	Steel, stainless	C, Mn, P, S, Si, Cr, (Cu, V, Mo)	150	3.00
57	Refined silicon	Complete analysis	60	2.00
58	Ferrosilicon, (75% silicon)	do	75	2.00
59	Ferrosilicon, (50% silicon)	do	75	2.00
61	Ferrovanadium, (high carbon)	do	100	3.00
64	Ferrochromium, (high carbon)	do	100	3.00
66	Spiegeleisen	do	100	2.00
67	Manganese metal	do	100	2.50
68	Ferromanganese	do	100	2.50
75	Ferrotungsten	do	150	4.00
90	Ferrophosphorus	Phosphorus	75	2.50
37b	Brass, sheet	Complete analysis	150	3.00
52	Bronze, cast	do	150	3.00
53	Lead-base bearing metal	do	200	3.00
54	Tin-base bearing metal	do	200	3.00
62	Manganese bronze	do	150	3.00
63	Phosphor-bronze bearing metal	do	150	3.00
86	Aluminum base casting-alloy	do	60	2.00
42b	Tin	Melting point 231.9° C	350	2.00
43b	Zinc	Melting point 419.4° C	350	2.00
44b	Aluminum	Melting point 658.9° C	200	1.00
45a	Copper	Melting point 1,083° C	450	2.00
49	Lead	Melting point 327.3° C	1,650	2.00

DESCRIPTIVE LIST OF STANDARD SAMPLES, WITH SCHEDULE OF WEIGHTS AND FEES—Continued

Sample number	Name	Constituents determined or intended use	Weight of sample in grams	Fee per sample
46m	Cement (normal)	Fineness (testing sieves)	160	$1.00
47d	Cement (extra fine)	do	160	1.00
84	Acid potassium phthalate	Acidimetric value	60	3.00
39c	Benzoic acid	Acidimetric and calorimetric values	30	2.00
40b	Sodium oxalate	Oxidimetric value	60	2.00
83	Arsenic trioxide	do	75	2.00
38a	Naphthalene	Calorimetric value	50	2.00
17	Sucrose	Calorimetric and saccharimetric values	60	2.00
41	Dextrose	Reducing value	70	2.00

SUMMARY OF ANALYSES

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

AVERAGED ANALYSES

IRONS

Number	Total carbon	Graphite	Combined carbon	Manganese	Phosphorus (gravimetric)	Phosphorus (alkali titration)	Sulphur by oxidation	Silicon	Titanium	Copper	Chromium	Nickel
4d	2.66	2.00	0.65	0.894	0.080	0.080	0.075	1.27	0.036	0.24	0.015	0.034
5f	2.25	1.52	.72	.755	.244	.243	.090	2.31	.036	.55	.013	.108
6d	2.70	2.03	.65	1.63	.484	.480	.025	2.56	.14	.14	.01	.03
7b	2.85	2.32	.53	.48	.88	.87	.074	2.08	.07	.015	.012	.007
55	0.013			.019	.003	.004	.017	.001		.041	.002	.020
74	3.03	2.79	.24	.66	.47	.46	.083	2.55	.12	.03	.034	.036
82	2.80	2.28	.50	.75	.102	.105	.031	2.11	.05	.02	.24	.98

STEELS

Number	Kind of sample with approximate carbon content	Carbon, direct combustion	Manganese	Phosphorus	Sulphur		Silicon
					By oxidation	Evolved as hydrogen-sulphide	
	Bessemer						
8d	0.1	0.078	0.486	0.101	0.030	0.082	0.018
9c	.2	.203	.655	.096	.037	.036	.047
10d	.4	.418	.915	.088	.030	.031	.063
22b	.6	.67	.934	.084	.042	.042	.123
23a	.8	.885	.634	.102	.038	.036	.160
	Basic open hearth						
15b	0.1	.102	.560	.032	.039	.039	.290
11d	.2	.203	.430	.005	.041	.041	.027
12c	.4	.418	.409	.016	.036	.036	.046
13c	.6	.57	.70	.012	.023	.023	.20
14b	.8	.817	.493	.008	.031	.031	.009
16b	1.0	1.01	.38	.023	.031	.030	.078
	Acid open hearth						
19c	0.2						
20c	.4	.425	.673	.044	.026	.026	.223
21c	.6						
34a	.8	.762	.501	.028	.026	.026	.276
35a	1.0	1.03	.34	.037	.036	Low.	.39
	Electric furnace						
51	1.2	1.29	.271	.011	.013	.014	.250
	Acid electric						
65		.24	.74	.020	.040	.040	.41

AVERAGED ANALYSES—Continued

ALLOY STEELS

Number	Kind	Carbon direct combustion	Manganese	Phosphorus	Sulphur	Silicon	Nickel	Chromium	Vanadium	Tungsten	Molybdenum
30c	Chrome-vanadium	0.490	0.71	0.019	0.014	0.236	0.79	0.971	0.24	-------	-------
32b	Chrome-nickel	.413	.623	.016	.018	.220	1.20	.64	.008	-------	-------
33b	Nickel	.366	.700	.037	.032	.233	3.48	.029	.005	-------	-------
50a	Chrome-tungsten-vanadium										
72	Chrome-molybdenum	.29	.65	.014	.021	.143	.29	.91	.01	-------	0.15
73	Stainless	.315	.27	.021	.031	.36	.08	13.91	.03	-------	-------

FERROALLOYS

Number	Kind	Silicon	Carbon	Manganese	Phosphorus	Sulphur	Titanium	Aluminum	Calcium	Iron
57	Refined silicon	96.8	0.09	0.034	0.007	0.005	0.10	0.67	0.75	0.65
58	Ferrosilicon (75% Si)	75.6	.033	.16	.016	.01	.09	.80	.45	22.4
59	Ferrosilicon (50% Si)	50.0	.015	.31	.034	.01	.11	1.00	.04	48.3

Number	Kind	Vanadium	Carbon	Manganese	Phosphorus	Sulphur	Silicon	Aluminum	Molybdenum	Iron
61	Ferrovanadium (high carbon)	31.15	1.16	3.55	0.243	0.003	7.75	0.02	0.72	52.84

Number	Kind	Chromium	Carbon	Manganese	Phosphorus	Sulphur	Silicon	Nickel	Vanadium	Iron
64	Ferrochromium (high carbon)	67.95	5.10	0.22	0.016	0.070	2.05	0.33	0.12	24.08

Number	Kind	Manganese	Carbon	Phosphorus	Sulphur	Silicon	Nickel	Chromium	Vanadium	Iron
66	Spiegeleisen	20.0	4.06	0.060	0.015	2.22	0.015	0.01	0.01	73.5
67	Manganese metal	97.2	.06	.24	--------	.405	.05	.18	.19	1.50
68	Ferromanganese	80.7	6.87	.30	.014	.235	.10	.03	.08	11.45

Number	Kind	Tungsten	Carbon	Manganese	Phosphorus	Sulphur	Silicon	Copper	Tin	Molybdenum
75	Ferrotungsten	75.2	.54	1.16	0.015	0.039	0.67	0.039	0.18	0.23

Number	Kind	Phosphorus
90	Ferrophosphorus	26.2

SHEET BRASS

Number	Copper	Zinc	Tin	Lead		Iron	Nickel
				$PbSO_4$ method	PbO_2 method		
37b	70.36	27.08	0.99	0.89	0.91	0.21	0.45

AVERAGED ANALYSES—Continued

BRONZES

Number	Kind	Copper	Tin	Zinc	Lead	Iron	Nickel	Antimony	Manganese	Aluminum
52	Cast	88.33	7.88	1.89	1.53	0.12	0.13	0.15		
62	Manganese	59.06	.81	35.06	.57	1.13	.63		1.60	1.13

BEARING METALS

Number	Kind	Lead	Tin	Antimony	Bismuth	Copper	Iron	Arsenic	Phosphorus	Zinc
53	Lead-base	78.87	10.91	10.09	0.06	0.05	0.05	0.02		
54	Tin-base	.55	88.20	7.32	.06	3.75	.06	.05		
63	Phosphor-bronze	9.74	9.9	.54		78.1	.30	.20	0.65	0.50

ALUMINUM BASE CASTING ALLOY

Number	Si	Cu	Fe	Zn	Mn	Mg	Ti	Zr
86	0.34	7.65	1.53	1.48	0.01	0.02	0.02	0.01

DOLOMITE

Number	SiO_2	Fe_2O_3	Al_2O_3	TiO_2	MnO	CaO	SrO	MgO	Na_2O
88	0.311	0.086	0.069	0.004	0.009	30.48	0.01	21.54	0.08

Number	K_2O	SO_3	S	P_2O_5	CO_2	C	H_2	Ignition loss
88	0.03	0.035	0.013	0.002	47.25	0.08	0.008	47.38

FELDSPAR

Number	K_2O	Na_2O	SiO_2	Al_2O_3	Fe_2O_3	CaO
70	12.6	2.4	66.7	18.1	0.03	0.01

FLUORSPAR

Number	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	94.9	0.99	1.89	0.34	0.25	0.14	0.15	0.02	0.005	0.003	0.01	0.06	0.15	0.08	0.003

SODA-LIME GLASS

Number	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	ZrO_2	MnO	As_2O_5	As_2O_3	CaO	MgO	K_2O	Na_2O	SO_3	Cl	Ignition loss
80	74.1	0.02	0.32	0.06	0.003	0.003	0.068	0.031	4.65	3.23	0.04	16.63	0.41	0.047	0.30

AVERAGED ANALYSES—Continued

LEAD BARIUM GLASS

Number	SiO_2	PbO	Al_2O^3	Fe_2O_3	TiO_2	CaO	BaO	MgO	MnO	Na_2O	K_2O	P_2O_5	SO_3	As_2O_5	As_2O_3	Cl	Ignition loss
89	65.4	17.50	0.14	0.048	0.01	0.21	1.41	0.03	0.09	5.73	8.38	0.22	0.03	0.36	0.03	0.05	0.30

OPAL GLASS

Number	SiO_2	CaO	Na_2O	K_2O	Al_2O_3	F	As_2O_3	As_2O_5	Fe_2O_3	PbO	ZnO	P_2O_5	TiO_2	ZrO_2	Cl_2	MnO	MgO
91	67.6	10.5	8.46	3.24	6.00	5.75	0.10	0.10	0.082	0.10	0.08	0.02	0.017	0.01	0.014	0.008	0.01

GLASS SAND

Number	Fe_2O_3	Al_2O_3	TiO_2	ZrO_2	CaO	MgO
81	0.072	0.26	0.09	0.04	0.02	0.01

BAUXITE AND REFRACTORIES

Number	Total Al_2O_3	Total Fe_2O_3	Loss on ignition	SiO_2	TiO_2	ZrO_2	MnO
69	55.0	5.60	28.8	6.3	3.1	0.1	0.55
76	37.7	2.4	.22	54.7	2.2	.1	----------
77	59.4	.90	.21	32.4	2.9	.1	----------
78	70.0	.8	.26	20.7	3.4	.1	----------

ZINC ORE

[Cf. J. Am. Chem. Soc. 29, p. 262; 1907]

Number	Zinc—general average
2	31.43

MANGANESE ORE

Number	Total manganese	Available oxygen	Calculated MnO_2
25b	58.4	16.7	90.5

LAKE SUPERIOR IRON ORES

Number	Name	SiO_2	TiO_2	P	Al_2O_3	Fe	Mn	CaO	MgO
26	Crescent	[1] 5.03	[1] 0.07	[1] 0.040	1.02	[1] 58.62	--------	2.56	3.27
27a	Sibley	1.02	--------	.039	--------	68.57	--------	--------	--------
28	Norrie	--------	--------	--------	--------	--------	0.465	--------	--------

[1] Values derived from a small number of determinations at the Bureau of Standards and not so well established as the other values.

AVERAGED ANALYSES—Continued

MAGNETITE IRON ORE

Number	SiO_2	TiO_2	Al_2O_3	V_2O_3	FeO	Fe_2O_3	Fe	MnO
29	12.02	0.99	1.91	0.08	24.78	52.20	[55.75]	0.09

Number	CaO	MgO	K_2O	Na_2O	H_2O+	CO_2	P_2O_5	S
29	2.90	2.01	0.51	0.45	0.47	0.68	1.01	0.025

TENNESSEE PHOSPHATE ROCK

Number	Total P_2O_5	Total Fe_2O_3	Total Al_2O_3	CaO	MgO
56	31.33	3.30	3.1	44.8	0.40

CALCIUM MOLYBDATE

Number	Molybdenum	Iron	Titanium
71	35.30	1.92	0.06

PURE CHEMICALS

SUGARS

Number	Name	Moisture	Reducing substances	Ash
17	Sucrose	<0.01	<0.003	<0.003
41	Dextrose	<.05		<.003

NAPHTHALENE

Number	S	
38a	<0.05	Cf. method of purification, p. 10, Circular No. 25.

BENZOIC ACID

Number	
39c	Chlorine <0.001%. Sulphur 0.001%.

SODIUM OXALATE

Number	Water		$NaHCO_3$	S	K	Fe	Cl	Organic impurity
	105°	240°						
49b	0.008	0.036	0.06	None found	None found	None	<0.002	None.

PURE CHEMICALS—Continued

ARSENIC TRIOXIDE

Number	Purity on basis of titration	Non-volatile matter	Sulphides	Chlorides	Antimony	Iron	Other foreign metals	Density $\frac{25°}{4°}$
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*		
83	99.97	0.014	<0.001	<0.002	<0.005	<0.003	None found.	3.71

ACID POTASSIUM PHTHALATE

Number	Purity on basis of titration	Chlorides	Sulphates	Heavy metals	Iron	Density $\frac{20°}{4°}$
	Per cent	*Per cent*			*Per cent*	
84	99.97	<0.001	None found	None found	<0.001	1.636

GENERAL INFORMATION

(*a*) Bottling.—Iron, steel, and ore samples are sent in screw-capped glass bottles and organic samples in glass-stoppered bottles under seal.

(*b*) Literature.—Detailed certificates of analysis are sent under separate cover to the same destination as the samples. Gummed labels with the summary of analysis are also furnished with most samples. Circulars containing information on certain samples may be obtained upon request. In the case of new or renewed samples provisional typewritten certificates will be supplied until they can be replaced by the printed certificates and labels when ready.

(*c*) Samples Out of Stock.—The preparation of "Renewal" samples is intended to be complete 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.

(*d*) New Samples.—When new samples or renewals of old ones are issued, announcement will be made in scientific and trade journals.

(*e*) Mixing.—In order to overcome the effect of any segregation of granular samples in shipment, the contents of each bottle (except the organic samples) *should be thoroughly mixed before any is used for analysis.*

Note.—This supplement replaces the supplement issued April 24, 1928. It supersedes all previous supplements and is effective on the date of issue hereof.

George K. Burgess,
Director.

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