CHEMICAL AND X-RAY ANALYSES OF 175 CALCITE AND MARBLE SAMPLES FROM THE COLLECTION OF THE NATIONAL MUSEUM OF NATURAL HISTORY, SMITHSONIAN INSTITUTION

By EURYBIADES BUSENBERG AND L. NIEL PLUMMER

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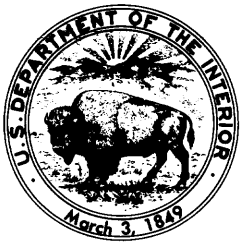

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Eurybiades Busenberg and L. Niel Plummer

As part of a study of the effects of substitution of magnesium (Mg), iron (Fe), and manganese (Mn) on the solubility of calcite, several hundred specimens from the National Museum of Natural History, Smithsonian Institution of Washington, D.C. were examined. Chips of 20-50 mg were obtained from 175 specimens for analysis. These samples were ground to fine powders in agate mortars. A 10.0 mg portion of each sample was transferred into a 100 ml volumetric flask, dissolved in a few milliliters of 0.1 molar hydrochloric acid, and diluted to volume with deionized water. Magnesium was determined by atomic absorption spectrophotometry, iron and manganese by spectrophotometry using the procedures described by Shapiro (1975). Calcium was assumed to be the only other cation present and was calculated from the known weight of the sample and charge balance considerations.

X-ray diffraction patterns were obtained for some of the samples using Cu K_α radiation. Fluorite was used as an internal standard. The mole percent $MgCO_3$ in the calcites was calculated using the idealized curve of Goldsmith, Graft, and Heard (1961).

The National Museum numbers of marbles that contain significant amounts of dolomite or other minerals insoluble in dilute hydrochloric acid are: 92373, 73459, 114589, 37892, 37814, 88174, 61210, 61211, 27088, 61209, 87786-12, 75499-8, 87786-13, 87786-30, 87786-98, and 75499-145. These specimens were not included in table 1.

The data in table 1 should be used with caution because the samples available for analysis were very small and may, or may not, have been completely representative of the bulk composition of the specimens. Some samples were inhomogeneous mixtures of more than one mineralogical phase (table 1, column 15). In other instances, the specimens were coarse-grained, and the sample analyzed cannot be considered completely representative of the bulk composition of the specimens (Volborth, 1969).

The column by column explanation of the headings of table 1 are: I. Column 1 is the U.S. Geological Survey laboratory number of the Museum specimen. II. Column 2 is the National Museum number of the specimen. III. Column 3 is the Museum location of the specimen (stack and drawer number). IV. Column 4 gives the type of the specimen (M = marble, C = calcite crystal, W = calcite marble associated with wollastonite, D = calcite marble associated with diopside). V. Columns 5-8 give the weight percent of $CaCO_3$, $MgCO_3$, $FeCO_3$, and $MnCO_3$ in the specimen. VI. Columns 9-12 give the mole percent of the component $CaCO_3$, $MgCO_3$, $FeCO_3$, and $MnCO_3$ in the specimen. VII. Column 13

entitled "Sum Mg + Fe + Mn" is the sum of the mole percent $MgCO_3$, $FeCO_3$, and $MnCO_3$ obtained by chemical analysis. VIII. Column 14 entitled "Sum by x-ray" is the mole percent of $MgCO_3$ + $FeCO_3$ + $MnCO_3$ in the calcites obtained by x-ray diffraction. A significant difference between Columns 14 and 13 indicates the presence of a secondary phase containing $MgCO_3$ (dolomite) in the calcite specimen. A horizontal line indicates that no x-ray pattern was obtained for the particular specimen. IX. Column 15 identifies secondary phases present in the calcite specimens. A blank line indicates that the specimen is a single calcite phase or no x-ray pattern was obtained for the particular specimen.

REFERENCES

Goldsmith, J. R., Graft, D. L., and Heard, H. C., 1961, Lattice constants of the calcium magnesium carbonates: American Mineralogist, v. 46, p. 453-457.

Shapiro, Leonard, 1975, Rapid analysis of rocks and minerals by a single-solution method: U.S. Geological Survey Bulletin 1407, 76 p.

Volborth, Alexis, 1969, Elemental analysis in geochemistry. A. Major elements: Amsterdam, Elsevier Publishing Company, 373 p.

Table 1.-Chemical and mineralogical composition of the calcites and marbles*

Lab. No.	Museum Number	Museum Location	Type	—WEIGHT PERCENT IN SOLID— CaCO3	MgCO3	FeCO3	MnCO3	—MOLE PERCENT IN SOLID— CaCO3	MgCO3	FeCO3	MnCO3	Sum of Mg+Fe+Mn	Sum by X-Ray	Other Phases Present as Determined by X-ray Diffraction
1	70542	A136-09	M	99.13	0.854	0.02	0.00	98.97	1.012	0.02	0.00	1.03	1.2	
2	91021	A136-09	M	94.36	5.595	0.04	0.00	93.39	6.574	0.03	0.00	6.61	2.2	Dolomite
4	11708	A136-10	M	99.75	0.156	0.04	0.05	99.73	0.185	0.04	0.05	0.27	—	
5	36735	A136-10	M	96.11	3.447	0.45	0.00	95.55	4.068	0.38	0.00	4.45	2.6	Dolomite
6	114586	A136-10	M	99.23	0.637	0.14	0.00	99.13	0.755	0.12	0.00	0.87	—	
9	26555	A136-11	M	99.48	0.460	0.06	0.00	99.40	0.545	0.06	0.00	0.60	—	
10	68305	A136-12	M	98.44	1.131	0.33	0.10	98.29	1.341	0.29	0.09	1.71	—	
11	26275	A136-12	M	99.51	0.434	0.06	0.00	99.44	0.515	0.05	0.00	0.56	—	
12	17345	A136-12	M	99.55	0.392	0.06	0.00	99.48	0.465	0.05	0.00	0.52	—	
13	27001	A136-12	M	97.61	2.367	0.02	0.00	97.18	2.798	0.02	0.00	2.82	—	
14	68306	A136-12	M	98.84	0.535	0.46	0.16	98.82	0.636	0.40	0.14	1.18	—	
15	113592	B156-08	M	99.59	0.363	0.04	0.00	99.53	0.431	0.04	0.00	0.47	—	
17	113588	B156-08	M	96.32	3.661	0.02	0.00	95.67	4.316	0.02	0.00	4.33	4.6	
18	113587	B156-08	M	99.44	0.514	0.02	0.03	99.35	0.609	0.02	0.03	0.65	—	
19	113589	B156-08	M	99.08	0.881	0.04	0.00	98.92	1.044	0.04	0.00	1.08	0.9	
20	28628	B156-08	M	98.84	1.113	0.04	0.00	98.64	1.319	0.04	0.00	1.36	—	
21	27548	B156-09	M	99.49	0.379	0.14	0.00	99.43	0.449	0.12	0.00	0.57	—	
22	28767	B156-09	M	99.48	0.444	0.08	0.00	99.40	0.526	0.07	0.00	0.60	—	
25	61205	B156-14	M	98.62	1.339	0.04	0.00	98.38	1.585	0.04	0.00	1.62	1.9	
26	28625	B156-15	M	98.34	1.616	0.04	0.00	98.05	1.913	0.03	0.00	1.95	—	
28	61230	B156-15	M	98.49	1.495	0.02	0.00	98.21	1.770	0.02	0.00	1.79	2.2	
29	61188	B156-15	M	93.87	6.106	0.02	0.00	92.81	7.167	0.02	0.00	7.19	2.6	Dolomite
30	61208	B156-15	M	98.28	1.697	0.02	0.00	97.98	2.008	0.02	0.00	2.02	1.2	
32	87757	B156-17	M	99.42	0.477	0.10	0.00	99.35	0.566	0.09	0.00	0.65	—	
33	113582	B156-18	M	99.61	0.305	0.08	0.00	99.57	0.361	0.07	0.00	0.43	—	
34	113581	B156-18	M	99.37	0.520	0.11	0.00	99.28	0.617	0.10	0.00	0.72	—	
35	88329	B156-18	M	99.68	0.279	0.04	0.00	99.63	0.331	0.04	0.00	0.37	—	
36	88633	B157-02	M	99.49	0.449	0.06	0.00	99.41	0.533	0.05	0.00	0.59	—	
37	77835	B157-03	M	99.31	0.630	0.06	0.00	99.20	0.747	0.05	0.00	0.80	—	
38	77867	B157-06	M	98.98	0.943	0.08	0.00	98.81	1.118	0.07	0.00	1.19	—	
39	27549	B157-06	M	99.52	0.355	0.12	0.00	99.47	0.422	0.11	0.00	0.53	—	
40	62944	B157-06	M	99.42	0.440	0.14	0.00	99.36	0.522	0.12	0.00	0.64	—	
41	17426	B157-08	M	99.40	0.490	0.10	0.00	99.33	0.582	0.09	0.00	0.67	—	
44	113598-58	B157-10	M	98.14	1.778	0.08	0.00	97.83	2.104	0.07	0.00	2.17	1.7	
45	38368	B157-10	M	98.28	1.599	0.12	0.00	98.01	1.893	0.10	0.00	1.99	—	
46	25454	B157-10	M	99.04	0.939	0.02	0.00	98.87	1.113	0.02	0.00	1.13	0.9	
47	113598-56	B157-10	M	98.88	1.058	0.06	0.00	98.70	1.254	0.05	0.00	1.30	1.1	
48	61212	B157-11	M	97.23	2.688	0.08	0.00	96.75	3.175	0.07	0.00	3.25	1.0	Dolomite
49	75844	B157-11	M	98.29	1.692	0.02	0.00	97.98	2.002	0.02	0.00	2.02	2.2	
50	77843	B157-12	M	99.50	0.381	0.12	0.00	99.44	0.452	0.10	0.00	0.56	—	
51	77853	B157-13	M	99.51	0.444	0.04	0.00	99.44	0.527	0.04	0.00	0.56	—	
52	78101	B157-15	M	99.54	0.418	0.04	0.00	99.47	0.496	0.03	0.00	0.53	—	
53	78101	B157-16	M	99.33	0.587	0.08	0.00	99.24	0.696	0.07	0.00	0.76	—	
54	77856	B157——	M	99.30	0.630	0.02	0.05	99.19	0.747	0.02	0.05	0.81	—	
55	77849	B157-24	M	99.53	0.370	0.10	0.00	99.48	0.439	0.09	0.00	0.52	—	
56	77846	B157——	M	99.31	0.523	0.16	0.00	99.24	0.621	0.14	0.00	0.76	—	
57	77858	B157-27	M	99.73	0.231	0.04	0.00	99.69	0.274	0.03	0.00	0.31	—	
58	77851	B158-03	M	99.31	0.650	0.04	0.00	99.19	0.771	0.04	0.00	0.81	—	

*For further explanation, see text.

Table 1.-Chemical and mineralogical composition of the calcites and marbles - continued

Lab. No.	Museum Number	Museum Location	Type	—WEIGHT PERCENT IN SOLID— CaCO3	MgCO3	FeCO3	MnCO3	—MOLE PERCENT IN SOLID— CaCO3	MgCO3	FeCO3	MnCO3	Sum of Mg+Fe+Mn	Sum by X-Ray	Other Phases Present as Determined by X-ray Diffraction
59	53552	B158-10	M	96.02	1.738	2.08	0.16	96.00	2.062	1.80	0.14	4.00	3.4	
61	88331	B158-20	M	99.68	0.285	0.04	0.00	99.63	0.338	0.03	0.00	0.37	—	
62	87689	B158-23	M	97.86	2.101	0.04	0.00	97.48	2.485	0.04	0.00	2.52	2.4	
63	37918	B160-14	M	99.28	0.593	0.12	0.00	99.19	0.703	0.11	0.00	0.81	—	
64	92519/155	B162-06	M	99.65	0.094	0.15	0.11	99.67	0.111	0.13	0.09	0.33	—	
65	87786-3	A63-04	M	99.34	0.597	0.06	0.00	99.24	0.708	0.05	0.00	0.76	—	
66	87786-7	A63-04	M	98.41	1.249	0.34	0.00	98.23	1.480	0.29	0.00	1.77	—	
68	87786-8	A63-04	M	98.40	1.474	0.12	0.00	98.15	1.745	0.11	0.00	1.85	—	
70	75499-9	A63-04	M	99.29	0.653	0.06	0.00	99.17	0.775	0.05	0.00	0.83	1.2	
72	87786-9	A63-04	M	99.06	0.833	0.11	0.00	98.92	0.988	0.09	0.00	1.08	—	
73	87786-6	A63-04	M	99.05	0.803	0.14	0.00	98.92	0.952	0.12	0.00	1.08	—	
74	87786-10	A63-04	M	98.33	1.493	0.18	0.00	98.08	1.768	0.15	0.00	1.92	—	
75	87786-14	A63-04	M	99.57	0.370	0.06	0.00	99.51	0.438	0.05	0.00	0.49	—	
76	75499-6	A63-04	M	94.45	5.270	0.28	0.00	93.56	6.197	0.24	0.00	6.44	4.6	Dolomite
77	87786-16	A63-05	M	97.83	2.050	0.12	0.00	97.47	2.424	0.10	0.00	2.53	2.2	
78	75499-36	A63-05	M	99.39	0.524	0.08	0.00	99.31	0.622	0.07	0.00	0.69	—	
79	87786-32	A63-06	M	98.75	1.184	0.06	0.00	98.54	1.403	0.05	0.00	1.46	1.7	
80	87786-28	A63-06	M	99.10	0.815	0.08	0.00	98.96	0.966	0.07	0.00	1.04	—	
81	87786-44	A63-06	M	98.89	0.766	0.35	0.00	98.79	0.908	0.30	0.00	1.21	—	
83	87786-62	A63-07	M	99.42	0.451	0.12	0.00	99.36	0.535	0.11	0.00	0.64	—	
84	87786-67	A63-07	M	99.04	0.791	0.17	0.00	98.92	0.938	0.15	0.00	1.08	—	
85	87786-72	A63-07	M	99.31	0.622	0.07	0.00	99.20	0.738	0.06	0.00	0.80	—	
86	87786-82	A63-07	M	99.52	0.422	0.06	0.00	99.45	0.501	0.05	0.00	0.55	—	
87	87786-87	A63-07	M	98.99	0.902	0.11	0.00	98.83	1.070	0.10	0.00	1.17	—	
88	87786-78	A63-07	M	98.94	0.892	0.16	0.00	98.80	1.058	0.14	0.00	1.20	—	
89	87786-79	A63-07	M	97.45	2.411	0.14	0.00	97.03	2.850	0.12	0.00	2.97	2.6	
91	87786-97	A63-08	M	99.44	0.493	0.06	0.00	99.36	0.585	0.05	0.00	0.64	—	
92	75499-144	A64-13	M	98.37	1.284	0.35	0.00	98.18	1.521	0.30	0.00	1.82	—	
94	113867	44-1	C	98.75	0.623	0.42	0.20	98.72	0.739	0.37	0.17	1.28	—	
95	106934-1	44-2	C	99.84	0.138	0.02	0.00	99.82	0.164	0.02	0.00	0.18	—	
96	B-10620	44-4	C	98.29	1.278	0.06	0.37	98.11	1.515	0.05	0.32	1.89	1.9	
97	B-8760	44-5	C	99.32	0.632	0.02	0.03	99.21	0.749	0.02	0.03	0.79	—	
98	B-9067	44-5	C	99.14	0.425	0.24	0.19	99.12	0.505	0.21	0.17	0.88	1.2	2 Mg-calcites
99	B-8719	44-5	C	98.68	0.091	0.29	0.94	98.82	0.108	0.25	0.82	1.18	1.2	
100	B-8701	44-6	C	98.79	0.011	0.03	1.16	98.94	0.013	0.03	1.02	1.06	0.9	
101	85789	44-6	C	99.20	0.000	0.00	0.80	99.31	0.000	0.00	0.69	0.69	0.7	
102	151407	44-8	C	94.14	0.604	2.88	2.38	94.69	0.721	2.50	2.09	5.31	4.1	
103	B-9434	44-9	C	99.99	0.000	0.01	0.00	99.99	0.000	0.01	0.00	0.01	—	
104	137317	44-9	C	99.84	0.004	0.01	0.14	99.86	0.004	0.01	0.12	0.14	—	
105	136061	44-12	C	99.28	0.289	0.34	0.09	99.29	0.343	0.30	0.08	0.71	—	
106	62944	44-14	C	99.53	0.370	0.10	0.00	99.48	0.439	0.09	0.00	0.52	—	
107	44542	44-14	C	99.85	0.155	0.00	0.00	99.82	0.184	0.00	0.00	0.18	—	
108	128275	44-14	C	100.00	0.000	0.00	0.00	100.00	0.000	0.00	0.00	0.00	—	
109	121840	44-14	C	94.67	4.749	0.53	0.05	93.91	5.592	0.45	0.04	6.09	4.8	Dolomite
110	2310-15	44-15	C	99.24	0.064	0.03	0.66	99.32	0.075	0.03	0.58	0.68	—	
111	82362	43-2	C	99.90	0.103	0.00	0.00	99.88	0.122	0.00	0.00	0.12	—	
112	2337	43-2	C	99.88	0.115	0.00	0.00	99.86	0.137	0.00	0.00	0.14	—	
113	128265	43-4	C	99.01	0.432	0.34	0.21	99.01	0.513	0.30	0.19	0.99	—	

Table 1.-Chemical and mineralogical composition of the calcites and marbles - continued

Lab. No.	Museum Number	Museum Location	Type	—WEIGHT PERCENT IN SOLID— CaCO3	MgCO3	FeCO3	MnCO3	—MOLE PERCENT IN SOLID— CaCO3	MgCO3	FeCO3	MnCO3	Sum of Mg+Fe+Mn	Sum by X-Ray	Other Phases Present as Determined by X-ray Diffraction
114	B-9142	43-5	C	99.52	0.483	0.00	0.00	99.43	0.573	0.00	0.00	0.57	—	
115	C-5413	43-6	C	99.70	0.031	0.00	0.27	99.72	0.037	0.00	0.24	0.28	0.9	
116	95009	43-6	C	99.91	0.094	0.00	0.00	99.89	0.112	0.00	0.00	0.11	—	
117	126982	43-7	C	99.92	0.080	0.00	0.00	99.91	0.094	0.00	0.00	0.09	—	
118	95240	43-7	C	98.45	0.604	0.65	0.29	98.47	0.717	0.56	0.26	1.53	1.9	
119	126978	43-7	C	99.81	0.070	0.04	0.08	99.81	0.083	0.03	0.07	0.19	—	
120	105095-3	43-8	C	99.80	0.145	0.00	0.05	99.78	0.172	0.00	0.05	0.22	—	
121	156229	43-9	C	99.18	0.084	0.03	0.70	99.26	0.099	0.03	0.61	0.74	—	
122	91691	43-9	C	94.52	0.228	1.28	3.97	95.13	0.272	1.11	3.48	4.87	4.3	
123	113516	43-11	C	99.63	0.369	0.00	0.00	99.56	0.438	0.00	0.00	0.44	—	
124	113549	43-12	C	96.67	0.110	1.51	1.71	97.07	0.131	1.31	1.50	2.93	2.9	
125	48870	43-14	C	97.57	0.276	1.11	1.05	97.80	0.328	0.96	0.92	2.20	2.2	
126	C-1877-13	43-15	C	97.64	0.029	0.38	1.95	97.94	0.034	0.33	1.70	2.06	1.5	
127	113609	43-15	C	95.10	0.201	1.08	3.62	95.65	0.240	0.94	3.17	4.35	3.8	
128	R-8225-2	45-1	C	99.97	0.026	0.00	0.00	99.97	0.031	0.00	0.00	0.03	—	
129	R-2310-41	45-1	C	99.98	0.020	0.00	0.00	99.98	0.023	0.00	0.00	0.02	—	
130	105677-12	45-5	C	99.97	0.034	0.00	0.00	99.96	0.040	0.00	0.00	0.04	—	
131	143524	45-7	C	98.21	0.002	0.02	1.77	98.44	0.002	0.02	1.54	1.56	2.2	2 Mg-calcites
132	75591	45-10	C	99.77	0.179	0.00	0.05	99.74	0.213	0.00	0.05	0.26	—	
133	84435-4	45-11	C	99.65	0.220	0.00	0.13	99.62	0.261	0.00	0.12	0.38	—	
134	92716	45-12	C	99.62	0.270	0.00	0.11	99.59	0.321	0.00	0.09	0.41	—	
135	156234	45-12	C	99.82	0.122	0.00	0.05	99.81	0.145	0.00	0.05	0.19	—	
136	100303	45-12	C	99.79	0.134	0.00	0.08	99.77	0.160	0.00	0.07	0.23	—	
137	151379	45-14	C	99.18	0.816	0.00	0.00	99.03	0.968	0.00	0.00	0.97	1.0	
138	121788	45-14	C	97.00	1.965	1.04	0.00	96.78	2.327	0.89	0.00	3.22	3.8	
139	R-16275	45-14	C	99.38	0.584	0.00	0.03	99.28	0.693	0.00	0.03	0.72	—	
140	1932-4	45-16	C	100.00	0.002	0.00	0.00	100.00	0.002	0.00	0.00	0.00	—	
141	133449	45-16	C	99.96	0.005	0.00	0.03	99.97	0.006	0.00	0.03	0.03	—	
142	R-2316	45-17	C	95.88	0.549	0.54	3.04	96.23	0.654	0.46	2.65	3.77	—	2 Mg-calcites
143	C-1923	45-18	C	100.00	0.000	0.00	0.00	100.00	0.000	0.00	0.00	0.00	—	
144	143632	46-1	C	96.47	3.145	0.29	0.10	95.96	3.714	0.25	0.08	4.04	2.9	Dolomite
145	143653	46-1	C	96.26	2.302	0.99	0.45	96.03	2.726	0.86	0.39	3.97	1.7	
146	119656	46-1	C	99.46	0.017	0.01	0.51	99.53	0.020	0.01	0.44	0.47	0.9	
147	146938	46-1	C	97.28	2.482	0.16	0.08	96.86	2.934	0.14	0.07	3.14	2.6	
148	106158-10	46-2	C	100.00	0.004	0.00	0.00	100.00	0.004	0.00	0.00	0.00	—	
149	113764	46-3	C	99.23	0.208	0.12	0.45	99.26	0.247	0.10	0.39	0.74	—	
150	C-1944-2	46-3	C	100.00	0.000	0.00	0.00	100.00	0.000	0.00	0.00	0.00	—	
151	97522	46-3	C	96.16	3.387	0.36	0.10	95.61	3.998	0.31	0.08	4.39	4.9	
152	132546	46-3	C	99.72	0.149	0.02	0.11	99.71	0.176	0.02	0.09	0.29	—	
153	———	46-4	C	97.18	2.304	0.47	0.05	96.83	2.726	0.40	0.04	3.17	3.1	
154	B-9527	46-4	C	99.94	0.060	0.00	0.00	99.93	0.071	0.00	0.00	0.07	—	
155	R-2425	46-6	C	99.13	0.303	0.30	0.26	99.15	0.359	0.26	0.23	0.85	—	
156	46480	46-6	C	99.16	0.240	0.35	0.25	99.19	0.285	0.30	0.22	0.81	1.2	
157	149798	46-7	C	99.43	0.543	0.00	0.03	99.33	0.644	0.00	0.03	0.67	—	
158	149797	46-7	C	99.59	0.405	0.00	0.00	99.52	0.481	0.00	0.00	0.48	—	
159	R-2333	46-8	C	96.60	0.107	1.42	1.87	97.01	0.128	1.23	1.63	2.99	3.2	
160	93322	46-9	C	99.29	0.035	0.03	0.65	99.37	0.041	0.03	0.57	0.63	—	
161	126750	46-11	C	99.45	0.551	0.00	0.00	99.35	0.653	0.00	0.00	0.65	—	

Table 1.-Chemical and mineralogical composition of the calcites and marbles - continued

Lab. No.	Museum Number	Museum Location	Type	—WEIGHT PERCENT IN SOLID— CaCO3	MgCO3	FeCO3	MnCO3	—MOLE PERCENT IN SOLID— CaCO3	MgCO3	FeCO3	MnCO3	Sum of Mg+Fe+Mn	Sum by X-Ray	Other Phases Present as Determined by X-ray Diffraction
162	38366	46-11	C	99.75	0.246	0.00	0.00	99.71	0.292	0.00	0.00	0.29	—	
163	B-19106	46-11	C	99.89	0.006	0.00	0.11	99.90	0.007	0.00	0.09	0.10	—	
164	144917	46-12	C	99.82	0.015	0.01	0.16	99.83	0.018	0.01	0.14	0.17	—	
165	10804	46-13	C	99.61	0.264	0.12	0.00	99.58	0.313	0.11	0.00	0.42	0.8	
166	49122	46-13	C	99.85	0.099	0.00	0.05	99.84	0.117	0.00	0.04	0.16	—	
167	93845	46-13	C	99.66	0.256	0.00	0.08	99.63	0.304	0.00	0.07	0.37	—	
168	R-12529	101-14	D	94.34	5.038	0.49	0.13	93.54	5.930	0.42	0.11	6.46	4.6	Dolomite
169	R-2982	101-14	D	94.46	4.919	0.50	0.13	93.67	5.791	0.43	0.11	6.33	5.1	Dolomite
170	121060	101-17	D	99.70	0.095	0.15	0.05	99.71	0.113	0.13	0.04	0.29	—	
171	47692	102-1	D	95.42	4.321	0.19	0.07	94.68	5.090	0.16	0.06	5.32	—	Dolomite
172	C-6137	102-3	D	97.24	2.744	0.02	0.00	96.74	3.241	0.02	0.00	3.26	2.4	
173	115294	102-4	D	95.77	4.213	0.02	0.00	95.02	4.963	0.02	0.00	4.98	3.4	Dolomite
174	157113	104-1	W	99.36	0.633	0.01	0.00	99.24	0.751	0.01	0.00	0.76	—	
175	C-2442	104-3	W	99.59	0.304	0.10	0.00	99.55	0.360	0.09	0.00	0.45	—	