Chemical Studies on the Ocean. (LIV)

Chemical Studies of the Shallow-water Deposits. (10)
On the Chemical Constituents of the Shallow-water Deposits along the Sea-coast of Hiroshima Prefecture

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In this paper, the analytical results of the deposits, that is, 4 kinds of sands and 5 kinds of muds from the sea-coast of Hiroshima prefecture are described. Of the shallow-water deposits we have analysed, the sands in the present paper are exceedingly high in SiO_2 and low in Fe_2O_3, Al_2O_3, CaO, MgO, etc. The K_2O content is considerably high in both sands and muds.

INTRODUCTION

In the previous paper[1], we have reported the chemical composition of 11 kinds of the deposits from the sea-coasts of Niigata, Yamagata and Akita prefectures. In this paper, the analytical results on 9 kinds of the deposits from the sea-coast of Hiroshima prefecture are described.

In this district, as in Aichi[2], there are many places where the deposits near the shoreline consist of muds. Namely, it is shown in the Charts Nos. 103, 114, 142, 153 and 163** that mud banks dry at nearly lowest low water in the neighbourhood of the mouth of the Ashida River, at the Matsunaga and Mihara Bays and in many other places. The samples in this report consist of 4 kinds of sands and 5 kinds of muds.

SAMPLES

Locality and date of sampling are shown in Table 1.

These samples are the deposits collected in the neighbourhood of the shoreline.

Sample 26: grayish green fine mud containing shell fragments; collected by T. Abe at the point about 400 m north of the Shingaikarahi-haisuihimon.

Sample 27: grayish green fine mud; collected by T. Ōta at the estuary of the Ashida River.

Sample 28: grayish green mud containing small amounts of shell fragments;

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** Issued by the Japanese Hydrographic Office in 1934, 1932, 1941, 1932 and 1930, respectively.

Table 1.

Sample No.	Locality	Date
26	Shingaimachi, Fukuyamashi, Hiroshimaken	Sept. 4, 1948
27	Minomimachi, Numakumagun, Hiroshimaken	Oct. 18, 1948
28	Yoshiwamachi, Onomichishi, Hiroshimaken	Aug. 12, 1948
29	Nouji, Saizakimachi, Toyotagun, Hiroshimaken	Sept. 3, 1948
30	Miyatoko, Tadanoumimachi, Toyotagun, Hiroshimaken	Aug. 20, 1948
31	Kitazaki, Takeharamachi, Kamogun, Hiroshimaken	Nov. 11, 1948
32	Kirasaki, Shimonomura, Kamogun, Hiroshimaken	Aug. 12, 1948
33	Mitsu, Akitsumachi, Kamogun, Hiroshimaken	Aug. 15, 1948
34	Tsukimigahama, Itsukaichi, Itsukaichimachi, Sahekigun, Hiroshimaken	Aug. 19, 1948

collected by S. Yamaoka at the point about 400 m east of the estuary of the Yoshiwa River.

Sample 29: yellowish white sand containing comparatively many small gravels; collected by M. Kurimoto at the estuary of the Hataoka River.

Sample 30: light brown sand containing shell fragments and comparatively many small gravels; collected by N. Ogawa at the point about 150 m east of Sarugahana.

Sample 31: grayish green fine mud; collected by K. Takahara at the point about 80 m southeast of the estuary of the Hon River.

Sample 32: grayish green mud; collected by Y. Morikawa at the point about 70 m west of the estuary of the Kamo River.

Sample 33: light grayish brown sand; collected by Y. Aoyama at the point about 500 m east of the estuary of the Shiokuguri River.

Sample 34: light brown sand containing shell fragments and comparatively many small gravels; collected by T. Konishi at the point about 900 m west of the estuary of the Yahata River.

The size composition of these deposits is shown in Table 2.

The geology of the land adjacent to the locations sampled is briefly as follows*:

In this district, granite and quartz-diorite are widely distributed, and are found near the locations of all the samples.

Samples 26 and 27: granite, quartz-diorite, quartz-porphyry and Quaternary formations.

Samples 28 and 30: granite and quartz-diorite.

Samples 29: granite, quartz-diorite, Ryōke metamorphics and Quaternary formations.

Sample 31: granite and quartz-diorite; (Quaternary formations).

* The parentheses are for the rocks and formations which distribute in the land areas not so far from the location of collection.

Table 2. Size composition of the deposits.

Sample No.	Mesh[a]						
	>8	14	28	48	100	200	pan
	%	%	%	%	%	%	%
26	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
27	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
28	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
29	27	31	23	11	5	2	1
30	28	25	21	14	10	2	0
31	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
32	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
33	6	12	52	26	3	1	0
34	20	39	32	7	2	0	0

[a] Tyler standard.

Sample 32 : Quaternary formations ; (granite, quartz-diorite and quartz-porphyry).

Sample 33 : quartz-porphyry and Quaternary formations ; (granite, quartz-diorite and granite-porphyry).

Sample 34 : Quaternary formations ; (granite and quartz-diorite).

EXPERIMENTAL PROCEDURE, RESULTS AND DISCUSSION

Experiments were carried out as described previously[3)].

The analytical results of the air-dried samples are shown in Table 3. From this table we obtain the percentages of chemical constituents in the sea-salt-free samples dried at 105~110°C as shown in Table 4*.

Of the shallow-water deposits already analysed, the sands shown in Table 4 are exceedingly high in SiO_2 and low in Fe_2O_3 and Al_2O_3. And the CaO, MgO and P_2O_5 contents are also low in most of them. Further, it is noticeable that the K_2O content is considerably high in all the sands, ranging from 3.70 to 5.05 %.

Next, as for the muds, it is seen that the fine muds such as Samples 26, 27 and 31 are lower in SiO_2 and higher in Fe_2O_3, Al_2O_3, etc. as compared with other muds in Table 4 which are somewhat sandy. Especially, in Sample 27 which is the finest mud, the SiO_2 content is the lowest and the contents of Fe_2O_3, Al_2O_3, MnO, MgO, etc. are the highest.

The K_2O content is considerably high in all the muds, ranging from 2.43 to 3.25 %, its mean value being 2.84 %, which is higher than that of Korean muds, 2.31%, and that of the muds of Aichi prefecture, 2.18 %, shown in the previous papers[5)]. Such a high content of K_2O in both sands and muds in the present report may be caused by the fact that the source materials of these deposits have been chiefly de-

* We performed this calculation on the basis of the same assumption as in the previous paper[1)].

Table 3. Chemical composition of the deposits.

Sample No.	26	27	28	29	30	31	31	33	34
	%	%	%	%	%	%	%	%	%
Drying loss	5.85	6.42	2.12	0.44	0.28	3.82	2.60	0.39	0.20
Ignition loss	7.15	10.20	3.85	0.97	1.31	6.10	3.95	1.44	1.63
Fe_2O_3	4.32	5.63	3.39	1.29	1.15	4.45	3.67	1.32	1.08
TiO_2	0.34	0.57	0.35	0.26	0.12	0.45	0.31	0.24	0.15
Al_2O_3	14.28	16.97	12.87	10.07	10.03	16.03	14.65	9.39	9.74
MnO	0.06	0.08	0.04	0.02	0.01	0.04	0.03	0.01	0.01
CaO	2.44	1.25	2.20	0.46	1.25	1.95	1.36	0.50	1.80
MgO	1.61	1.75	1.31	0.41	0.24	1.05	0.93	0.42	1.14
K_2O	3.03	2.26	2.80	4.05	5.02	2.38	3.06	3.68	4.66
Na_2O	3.20	2.91	3.76	2.19	2.61	2.84	3.74	1.71	2.28
SiO_2	58.54	52.09	67.59	79.65	77.93	61.52	65.85	81.11	78.41
SO_3	0.71	2.59	0.52	0.07	0.03	0.70	0.29	0.15	0.09
Cl	1.05	0.49	0.61	0.20	0.13	0.76	0.58	0.10	0.14
P_2O_5	0.13	0.13	0.05	trace	0.01	0.11	0.05	0.03	0.03
CO_2	1.60	—	0.43	—	0.42	—	—	—	0.80
N	0.13	0.05	0.11	n.d.	n.d.	0.06	0.05	n.d.	n.d.

Table 4. Chemical composition of the deposits on sea-salt-free and dry basis (calculated from Table 3).

Sample No.	26	27	28	29	30	31	32	33	34
	%	%	%	%	%	%	%	%	%
Fe_2O_3	4.68	6.07	3.50	1.30	1.16	4.69	3.81	1.33	1.08
TiO_2	0.37	0.61	0.36	0.26	0.12	0.47	0.32	0.24	0.15
Al_2O_3	15.48	18.31	13.30	10.15	10.08	16.91	15.20	9.44	9.78
MnO	0.07	0.09	0.04	0.02	0.01	0.04	0.03	0.01	0.01
CaO	2.61	1.34	2.25	0.45	1.26	2.04	1.39	0.50	1.81
MgO	1.62	1.83	1.28	0.39	0.23	1.02	0.90	0.41	1.13
K_2O	3.25	2.43	2.88	4.08	5.05	2.49	3.17	3.70	4.68
Na_2O	2.62	2.75	3.42	2.16	2.52	2.41	3.44	1.65	2.19
SiO_2	63.46	56.20	69.84	80.29	78.34	64.89	68.34	81.57	78.76
SO_3	0.64	2.73	0.46	0.05	0.01	0.64	0.23	0.14	0.07
P_2O_5	0.14	0.14	0.05	trace	0.01	0.12	0.05	0.03	0.03
CO_2	1.73	—	0.44	—	0.42	—	—	—	0.80
N	0.14	0.05	0.11	n.d.	n.d.	0.06	0.05	n.d.	n.d.
Na_2O+K_2O	5.87	5.18	6.30	6.24	7.57	4.90	6.61	5.35	6.87
K_2O/Na_2O	1.24	0.88	0.84	1.89	2.00	1.03	0.92	2.24	2.14

rived from the granitic rocks, perhaps rich in K, which are widely distributed in the terrestrial regions.

In this connection, the full comparison of chemical composition of these muds with that of the deposits from other districts will be discussed in the forthcoming report on the muds of Okayama prefecture.

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