Chemical Studies on the Ocean. (LV)

Chemical Studies of the Shallow-water Deposits. (11)
On the Chemical Constituents of the Shallow-water Deposits along the Sea-coasts of Aomori and Iwate Prefectures

Masayoshi ISHIBASHI and Shunzō UEDA*

Received April 5, 1956

We have analysed 11 kinds of the deposits, that is, 10 kinds of sands and 1 kind of sandy mud from the sea-coasts of Aomori and Iwate prefectures, and found that the blackish sands which exist in several numbers, mostly show the different chemical composition from that of others, having the exceedingly lower contents of SiO_2 and K_2O and the exceedingly higher contents of Fe_2O_3, CaO and MgO.

As for the K_2O content, it is generally low in the samples of this report, its mean value being only 1.18 %.

INTRODUCTION

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

SAMPLES

Locality and date of sampling are shown in Table 1.

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

Sample 39: grayish white sand; collected by K. Suzuki at the estuary of the Kurosaki River.

Sample 40: blackish sand; collected by Y. Kudō at the point about 900 m north of the estuary of the Rokumaibashi River.

Sample 41: grayish sand containing shell fragments and comparatively many gravels; collected by K. Ogata at the point about 400 m north of the estuary of the Shiodate River.

Sample 42: brown sand; collected by K. Satō at the point about 1 km southeast of the estuary of the Ōhata River.

Sample 43: blackish brown sand; collected by K. Shito at the point about 200 m northeast of the Hiyorizima.

* 石橋 雅義, 上田 俊三

Table 1.

Sample No.	Locality	Date
39	Kohama, Kurosaki, Iwasakimura, Nishitsugarugun, Aomoriken	Aug. 3, 1947
40	Isouchi, Rokumaibashi, Ushirogatamura, Higashi-tsugarugun, Aomoriken	Sept. 22, 1947
41	Asadokoro, Kominatomachi, Higashitsugarugun, Aomoriken	Aug. 21, 1947
42	Uwano, Ōhata, Ōhatamachi, Shimokitagun, Aomoriken	Aug. 15, 1947
43	Tomari, Rokukashomura, Kamikitagun, Aomoriken	Aug. 16, 1947
44	Hitokawame, Momohimachi, Kamikitagun, Aomoriken	Aug. 12, 1947
45	Tamakawa, Nodamura, Kunohegun, Iwateken	Nov. 9, 1948
46	Fujiwara, Miyakoshi, Iwateken	Aug. 20, 1947
47	Tsugaruishimura, Shimoheigun, Iwateken	Aug. 24, 1948
48	Orikasamura, Shimoheigun, Iw teken	Aug. 25, 1948
49	Akasawa, Ōfunatomachi, Kesengun, Iwateken	Aug. 10, 1947

Sample 44 : blackish sand ; collected by R. Tanaka at the sea-coast of so-called Futakawame.

Sample 45 : grayish white sand containing fine shell fragments ; collected by S. Ōhira at the point about 400 m south of the estuary of the Tama River.

Sample 46 : blackish sand ; collected by T. Kudō at the point about 250 m south of the estuary of the Hei River.

Sample 47 : grayish white sand ; collected by T. Yamanome at the point about 250 m southeast of the estuary of the Tsugaruishi River.

Sample 48 : dark grayish sandy mud ; collected by H. Haga at the point about 100 m southeast of the estuary of the Orikasa River.

Sample 49 : blackish sand ; collected by S. Niinuma at the point about 400 m southwest of the estuary of the Sakari River.

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

The geology of the land adjacent to the locations where sampls were taken is briefly as follows* :

Aomori prefecture :

Sample 39 : Tertiary formations.

Samples 40 and 41 : Quaternary formations ; (Tertiary formations).

Sample 42 : Quaternary formations ; (pyroxene-andesite and its agglomerate).

Sample 43 : pyroxene-andesite and its agglomerate.

Sample 44 : Quaternary formations.

The mountainous areas of this district are chiefly composed of pyroxene-andesite

* 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
	%	%	%	%	%	%	%
39	1	2	18	59	19	1	0
40	0	0	15	63	19	3	0
41	20	8	6	8	9	38	11
42	3	6	8	17	58	8	0
43	2	5	34	48	10	1	0
44	0	1	11	36	35	17	0
45	2	1	3	13	66	15	0
46	0	0	2	29	53	17	0
47	15	1	1	2	27	49	5
48	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
49	1	6	4	24	50	15	0

[a] Tyler standard.

and its agglomerate and tuff, and small amounts of Tertiary sedimentary rooks and liparite are found there.

Iwate prefecture:

Sample 45: Tertiary formations; (granites and Paleozoic formations).

Samples 46 and 47: Quaternary formations; (granites).

Sample 48: granites.

Sample 49: Quaternary formations; (Mesozoic formations and porphyrite).

The mountain range close to the sea-coast of this district consists chiefly of Paleozoic formations which are intruded by granites everywhere.

EXPERIMENTAL PROCEDURE, RESULTS AND DISCUSSION

Experiments were carried out as described previously[2].

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

As obvious from Table 4, the blackish sands such as Samples 40, 43, 44 and 49 show the different chemical composition as compared with other samples, being exceedingly low in SiO_2 and K_2O and exceedingly high in Fe_2O_3, CaO and MgO. Particularly, it is noticeable that Sample 43 has such a high MgO content as about 10 %. And Sample 46, which is blackish sand, shows also relatively high contents of Fe_2O_3, CaO and MgO, though the SiO_2 and K_2O contents are rather high in this

* We performed this calculation on the basis of the same assumption as in the previous paper[3].

Table 3. Chemical composition of the deposits.

Sample No.	39	40	41	42	43	44	45	46	47	48	49
	%	%	%	%	%	%	%	%	%	%	%
Drying loss	0.24	0.22	2.27	1.15	0.27	0.68	0.28	0.42	0.71	2.37	0.23
Ignition loss	1.32	0.42	5.06	1.79	0.46	0.97	2.27	1.50	1.89	1.96	1.63
Fe_2O_3	2.36	11.32	3.12	3.14	12.92	9.19	2.55	6.52	3.62	4.25	12.01
TiO_2	0.48	1.40	0.65	0.38	0.76	1.25	0.31	0.49	0.51	0.85	1.19
Al_2O_3	12.04	8.51	9.53	14.25	6.19	14.32	6.85	10.04	12.58	14.66	11.88
MnO	0.04	0.29	0.04	0.05	0.47	0.23	0.05	0.12	0.08	0.09	0.15
CaO	2.19	4.40	2.70	4.90	6.73	6.05	3.74	3.52	2.55	3.00	5.46
MgO	0.69	4.45	1.16	1.10	9.93	3.47	0.94	2.70	1.59	2.31	3.50
K_2O	2.72	0.56	1.16	0.65	0.44	0.74	1.32	1.74	1.31	1.41	0.85
Na_2O	3.33	1.82	1.76	2.52	1.57	2.63	1.28	2.14	1.99	2.54	1.18
SiO_2	75.21	67.46	72.61	70.75	60.55	61.37	80.97	70.82	73.22	65.23	62.03
SO_3	0.02	0.10	1.08	0.09	0.08	0.07	0.07	0.13	0.11	1.57	0.06
Cl	0.04	0.04	0.08	0.35	0.17	0.39	0.35	0.26	0.22	0.17	0.04
P_2O_5	0.08	0.08	0.06	0.04	0.24	0.13	0.05	0.10	0.06	0.10	0.09
CO_2	—	—	0.36	—	—	—	1.58	—	—	—	—
N	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	0.11	n.d.

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

Sample No.	39	40	41	42	43	44	45	46	47	48	49
	%	%	%	%	%	%	%	%	%	%	%
Fe_2O_3	2.37	11.35	3.20	3.20	13.00	9.32	2.57	6.58	3.66	4.37	12.05
TiO_2	0.48	1.40	0.67	0.39	0.76	1.27	0.31	0.49	0.52	0.87	1.19
Al_2O_3	12.08	8.53	9.77	14.51	6.23	14.52	6.91	10.13	12.72	15.06	11.92
MnO	0.04	0.29	0.04	0.05	0.47	0.23	0.05	0.12	0.08	0.09	0.15
CaO	2.20	4.41	2.77	4.98	6.76	6.13	3.76	3.54	2.57	3.07	5.48
MgO	0.69	4.46	1.18	1.08	9.97	3.48	0.91	2.69	1.59	2.35	3.51
K_2O	2.73	0.56	1.19	0.65	0.44	0.74	1.32	1.75	1.31	1.45	0.85
Na_2O	3.31	1.80	1.74	2.30	1.45	2.37	1.03	1.97	1.85	2.48	1.15
SiO_2	75.44	67.66	74.40	72.03	60.90	62.23	81.71	71.46	74.04	67.03	62.22
SO_3	0.02	0.10	1.10	0.05	0.06	0.02	0.03	0.10	0.08	1.59	0.06
P_2O_5	0.08	0.08	0.06	0.04	0.24	0.13	0.05	0.10	0.06	0.10	0.09
CO_2	—	—	0.37	—	—	—	1.59	—	—	—	—
N	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	0.11	n.d.
Na_2O+K_2O	6.04	2.36	2.93	2.95	1.89	3.11	2.35	3.72	3.16	3.93	2.00
K_2O/Na_2O	0.82	0.31	0.68	0.28	0.30	0.31	1.28	0.89	0.71	0.58	0.74

case. Further, these blackish sands generally have comparatively higher TiO_2 and MnO contents than others.

Now, in the previous papers[4] we found that there was a relation in many samples that the Al_2O_3 content is high in those of low SiO_2 content, while, there appear

exceptions in this report such as Samples 40 and 43 which are low in both SiO_2 and Al_2O_3.

As for the K_2O content reported in this paper, it is low on the whole, as compared with the deposits shown in the previous papers. Namely, it ranges 0.44~2.73 %, being about 1 % or lower in many of them. Especially, it is remarkable that the above four blackish sands are all exceedingly low in K_2O. The average value of all samples amounts to 1.18 %, which is considerably lower than that of the deposits from other districts already reported, i.e. 2.34 % of Korea[5], 2.65 % of Ishikawa and Toyama prefectures[2], 2.18 % of Aichi prefecture[6] and the like.

We wish to express our thanks to Mr. Y. Kaseno, Assist. Professor of Geological Institute, Faculty of Science, Kanazawa University, for his useful advice in many ways, and further, to Messrs. K. Suzuki, Y. Kudō, K. Ogata, K. Satō, K. Shito, R. Tanaka, S. Ōhira, T. Kudō, T. Yamanome, H. Haga and S. Niinuma who presented us with many valuable samples.

REFERENCES

(1) M. Ishibashi and S. Ueda, This Bulletin, **34**, 132 (1956).
(2) M. Ishibashi and S. Ueda, This Bulletin, **34**, 117 (1956).
(3) M. Ishibashi and S. Ueda, This Bulletin, **33**, 165 (1955).
(4) M. Ishibashi, *J. Agr. Chem. Soc. Japan*, **17**, 67 (1941); M. Ishibashi and S. Ueda, This Bulletin, **33**, 165 (1955) ⟶ **34**, 132 (1956).
(5) M. Ishibashi and S. Ueda, This Bulletin, **33**, 170 (1955).
(6) M. Ishibashi and S. Ueda, This Bulletin, **34**, 122 (1956).