23. INTERSTITIAL WATER CHEMISTRY: DEEP SEA DRILLING PROJECT, LEG 20

B. J. Presley, R. R. Sims, and S. E. Feagley, Department of Oceanography,
Texas A&M University, College Station, Texas

INTRODUCTION AND PROCEDURES

Leg 20 of the Deep Sea Drilling Project began in Yokohama, Japan, on September 17, 1971 and ended in Suva, Fiji, on November 10, 1971. Most of the sites occupied were in very deep water and this, plus the lithology of the sediments, led to a number of problems. The result was a rather poor core recovery and extensive disturbance of many of the cores that were recovered.

A total of 13 pore-water samples was received at Texas A&M. These had been collected at six different sites, with more than two samples coming from only one of the six. The samples, which consisted of about 3-4 ml of pore water, had been filtered through a 0.45μ membrane filter immediately after squeezing and had then been heat sealed into short sections of semirigid plastic tubing. They were stored this way, at $4^{\circ}C$, for about one year before they were opened and analyzed.

The analytical procedures used for these samples are essentially the same as those described in an earlier report (Presley, 1971), but small modifications have been made to facilitate sample handling.

RESULTS AND DISCUSSION

All data obtained from the Leg 20 interstitial water are given in Table 1. Chloride values for the Leg 20 samples are all high; this might be indicative of a 4% or so evaporative concentration during storage or a problem with the standard seawater used in the analysis. The values might be real, but if so, their geochemical significance is unknown. The bromide values given in Table 1 also look suspicious because most of the Cl to Br ratios are high by several percent. This may also be an analytical problem in view of the fact that Cl and Br values have in previous analyses been comparable to those of seawater except where evaporites are present in the sedimentary column.

Only from Site 199 were enough samples available to show any trends with depth below the sea floor. There the major cation concentrations gave trends that have become familiar based on previous legs. Calcium increases in concentration with depth, while potassium and magnesium decrease. Site 199 shows another feature, however, that has not been seen at previous sites; that is, a very sharp break in the Ca trend, a break that coincides with a sharp break in lithology. Apparently the radiolarian ooze samples at a depth of 150 meters at this site is taking up Ca, rather than releasing it as is the sediment above and below it.

It is also interesting that lithium ion concentration shows a smooth decrease at Site 199, whereas smooth increases, or no change, have been the general rule at most previous sites.

Boron concentrations do not vary much from the accepted sea-water value, but silicon is generally enriched, especially in the Site 199 radiolarian ooze referred to above. All samples contained a measurable amount of ammonia, but the long storage could well have affected this constituent.

Manganese concentrations were even more variable than usual, with two of the highest values ever recorded, yet in some samples manganese was below the detection limit. As usual, these concentrations seem not to be related to any other variable.

ACKNOWLEDGMENTS

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REFERENCE

Presley, B. J., 1971. Techniques for analyzing interstitial water samples. Part I: Determination of selected minor and major inorganic constituents. *In* Winterer, E. L., Riedel, W. R., et al. Initial Reports of the Deep Sea Drilling Project, Volume VII: Washington (U. S. Government Printing Office), p. 1756.

TABLE 1
Interstitial Water Chemistry, Leg 20

Sample	Depth Below Sea Floor (m)	Age[a]	Description[a]	Cl g/kg	Br mg/kg	Na g/kg	K mg/kg	Ca mg/kg	Mg g/kg	Li mg/kg	B mg/kg	NH_3 mg/kg	Si mg/kg	Mn mg/kg
194-1-6	46	Quaternary	Silty clay, rads, ash	20.2	61	11.5	558	442	1.23	120	3.5	4.0	12.4	5.1
194-2-5	150	Cretaceous	Silty clay, rads, ash	20.3	62	11.5	427	516	1.20	297	4.0	5.6	24.0	15.9
195-1-6	72	Quaternary	Silty clay, rad, ash	20.4	64	11.2	463	447	1.26	251	4.1	3.6	13.1	15.9
195-2-2	123	Miocene	Brown clay, Mn nodules	20.4	67	11.5	427	535	1.21	270	4.2	2.0	21.8	11.6
196-2-4	107	Cretaceous	Zeolitic red clay	20.1	67	11.5	498	480	1.24	200	4.7	1.7	18.8	0.1
198A-1-6	99	Unknown	Zeolitic brown clay, ash	–	65	11.4	422	436	1.25	220	5.8	2.1	5.2	0.1
198A-3-5	117	Cretaceous	Zeolitic brown clay, ash	19.9	70	11.0	414	434	1.24	228	4.8	2.0	13.8	0.1
199-1-4	62	Pliocene	$CaCO_3$ ooze, zeolitic clay	20.2	65	11.4	428	588	1.13	173	4.6	1.9	4.9	0.8
199-2-6	75	Miocene	Brown zeolitic clay	20.1	67	11.3	411	632	1.10	153	4.3	1.8	6.1	1.5
199-4-5	93	Miocene	Brown zeolitic clay	20.1	71	11.4	395	773	1.10	138	4.4	–	6.6	1.9
199-5-6	151	Miocene	Radiolarian ooze	20.1	68	11.0	317	201	0.78	130	4.2	2.6	24.9	2.2
199-6-4	205	Miocene	Gray zeolitic clay, ash	20.1	67	11.0	305	317	0.66	115	4.0	2.4	3.4	1.8
200-3-3	81	Miocene	Brown zeolitic clay	20.1	64	11.3	412	458	1.32	205	3.9	3.2	3.4	0.2
Average seawater				19.4	67	10.8	387	411	1.29	170	4.5	–	3.0	0.002

[a]From preliminary hole summaries.