

Heavy Minerals in Beach Sands of Chatrapur (Orissa), East Coast of India

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Received 24 January 1984; revised received 22 May 1984

Heavy mineral fractions present in beach sands were analysed spectrochemically. Percentage (range) distribution of titanium, niobium, zirconium and thorium was 6-8.5, 2-3.8, 1-2 and 0.01-0.14 respectively.

Not much information is available on the heavy mineral distribution in the beach sands along the east coast of India^{1,2}. The beach sands along Chatrapur coast (lat. 19° 21' 15" N; long. 84° 58' 45" E) contain abundant quantities of heavy minerals rich in TiO₂ and ThPO₄. Heavy mineral concentration in the clastic sediments from this area is also indicated³. In the present investigation distributions of Ti, Nb, Zr and Th in the mineral matrix of Chatrapur beach sands is studied.

Representative sand samples after collection were dried, coned and quartered. These samples were subjected to mechanical size analysis and the heavy fractions were then separated from lighter fractions by bromoform⁴.

Preliminary qualitative analyses of heavy mineral fractions were done using the emission spectrograph (Radon make). In all samples, Si was the single abundant element followed by Ti, Al, Fe and Th. Zr, La, Ce and Yt were found in traces⁵.

Quantitative analyses of samples for Ti, Nb, Zr and Th were done using an optical spectrograph (Hilger and Watts make). Spectrochemical analyses were carried out in duplicate and the experimental error involved is <1% for each sample⁵.

Distribution of Ti, Nb, Zr and Th in different size fractions (A, B and C) is given in Table 1. Percentage of Ti, Nb, and Zr in all the fractions ranges from 6-8.5, 2-3.8 and 1-2% respectively; whereas the percentage of Th, present only in fraction A, ranges from 0.1-0.14. High percentage of Ti shows ilmenite to be the major component in the heavy mineral fraction. Percentage distribution of Nb versus the percentage of total samples analysed indicates that Nb content is higher in coarser fractions (fractions A and B). Distribution pattern of Nb follows that of Ti. It is found that 56% of the samples contain 1% Zr as against 44% of the sample which contain 2% of Zr. Further, it is noticed

Table 1—Percentage Distribution of Ti, Nb, Zr and Th in Different Size Fractions of Beach Sand

Sample No	Size	Ti	Nb	Zr	Th
1	A	7.0	3.0	0.9	0.1
	B	7.4	3.8	1.2	—
	C	7.9	2.4	1.8	—
2	A	8.0	3.45	1.0	0.02
	B	7.8	3.75	1.4	—
	C	8.8	3.7	1.6	—
3	A	7.2	3.3	0.8	0.04
	B	7.8	3.0	1.6	—
	C	8.4	2.7	1.9	—
4	A	6.2	2.8	0.7	0.045
	B	7.4	2.7	1.5	—
	C	7.9	2.5	1.9	—
5	A	6.0	3.4	0.8	0.06
	B	6.8	3.8	1.4	—
	C	7.2	2.9	2.0	—
6	A	6.0	3.4	0.7	0.08
	B	6.5	3.7	1.2	—
	C	7.0	3.9	1.6	—
7	A	7.0	3.6	0.6	0.12
	B	7.5	3.9	1.1	—
	C	8.2	3.7	1.8	—
8	A	7.2	3.4	0.7	0.14
	B	7.6	3.0	1.1	—
	C	8.0	2.9	1.8	—
9	A	8.0	3.0	1.0	0.14
	B	8.2	2.8	1.4	—
	C	8.4	2.0	1.8	—
10	A	7.6	2.8	0.9	0.16
	B	8.0	1.9	1.2	—
	C	8.6	1.9	1.6	—
11	A	7.9	3.0	0.8	0.16
	B	8.4	2.7	1.3	—
	C	8.6	2.6	1.9	—
12	A	7.8	3.1	1.0	0.165
	B	8.4	2.8	1.2	—
	C	8.7	2.7	1.8	—

*Size fractions: A = -0.180 mm, 0.150 mm
B = -0.150 mm, 0.125 mm
C = -0.125 mm, 0.105 mm

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that percentage of Zr is higher in finer fractions (fraction C). The pattern of distribution of Zr almost follows that of Nb and Ti. However, it is seen that 24% of the samples contain $>0.07\%$ Th, whereas 10% of the sample contains $<0.05\%$. The present results indicate that the Th content in the study area agrees with the generally expected Th value in the beach sands from different parts of India⁶.

The authors thank the authorities of BARC, Bombay and RRL, Bhubaneswar for facilities for the spectrochemical analyses. One of the authors (PCS) is grateful to UGC, New Delhi for the award of a teacher fellowship.

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