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Environmental Geochemistry of Surficial sediments From the South-west of the Caspian-Sea

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Abstract

The Caspian Sea is a Unique, evidently enclosed water body Shared between Iran and some neighboring Countries experiencing serious environmental problems.

The Caspian Sea receives river discharges which mostly Contain industrial and mining wastes. The Sediments provide a valuable record of environmental retrospective Changes. The heavy metal pollution of the environment of the Caspian Sea around Anzali area is gradually increasing due to urbanisation and industrial activities in the region. Therefore it is found to be interesting to investigate the pollution level of the Caspian sea around Anzali area using sediment Samples. In this Study surficial sediment samples, were analyzed quantitatively by neutron activation analysis (NAA) and activation autoradiography techniques.

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۱. Experimental

The surface sediments were collected from ۷ sites of the caspian sea nearby Anzali (

K۰ _ K۳ _ KR۹ _ KS۹۹ _ K۵ _ K۶ _ K۷) surface sediment samples were collected by

Van veen grab . The investigated samples were taken from the uppermost part of

collected sediments for each site , with spatulas and deposited into plastic bags . The

samples were dried at ۴۰ °C before being analysed [۱,۲] .

TABLE ۱. The results of NAA determination of impurities in sediments of the Caspian sea

Element	K0	K3	K5	K6	K7	KR9, KS99
Na	(150 ± 8)10 ²	(79 ± 6)10 ²	(140 ± 8)10 ²	(120 ± 8)10 ²	(110 ± 8)10 ²	(49 ± 3)10 ²
Ca	(68 ± 7)10 ²	(160 ± 20)10 ²	(260 ± 26)10 ²	(220 ± 28)10 ²	(230 ± 20)10 ²	(660 ± 60)10 ²
Sc	11 ± 1	4.7 ± 0.5	7.9 ± 0.9	9.1 ± 0.9	4.9 ± 0.5	3.1 ± 0.5
Ti	< 10	(31 ± 3)10 ²	(26 ± 3)10 ²	(14 ± 2)10 ²	(20 ± 2)10 ²	(18 ± 2)10 ²
Cr	110 ± 10	53 ± 6	73 ± 8	72 ± 8	42 ± 5	450 ± 50
Mn	510 ± 30	230 ± 20	380 ± 20	300 ± 20	250 ± 20	340 ± 20
Fe	(279 ± 32)10 ²	(123 ± 14)10 ²	(178 ± 20)10 ²	(198 ± 23)10 ²	(121 ± 14)10 ²	(105 ± 12)10 ²
Co	8.7 ± 0.9	5.8 ± 0.7	7.8 ± 0.9	8.8 ± 0.9	6.3 ± 0.7	3.2 ± 0.4
Ni	45 ± 6	75 ± 10			83 ± 10	68 ± 8
Cu	< 10	26 ± 3			11 ± 2	78 ± 9
As	8.9 ± 1	7.0 ± 0.8	10 ± 1.1	11 ± 1.1	6.9 ± 0.8	9.6 ± 1.1
Se	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0
Br	48 ± 5	21 ± 2	55 ± 6	43 ± 5	40 ± 5	8.3 ± 0.8
Sr	300 ± 30	870 ± 80	850 ± 80	650 ± 70	880 ± 90	970 ± 90
Zr	360 ± 40	210 ± 25	200 ± 25	230 ± 25	160 ± 20	860 ± 99
Mo	23 ± 3	14 ± 3	< 10	19 ± 3	37 ± 5	95 ± 10
Ag	1.4 ± 0.2	0.94 ± 0.09	1.4 ± 0.2	1.4 ± 0.2	0.6 ± 0.07	0.36 ± 0.04
Cd	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sb	(36 ± 4)10 ⁻³	(49 ± 6)10 ⁻³	(53 ± 6)10 ⁻³	(87 ± 10)10 ⁻³	(87 ± 10)10 ⁻³	(60 ± 5)10 ⁻³
Cs	4.7 ± 0.5	2.0 ± 0.2	3.8 ± 0.4	3.8 ± 0.4	3.0 ± 0.3	0.58 ± 0.07
Ba	340 ± 40	270 ± 30	370 ± 40	570 ± 60	330 ± 40	120 ± 10
La	28 ± 3	8.4 ± 0.6	12 ± 2	16 ± 2	18 ± 2	12 ± 2
Ce	68 ± 7	29 ± 3	52 ± 6	49 ± 5	27 ± 3	32 ± 3
Sm	3.3 ± 0.3	2.1 ± 0.2	3.1 ± 0.3	3.3 ± 0.3	2.4 ± 0.3	2.8 ± 0.3
Hf	8.0 ± 0.8	1.2 ± 0.2	2.8 ± 0.3	1.0 ± 0.1	1.2 ± 0.2	1.7 ± 0.2
Ta	0.57 ± 0.07	0.3 ± 0.03	0.3 ± 0.03	0.4 ± 0.05	0.37 ± 0.04	0.77 ± 0.09
W	15 ± 2	120 ± 15	70 ± 9	29 ± 4	38 ± 4	26 ± 4
Au	(26 ± 3)10 ⁻³	(28 ± 3)10 ⁻³	(23 ± 3)10 ⁻³	(19 ± 3)10 ⁻³	(5.8 ± 0.7)10 ⁻³	(12 ± 2)10 ⁻³
Hg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Th	7.7 ± 0.9	3.5 ± 0.4	6.0 ± 0.7	5.8 ± 0.7	3.4 ± 0.4	7.1 ± 0.8
U	5.9 ± 0.6	2.0 ± 0.3	4.0 ± 0.5	2.5 ± 0.3	2.8 ± 0.3	4.2 ± 0.5

* The confidence intervals are given for probability 0.975 and 5 multiple determinations.

۲. Results and Discussion

The NAA result of some elements of the caspian sea sediments are given in table ۱ .

Our results are compared with the available data in the literature for heavy metal concentrations of marine sediments taken from densely populated and industrialised areas . Table ۱. The result of NAA determination of impurities in sediments of the Caspian Sea .

۳. Conclusion

In this study some metal concentrations of the sediment samples taken from the Caspian sea around Anzali area are investigated by neutron activation analysis and activation autoradiography [۴] . The comparison of our result to those of the sediment samples taken from highly industrialised and densely populated areas of Anzali , indicated that the sediments around the Anzali Metropolitan area are significantly contaminated with heavy and toxic metals. The comparison of our result to those of other marine environments indicates , however , the heavy and toxic metals levels of the sediment samples may be considered as moderately elevated[۳] .

V , Cr , Fe , Cu and Zn concentrations of the caspian Sea sediments in Anzali found to be more than those of nearby coastal Sea sediments [۵] .

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