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NOTE

Estimation of Lead and Other Elements in Rocks, Soil and Silt Samples of Fluorite Mine Area of Chandidongri, Distt. Rajnandgaon in Chhattisgarh

S.N. BISWAS†, Hem Lata MOHABEY‡ and M.L. NAIK*
Department of Bio-science, Pt. Ravisankar University, Raipur, India

Rock, soil and silt samples were collected from fluorite mine area and non-mineralized area of Chandidongri (Chhattisgarh) and were analyzed for fluoride and other metals, *viz.*, lead, iron, aluminium, zinc, copper. etc. Some rock samples had very high percentage of lead, zinc, manganese, calcium and flouride, while others had very low concentration of the same. Thus rock samples exhibited much variation in composition while lesser variation in the concentration of the metals estimated was noticed in soil and silt. The experimental area being fluoride mineralised area, fluoride was present in all the samples collected.

Key Words: Analysis, Mine area, Fluorite, Rock, Soil, Silt.

Chandidongri is situated at Chhuria Tehsil of Rajnandgaon district in Chhattisgarh state. It have been long known as Chandidongri (meaning silver hill) because of argentiferrous galena and is famous for its fluorite deposits[1, 2].

Soil is one of the most important gifts to human beings by nature. The productivity of soil is affected by its chemical composition[3, 4]. The normal abundance of an element in earth material varies according to the nature of the material. At Chandidongri fluorite occurs in quartz veins, intrusive into granite. The host rock is pale greenish, purple, bluish, yellow, white and colourless[5–8]. Randomly collected rock samples from this mineralised area were analysed. Some rock samples had very high percentage of lead, zinc, manganese, calcium and fluoride while others had very low concentration of these. The soil and silt samples from mineralised and non-mineralised areas were collected and analysed for lead, copper, iron, manganese, fluorite etc. Standard methods were used for the analysis[9, 10]. These studies were used to correlate the effect of fluoride upon associated elements in plants, animals and human beings.

Rock samples were collected from the north and south areas of Chandidongri as they differ in physical appearance. Collected samples were broken into small pieces and then thoroughly washed, dried, powdered and kept in polythene bags. Similarly rock samples were collected from the nearby non-mineralised area Murhipar (RJN) for comparison. Silt samples were collected randomly from different points of mine pond located at north Chandidongri. Samples were dried, powdered and kept in polythene bags.

†Scientific Officer, Forensic Science Lab (M.U.), Rajnandgaon, India.
‡Government Digvijai College, Rajnandgaon, India.

Soil samples were taken randomly from different mineralised areas of Chandidongri. The samples were air dried, powdered and then stored in polythene bags. Soil samples were also collected from the nearby non-mineralised area for comparing chemical characters with mineralised area soil samples. Chemical analysis of the collected samples was performed by standared methods[9, 10] (Tables 1 and 2).

TABLE-1
CONCENTRATION OF ELEMENTS IN ROCK SAMPLES

S. No.	Sites	Elements (%)				Elements (ppm)				
		Pb	Al_2O_3	Fe_2O_3	CaO	Na_2O	K_2O	F	Zn	MnO
Mineralised area:										
1.	Chandidongri South.	37.78 (43.62 as PbS)	0.13	0.18	17.85	0.05	0.02	6.80	16	16
2.	Chandidongri North	0.832	2.64	1.29	23.24	0.08	1.90	7.40	147	40
Non-mineralised area:										
3.	Control rock sample	0.0034	4.61	3.01	32.75	0.29	1.50	0.15	24	850

From Table-1, it is clear that some rock samples contain high concentration of lead, zinc, manganese and fluoride as compared to other samples of same mineralised area. Al, Fe, Na, Ca, K, however, exhibited lesser variations as compared to earlier mentioned elements. This variation in the concentration of elements was negligible in soil and silt samples (Table-2). Concentration of lead was very low in rock samples of non-mineralized area.

TABLE-2
CHEMICAL ANALYSIS OF SOIL & SILT, FOR SOME ELEMENTS FROM MINERALISED & NONMIERALISED AREAS

S. No.	Sites	Elements (ppm)							Elements (%)		
		Cu	Co	Ni	Pb	Zn	Mn	Cr	Na_2O	K_2O	F
Soil											
1.	Chandidongri North mine area	27	11	20	815	206	434	153	0	4.62	0.776
2.	Chandidongri South, mine area	23	07	15	360	255	219	120	0	3.75	0.320
3.	Chandidongri South, cultivated field	16	11	25	287	69	276	164	0.30	1.98	0.098
4.	Chandidongri North, teak plantation area	10	09	12	20	24	278	132	0	2.50	0.120
5.	Chandidongri South, cultivated field behind factory	21	15	20	120	61	382	188	0	3.90	0.056
Silt											
6.	Chandidongri North, silt sample from mine pond area	20	17	28	210	61	459	178	0.11	3.39	0.092
Soil											
7.	Control soil sample from cultivated field of Jain School Vardhaman Nagar	25	22	49	32	46	578	231	0.64	4.47	0.051

In is clear that after the formation of the soil from rock, more uniform distribution of elements is achieved. pH is the most important factor to determine the solubility of fluorite in soil. Calcium is another important element which decides the soil toxicity. High calcium concentration in the soil reduces fluoride toxicity[11].

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