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LETTERS TO THE EDITOR

Comments on "Chemistry of monsoon rainwater at Delhi"

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Subramanian and Saxena (1980) report a weighted average (apparently, rainfall-weighted) sulfate ion concentration, $[SO_4^{2-}]$ of 58 p.p.m. for the area within 15 km radius of a coal-based thermal power plant in the Delhi City. They indicate that generally wet precipitation was collected. On the other hand, they, for some unspecified reason admit that their data suffer from limitations of sampling outlined by Galloway and Likens (1978). I would like to draw attention to a recent study on the rainwater composition in the Greater Bombay region during the 1974 monsoon (Sequeira, 1976a). Bulk precipitation was collected at 9 sampling points in a 300 km^2 area including two stations in the heart of a major industrial centre, Chembur-Trombay. The $[SO_4^{2-}]$ varied from ~1 p.p.m. at the unpolluted coastline to a maximum seasonal. weighted (rainfall-weighted) average of ~20 p.p.m. at Chembur tapering off sharply in neighboring areas. The representative weighted average for the entire Greater Bombay region was estimated to be 3.4 p.p.m. (Sequeira, 1976b). The value of 0.42 obtained by us for Delhi in our limited study of Indian rainwater during 1975 should not be compared with those obtained by the present authors since we had deliberately

Table 1. *The ion balance for precipitation from Delhi* (1978)*

Station No.	Date	Cations (+) μEq/L (ΣC)	Anions (−) μEq/L (ΣA)	Balance (±) μEq/L (B)	B/ΣA† (%)
	15 July	394	2476	−2082	84
1	16 Aug.	423	678	−255	38
	28 Aug.	398	753	−355	47
	15 July	363	1841	−1478	80
2	16 Aug.	357	930	−573	62
	28 Aug.	437	759	−322	42
	18 July	105	2077	−1972	95
3	16 July	186‡	583	−397	‡
	28 Aug.	442	452	−7	2
4	16 July	225	1897	−1672	88
	25 July	1277	2776	−2499	54
6	28 Aug.	324‡	1069	−745	‡
7	28 Aug.	510	1529	−1019	67

* Subramanian V. and Saxena K. K. (1980). (Partial data); $[H^+]$ negligible; $[PO_4]$ not considered due to uncertainty in valence.

† Negative sign omitted.

‡ K-data missing.

avoided sampling in polluted areas as we were interested in the country-wide pattern of salt deposition (Sequeira, 1976b; Sequeira and Kelkar, 1978) with minimal local influence. Besides, we operated one station in each area.

One finds a large cation deficit for the data of Subramanian and Saxena (cf. Table 1). The cation deficit would probably be even greater if nitrate had been considered. Nitrate is one of the major constituents in precipitation in industrialized areas. If the missing cations cannot be identified, the authors may want to look into the analytical methods they have employed for the reported ions particularly anions. (It must be mentioned here that the ion balance reported by me for Bombay (Table 5 of Sequeira, 1976a) cannot be compared with the balance shown in Table 1 reported here. The $[H^+]$ obtained was not always negligible. The same ion was deliberately omitted from ion balance calculations for the purpose of interpretation. Also, I did not analyze for HCO_3^- ion.) These Quality Control measures may be helpful in accounting for the unusually high anion excess obtained by the authors.

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