

Chemical composition and acidity of precipitation: A monitoring program in Northeastern Vietnam

Viet P.H., Tuan V.V., Hoai P.M., Anh N.T.K., Yen P.T.

Centre of Environmental Chemistry, Hanoi University of Science, 334-Nguyen Trai Street, Hanoi, Viet Nam; Institute of Hydrology and Meteorology, Lang Street, Hanoi, Viet Nam

Abstract: Rainwater has been sampled weekly from five sites (nos. 1-5) in northeastern Vietnam in the period of May 1997 to Apr. 2000 (except Hoabinh site, from Aug. 1999 to Apr. 2000). Since Aug. 1999, weekly dry deposition samples including acidic gas and aerosol have been additionally collected at Hanoi (no. 4) and Hoabinh (no. 5) using filter pack system. In general, the pH in rainwater was frequently higher than 5.0. However, the trend of lower pH was observed during the winter and the beginning of autumn (from Nov. to Apr.). Interestingly, the highest frequency of the acidifying rainwater (32 %) and the lowest pH value (min. pH = 4.0) were observed in Hoabinh site. Acidic pH of rain water was also observed in Viettri (no. 3) and Hanoi (no. 4), indicating the local effects of human and industrial activities. Ca^{2+} and SO_4^{2-} were generally found as predominant in both rainwater and aerosol. SO_2 and NH_3 in Hanoi and Hoabinh were monitored out of corresponding environmental features.

Author Keywords: Acidity; Chemical composition; Dry deposition; Northeastern Vietnam; Rainwater

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Correspondence Address: Viet, P.H.; Centre of Environmental Chemistry, Hanoi University of Science, 334-Nguyen Trai Street, Hanoi, Viet Nam; email: vietch@hn.vnn.vn

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Authors with affiliations:

1. Viet, P.H., Centre of Environmental Chemistry, Hanoi University of Science, 334-Nguyen Trai Street, Hanoi, Viet Nam
2. Tuan, V.V., Institute of Hydrology and Meteorology, Lang Street, Hanoi, Viet Nam
3. Hoai, P.M., Centre of Environmental Chemistry, Hanoi University of Science, 334-Nguyen Trai Street, Hanoi, Viet Nam
4. Anh, N.T.K., Institute of Hydrology and Meteorology, Lang Street, Hanoi, Viet Nam
5. Yen, P.T., Centre of Environmental Chemistry, Hanoi University of Science, 334-Nguyen Trai Street, Hanoi, Viet Nam

References:

1. (1997) Guidelines and Technical Manuals for Acid Deposition Monitoring Network in East Asia, , Anonymous Environment Agency, Government of Japan
2. Ayers, G.P., Yeung, K.K., (1996) Atmospheric Environment, 30, p. 1581
3. Charlson, R.J., Rodhe, H., (1982) Nature, 295, p. 683
4. Granat, L., Suksomsankh, K., Simachaya, S., Tabucanon, M., Rodhe, H., (1996) Atmospheric Environment, 30, p. 1589
5. Hayami, H., Carmichael, G.R., (1997) Atmospheric Environment, 31, p. 3429
6. Johnson, C.A., Sigg, L., Zobrist, J., (1987) Atmospheric Environment, 21, p. 2365
7. Samara, C., Tsitouridou, R., Balafoutis, C.H., (1992) Atmospheric Environment, 26 B, p. 359
8. Viet, P.H., Hoai, P.M., Trung, N.X., Nam, V.D., Composition and Acidity of Asian Precipitation (CAAP) (1998) Proceedings of the Forth Meeting of the IGAC/DEBITS Project., , Chulalongkorn University, Bangkok, Thailand
9. Wang, W., (1995) Water, Air and Soil Pollution, 85, p. 2295
10. Wang, W., Wang, T., (1996) Atmospheric Environment, 30, p. 4091
11. Yamaguchi, K., Tatano, A., Tsutomo, A., Tanaka, F., Nakao, M., Gomyoda, M., Hara, H., (1991) Atmospheric Environment, 25 A, p. 285

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