

A CONTRIBUTION TO THE PROBLEM OF STRONG
ACID DETERMINATION IN AIR

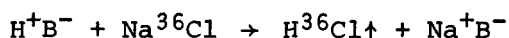
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ABSTRACT

The main indicator for acidic substances in the atmosphere is, now as before, the pH of rainwater. Factors influencing the acidity of precipitation are discussed, using results of air monitoring stations in Germany.⁶

These results seem to confirm the general assumption, that mainly sulphuric acid is responsible for the increase in atmospheric acidity. Only little information exists, however, on the concentration of sulphuric acid and other strong acids (HCl, HNO₃) in air. A few attempts have been made to solve this analytical problem, and the present situation in this field is briefly reviewed.^{1-3,5,7}

Finally a simple radiochemical thermodiffusion-procedure for the selective determination of strong acids is described. The basis of this technique is the reaction between a strong acid and sodium chloride, labelled with ³⁶Cl:



The reaction is carried out in an aqueous or partially aqueous medium at temperatures, at which the labelled hydrochloric acid is easily volatilized. The activity of the volatilized acid is proportional to the amount of protons of strong acids present in the sample.

Experimental details of this new method are presented as well as results of interference studies. The thermodiffusion technique can be applied to the analysis of precipitation and air-borne particulate matter. Its combination with a selective extraction² and a new sensitive sulphate-specific method⁴ makes possible the analysis of air samples for strong acids in total and for sulphuric acid separately.

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REFERENCES

- ¹Askne, C., and Brosset, C.: 1972, ATMOSPHERIC ENVIRONMENT 6, 695.
- ²Barton, S. C., and McAdie, H. G.: 1970, Proceedings of the Second International Clean Air Congress of the IUAPPA, Washington.
- ³Dubois, L., Baker, C. J., Teichmann, T., Zdrojewski, A., and Monkman, J. L.: 1969, MIKROCHIM.ACTA 1969, 269.
- ⁴Klockow, D., Denzinger, H., and Rönicke, G.: 1974, CHEMIE-INGENIEUR-TECHNIK 46, 831.
- ⁵Mudgett, P. S., Richards, W. L., and Roehrig, J. R.: 1974, in ANALYTICAL METHODS APPLIED TO AIR POLLUTION MEASUREMENTS (R. K. Stevens, W. F. Hergett), Ann Arbor Science Publ., Ann Arbor, Michigan, p. 85.
- ⁶Rönicke, G.: 1974, in Mitteilung IX der Kommission zur Erforschung der Luftverunreinigung, DIE pH-WERTE DES NIEDERSCHLAGES IN DER BUNDESREPUBLIK DEUTSCHLAND 1967-1972, Deutsche Forschungsgemeinschaft, Bonn.
- ⁷Scaringelli, F. P., and Rehme, K. A.: 1969, ANALYT. CHEMISTRY, 41, 707.