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USE OF A FLUORIDE-SELECTIVE ELECTRODE FOR THE DETECTION OF FLUORINATED COMPOUNDS IN AIR

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We first describe a device for the continuous analysis of a HF-contaminated atmosphere. HF is extracted from the air, using a washing vessel containing a small volume of a buffered acidic absorption solution at pH = 2.2; the resulting fluoride solution is continuously transferred into a measuring cell containing a fluoride-specific electrode.

An important factor affecting the detection limit of fluoride-selective electrodes is the concentration of interfering anions, especially the very mobile OH^- ions, present in the sample under measurement. On the other hand, the medium must not be too acidic because H^+ ions complex a fraction of F^- ions, leading to the undissociated HF acid or to HF_2^- . Moreover we noticed that the response time of the electrode increases with the pH. This effect must be taken into account for the adjustment of the pH of the solution to be used in a HF detector [1].

The same device is also used for the detection of inorganic fluorinated compounds which are hydrolyzed in the trapping solution. In addition, we have extended the method to other compounds, such as organophosphorus fluorides, for which F^- ions are released only in an alkaline medium. Thus, the device is somewhat modified since the pH of the alkaline absorption solution needs to be adjusted to a more acidic value just before streaming into the measuring cell. The sensitivity of the detector, towards organic phosphoro-fluorides, is comparable with that of a flame spectrophotometer. For both apparatus, the response is linear versus concentration .

The instrument was developed for automatic and continuous monitoring, during more than 15 hours, of concentrations of gaseous fluorides in the atmosphere. The detection limit is found to be equal to 7.5 ng/m^3 (250 times below the limit value recommended for the HF concentration in air to which workers may be exposed daily).

1 A. Dolegeal, D. Devilliers, G. Villard and M. Chemla, Analysis, 10 (1982) 377.