Internal Correspondence

dc J. W. McAllister

To E. D. Horne

From L. W. Anders

Subject Symposium on Sampling and Analysis of Toxic Material Found in the Environment

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3M

The D22 committee of the ASTM sponsors a symposium every two years on Sampling and Analysis of Toxic Materials found in the Environment. Colonel John Mazur of the U.S. Army is a session chairman for a session on Passive Monitoring Devices. He called indicating 3M had not submitted a paper for presentation at the symposium. Because all the other manufactures were on the program, he invited 3M to participate even though it is late and past the submission date. To accomodate our paper he would expand his Tuesday afternoon session from four to five papers. The symposium is August 3-5 and has always been held at University of Colorado in Boulder.

For the symposium, I think the most appropriate presentation would be to cover our protocol and technique for the documentation of the precision and accuracy of the sampling rates which are published in our new sampling and analysis guide. The abstract is attached.

L. W. Anders/eja

DOCUMENTATION OF SAMPLING RATES FOR THE 3M ORGANIC VAPOR MONITOR

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For diffusional sampling devices, the collection rate of the contaminant weight as defined by Fick's Law is dependent upon the concentration of the contaminant in the ambient atmosphere and a proportionality constant (DA/L) assuming $C_o = 0$.

$$W = \frac{DA}{L} (C-C_o) \qquad (1)$$

By combining the units for the diffusional coefficient (cm^2/min) for the contaminant, the geometric area (cm^2) and geometric length (cm) of the diffusional chamber, it can be observed that the proportionality constant has units of cubic centimeters per minute (cm^3/min) and therefore can be defined as a sampling rate (K).

$$K = \frac{DA}{L} \qquad (2)$$

For many contaminants, sampling rates have been empirically determined by measuring the rate of weight collection when sampling a laboratory challenge of known concentration. The empirical sampling rates are a linear function of the diffusion coefficients as calculated from the Hirschfelder Equation. The empirical sampling rate for each contaminant is shown to be constant when sampling from a known challenge as either a single component or as a component in a multicomponent mixture over concentration ranges from one-tenth to four times the permissible exposure level (PEL) at relative humidities ranging from less than 20% to 85%.