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Letter to the Editor

Detector temperature in electron capture detection

Sirs,

In a recent article, CASTELLO[1] described a unique and valuable application of the electron capture detector. Chlorinated compounds were detected at the parts per billion (p.p.b.)* level in breathing oxygen for pilots and for therapeutic purposes. However, the very important variable of the detector temperature was not specified or considered in the study. For certain compounds, the electron capture detector response is highly temperature dependent as pointed out by WENTWORTH AND CHEN[2]. In this particular case, the electron capture coefficients vary considerably with temperature for all the compounds except carbon tetrachloride. For example, the temperature of the detector in this study can be estimated to be 80° from the relative responses given by CASTELLO[1]. From data given by WENTWORTH AND CHEN[2] the detection limits can be calculated at different temperatures. In Table I the data from such calculations are presented for 227° and 350°. These temperatures are the upper temperature limits for the tritium and nickel 63 detectors, respectively. Note the dramatic increase in sensitivity for dichloromethane and dichloroethane as the temperature is increased to 350°.

TABLE I

PRACTICAL LIMIT OF DETECTION (PEAK AREA ABOUT 50 mm^2) AT MAXIMUM SENSITIVITY FOR 1 ml OF SAMPLE AT ATMOSPHERIC PRESSURE

Contaminant	*Detection limit (p.p.b.)*		
	80°	*227°*	*350°*
CCl_4	0.01	0.01	0.01
$CHCl_3$	1.0	0.10	0.05
CH_2Cl_2	1000.0	40.0	8.0
CH_2Cl–CH_2Cl	1000.0	20.0	1.0

Thus for maximum sensitivity, the maximum temperature should be used. It should be noted that this is true only for certain compounds, in this case, compounds which dissociate upon electron attachment. For other compounds, the reverse is true[2]. In conclusion, (1) it is suggested that wherever electron capture detector response data are given, the temperature of the detector must be specified, and (2) the optimum temperature for the analysis should be determined; in this analysis, the higher the temperature, the higher the sensitivity.

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1 G. CASTELLO, *J. Chromatogr.*, 58 (1971) 117.
2 W. E. WENTWORTH AND E. CHEN, *J. Gas Chromatogr.*, 4 (1967) 170.

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* Throughout this article the American p.p.b. (10^{-9}) is meant.