

METHOD 8261: USING SURROGATES TO MEASURE MATRIX EFFECTS AND CORRECT ANALYTICAL RESULTS

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The Environmental Protection Agency's Office of Research and Development has developed a vacuum distillation method to determine volatile organic compounds in difficult matrices. With the understanding that such a method would be intended for use by both the Superfund and RCRA Programs with a need to establish data quality, a novel approach to optimize QA requirements is incorporated. The resultant method (SW-846 Method 8261, Update IVB) uses surrogate compounds representing the range of chemical properties of the method's analytes in order to measure matrix effects and to compensate for their biases. Method 8261 eliminates the need for matrix spike/matrix spike duplicates as well as calibration of instrumentation by matrix type. This poster presents the theory behind the surrogate corrections incorporated within the method.

There are primarily three main chemical properties of volatile organic compounds that define their behavior and recovery during vacuum distillation. These properties are the compounds' vapor pressure (measured as boiling point, BP), partition coefficient between air and water (K_{aw}), and partition coefficient between an organic phase and air (K_{ao}). By adding surrogate compounds to measure recoveries as a function of these properties, the impact of any matrix (e.g., biota) on recovery of analytes is predicted. The measurement of matrix effects by sample eliminates the need for matrix spike/matrix spike duplicates as well as the need to calibrate instrumentation by matrix (i.e., Method 5030 for water and Method 5035 for soil).

The impact of Method 8261 corrections allows for an expanded list of analytes that include the volatile organic compounds (VOCs), polar compounds such as dioxane and pyridine, the nitrosamines and aniline, and compounds that are considered semi-volatile such as naphthalene. With the streamlining of analytical requirements and expanded analyte list, the productivity of using Method 8261 is greatly superior to alternative methods.

The measurement of matrix effects by sample simplifies the review of Method 8261 analytical data. The relationship of the chemical properties (BP, K_{aw} , and K_{ao}) to recovery are displayed graphically. The mysterious and dubious "matrix effects" disclaimer provided by other methods when an analysis does not perform as anticipated is not a hindrance to Method 8261. Extreme matrix effects are accurately compensated. Additional use of "check" surrogates allows the evaluation of matrix corrections effectiveness. Examples of data and graphic presentations for review are presented.

Notice

The U. S. Environmental Protection Agency (EPA) through its Office of Research and Development (ORD), funded this research and approved this abstract as a basis for a poster presentation. The actual presentation has not been peer reviewed by EPA. Mention of trade names or commercial products does not constitute endorsement or recommendation by EPA for use.