TVOCs

An important parameter for interpretation is TVOCs and is found in various forms at the bottom of each run in the Report of Analysis:

a) TVOCs (Toluene) is the total ion chromatogram (TIC) area calculated by macro software with the response factor (RF) of Toluene or d_8-Toluene. The relationship Tol/d_8-Tol is 0.9193 or the reciprocal 1.0879 which is also used to convert previously established response factors.

b) TVOCs (Toluene) ≥ C10 is the total ion chromatogram (TIC) area eluting after Decane calculated manually with RF Toluene or d_8-Toluene. It is a useful and reasonable estimate of the paraffin, isoparaffin and higher boiling substituted benzene concentration associated with naphthas, mineral spirits and odourless mineral spirits consisting of many poorly defined branched hydrocarbon isomers. Such petroleum hydrocarbons exhibit RFs within 30% of RF Tolulene.

c) TVOCs (Quantified) is the sum by macro software of concentrations in the Report of Analysis which are quantified using individual chemical Toluene response factors (TRFs). Chemical TRFs are established using standards and span a known concentration range. Sample concentrations in excess of the standard range need to be diluted since very elevated chemical concentrations result in saturated (truncated) ion peaks that cannot be quantified directly.

d) Molhave-Clausen TVOCs (Toluene) uses an approach recommended by these European researchers but somewhat broader in scope for the range of VOCs included. It is the sum by macro software of TVOCs (Quantified) plus TVOCs (Toluene) not included in the Report of Analysis and represents a more complete a more complete total volatile component (analogous to the sum S_{id} and S_{um} TVOC value).

Recommended Procedure for Measurements of TVOC

In their Indoor Air'96 paper, Molhave and Clausen describe a procedure recommended for measuring TVOC from the European Collaborative Action Work Group 18 (chaired by Molhave). The steps in the procedure are as follows:

1. Use Tenax GC or Tenax TA for sample collection.

2. Use a non-polar GC column for analysis (column polarity index of <10). The system must permit a detection limit corresponding to three times the noise level for toluene and 2-butoxyethanol of less than 0.5 and less than 1 $\mu g/m^3$, respectively.

3. Consider only the compounds found in the part of the chromatogram from n-hexane to n-hexadecane. In this procedure, the WHO definition has been slightly modified by replacing the range of boiling points by a definition of the "analytical window" in terms of the two specific reference compounds.

4. Based on individual calibration, quantify as many VOC as possible, but at least those contained in a list of known VOC pollutants of special interest and those representing the 10 highest peaks. Calculate the combined concentration S_{id} of these (mg/m^3). A list of compounds of interest is supplied in the report (EC-WG13 1996: The use of TVOC as an indicator in IAQ investigations. Report of working Group 13 of European Collaborative Action on Indoor Air Quality and its Impact on Man, JRC, Ispra Italy.).

5. Determine C_{um} (mg/m^3) of unidentified VOC using response factor of toluene.

6. An acceptable level of edification has been achieved if S_{id} exceeds three times S_{um}.

7. The sum S_{id} and S_{um} is called the TVOC concentration or TVOC value.