

KORY'S GC TECK-TIPS

Environmental Semi-Volatiles Analysis

Synonyms: EPA Method 8270D, Semi-VOA, BNA, EPA 525, EPA 625, SVOA

This analysis is one of the most common environmental analyses. It is a catch-all method for semi-volatiles that contains a wide variety of analytes that include bases, acids, neutrals, pesticides, phthalates, etc. Analyte lists typically have a minimum of 80 compounds but can range into the hundreds when adding optional Appendix compounds. Because of the complexity of the sample and probability of chromatographic co-elutions, this analysis is run by GC-MS because the MS is necessary to identify and verify chromatographically co-eluting compounds.

A sample is usually extracted from the matrix using a Liquid-Liquid extraction, ASE (Automated Solvent Extraction), or SPE depending on the matrix. Because of the wide variety of compounds, the extraction technique cannot be very selective and it is common that many contaminants are also extracted into the sample. The co-extracted contaminants will build up in the system and on the column requiring regular maintenance of the inlet as well as the column. Because of this, liners can be changed daily and column lifetime is typically short.

Before any samples can be run, a system suitability mix has to be passed. This mix contains some of the worst performing compounds from the method like Pentachlorophenol (acid), Benzidine (base), and DDT (pesticide), as well as DFTPP which is an inert standard used to measure performance of the MS. The response of the Pentachlorophenol, Benzidine, and DDT has to be sufficient before further analysis can begin. If responses are not sufficient, system maintenance needs to be performed to improve response of these compounds.

The method uses six deuterated PAH compounds as internal standards and calibration curves range from ~1 to 500 ppm *after* extraction, clean-up, and /or concentration of the samples. The middle concentration calibration sample is also re-run at regular periods as a Continuing Calibration Check (CCC) to verify the expected response of the system. If the response of the CCC is off by more than 15%, the calibration curve needs to be run again.

Because of the MS, any chromatographic co-elutions may be separated using the MS. The only separation requirements of the method are that analytes with similar masses need to be separated chromatographically or they have to be quantitated as one combined peak. One pair of isomers that are particularly problematic is Benzo[b]fluoranthene and Benzo[k]fluoranthene. This separation is best on a 5% phenyl column and is both flow and temperature dependant so any variance from the recommended conditions may sacrifice resolution.

Below are some commonly recommended applications that include chromatographic conditions as well as identification of analytes. Larger ID columns tend to offer higher calibration ranges while the smaller IDs provide faster separation and better detection at lower concentrations. The 20x0.18x0.32 dimension is a good choice for both fast analysis as well as sample capacity.

Recommended Normal Dimensions

ZB-5ms 30x0.25x0.25 – Application ID 14953

ZB-5MSi 30x0.25x0.25 – Application ID 16413

Recommended Fast GC Dimensions

ZB-5ms 20x0.18x0.18 – Application ID 15695

ZB-5ms 20x0.18x0.32 – Application ID 15696

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