Natural-matrix and Solution Standard Reference Materials for the Determination of Nitro-PAHs

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A suite of Standard Reference Materials (SRMs) are available for the determination of nitro-PAHs. These are available as both natural matrix materials and as solutions. The most recently developed natural matrix material is SRM 1650b, Diesel Particulate Matter. This SRM consists of actual diesel particulate matter that is representative of particles emitted from four-cycle, diesel fueled engines operated over a variety of conditions. SRM 1650b is intended to replace its predecessor SRMs: SRM 1650 (originally issued in 1985 and updated in 1991) and SRM 1650a (issued in 2000). SRM 1650b has been prepared from the same bulk diesel particulate matter used for the preparation of its predecessors. This has been confirmed by extensive analyses of SRM 1650b, results from which confirmed that the concentrations of PAHs and nitro-PAHs had not changed. It has been bottled in units of 100 mg and analyzed using multiple methods of analysis to provide a range of certified and reference values for PAHs, alkyl-PAHs, and nitro-PAHs. The nitro-PAH determinations are the focus of this talk.

Historically, in addition to PAHs, SRMs 1650 and 1650a were characterized for selected nitro-PAHs. However, only one compound had a certified concentration value (1-nitropyrene) and a limited number of compounds (two for SRM 1650 and only four for SRM 1650a) were listed as information values. Results from the analyses of SRM 1650b in its newly bottled state have been used to assign new certified and reference concentration values with an effort to increase the number of PAHs and nitro-PAHs with concentration values assigned relative to those in SRMs 1650 and 1650a. SRM 1650b has certified concentration values for 6 nitro-PAHs and an additional 16 nitro-PAHs have reference concentration values.

SRM 1650b complements two other diesel particulate-related SRMs that are currently available: SRM 2975, Diesel Particulate Matter (Industrial Forklift) and SRM 1975, Diesel Particulate Extract, the latter is a dichloromethane extract of the same material used to prepare SRM 2975. Both of these SRMs are characterized PAHs and nitro-PAHs. For example, SRM 1975 provides reference concentration values for 18 nitro-PAHs. Two air particulate SRMs are also characterized for nitro-PAHs: SRMs 1649a (Urban Dust) and 1648 (Urban Particulate Matter). The identification and quantification of 28 nitro-PAHs has resulted in the reporting of a range of reference values for nitro-PAHs in these air particulate matter SRMs. In addition, SRM 1649a has been used as a control material in selected interlaboratory comparison studies focused on the determination of the concentrations of organic contaminants in air particulate matter. The target analytes in these studies include nitro-PAHs and results from several laboratories have been used to evaluate the nitro-PAH content of SRM 1649a further. In support of these interlaboratory comparison studies, newly developed solution SRMs are additionally available for the determination of nitro-PAHs. SRMs 2264 and 2265 are mixtures of 11 and 16 nitro-PAHs, respectively, at levels ranging from about (2 to 5) microgram/g.