NIST's New Standard Reference Material for Organic Contaminants in House Dust

House dust is a repository for pesticides, flame retardants, and other chemicals used indoors and tracked into the house from outdoors. Once indoors where they are protected from environmental degradation, pollutants associated with dust persist for long periods, particularly if the dust is embedded in carpets. NIST has produced two house dust SRMs certified for these contaminants.

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A variety of chemical contaminants reside in house dust. Pesticides become associated with house dust primarily through interior use of pest control formulations, intrusion of vapors from foundation and crawl space treatments, and track-in of lawn and garden chemicals. Polycyclic aromatic hydrocarbons (PAHs) derive from indoor sources such as combustion, cooking, and smoking, as well as track-in of contaminated yard soil or residues from garage floors. Flame retardants, such as polybrominated diphenyl ethers (PBDEs), are commonly applied to many products found within homes (e.g., TVs, computers, furniture, carpets, etc.).

NIST has produced two house dust SRMs for lead and other trace elements (SRM 2583 Trace Elements in Indoor Dust, Nominal 90 mg/kg Lead and SRM 2584 Trace Elements in Indoor Dust, Nominal 1 % Lead). A third new house dust material, SRM 2585 Organic Contaminants in House Dust is intended for use in evaluating analytical methods for the determination of selected PAHs, polychlorinated biphenyl (PCB) congeners, chlorinated pesticides, and PBDE congeners in house dust and similar matrices [1].

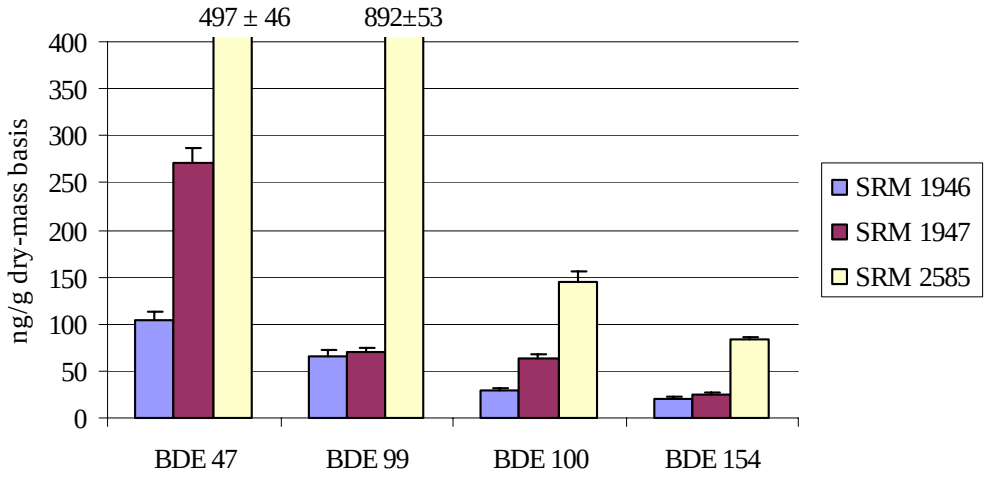
A total of 63 PAHs, 43 PCB congeners, 13 pesticides, and 18 PBDE congeners were value assigned with certified and reference values for the individual compounds using the results from two to six analytical methods. The concentrations of the individual PAHs range from approximately 20 ng/g to 4500 ng/g; concentrations for the PCB congeners range from approximately 2 ng/g to 40 ng/g; concentrations for the pesticides range from approximately 4 ng/g to 300 ng/g; and concentrations for the PBDE congeners range from approximately 4 ng/g to 2500 ng/g (***see figure***). The relative uncertainties of the certified and reference concentration values range from <1% to 30% with most of the uncertainties less than 10%.

Impact: SRM 2585 is one of the first matrix reference materials available with values assigned for PBDE congeners, an emerging class of contaminants [2].

The Centers for Disease Control and Prevention (CDC) has noted that the levels of brominated diphenyl ether congeners (PBDEs) in human blood have been increasing over the last decade. This new SRM will aid in the development of new analytical methods for the determination of current and emerging contaminants in the home.

SRM 2585 is intended for use as a control material for the determination of environmental contaminants in house dust and related matrices and may also be useful for the development of analytical methods for emerging contaminants and other classes of compounds, including personal care products [3].

Concentrations of PBDEs in SRM 2585 Organic Contaminants in House Dust compared to those in SRM 1946 Lake Superior Fish Tissue and SRM 1947 Lake Michigan Fish.



Future Plans: The stability of the PBDE congeners in SRM 2585 will be monitored closely, particularly the concentration of the decabrominated congener that may degrade over time.

References:

[1] Poster, D. L., Kucklick, J. R., Schantz, M. M., VanderPol, S. S., Leigh, S. D., and Wise, S. A., ***"Development of a House Dust Standard Reference Material for the Determination of Organic Contaminants,"*** submitted to Environ. Sci. Technol. (2006).

[2] Stapleton, H. M., Keller, J. M., Schantz, M. M., Kucklick, J. R., Leigh, S. D., and Wise, S. A., ***"Determination of Polybrominated Diphenyl Ethers (PBDEs) in Environmental Standard Reference Materials,"*** submitted to Anal. Bioanal. Chem., 2006).

[3] Peck, A.M., Kucklick, J.R., Schantz, M.M., ***"Synthetic musk fragrances in environmental Standard Reference Materials,"*** Anal. Bioanal. Chem., published on-line Aug 2006.