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New Method for Monitoring Toluene Diisocyanates in Air, Using ORBO-80 Filters and HPLC

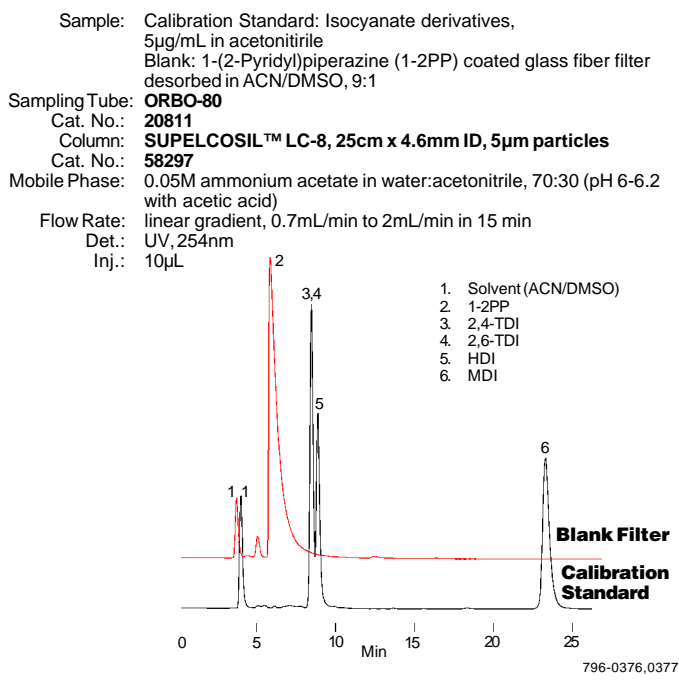
I. DeGraff

Supelco, Bellefonte, PA USA

Toluene diisocyanates, highly toxic compounds used in many manufacturing processes, must be stabilized when collected in air samples. An ASTM method has been developed for monitoring 2,4- and 2,6-toluene diisocyanates in air, using ORBO-80 filters and HPLC analysis. The ORBO-80 coated filter demonstrates reproducibility and stability in the collection of diisocyanates.

Toluene diisocyanates (TDIs) are reactive, highly toxic compounds used in the manufacture of polyurethane foams, coatings, and elastomers. To collect TDIs onto an air sampling device, a derivatizing reagent must be used for stabilization. A new American Society for Testing and Materials (ASTM) method, *D5836, Standard Test Method for Determination of 2,4-Toluene Diisocyanate (2,4-TDI) and 2,6-Toluene Diisocyanate (2,6-TDI) in Workplace Atmospheres (1-2PP Method)*, in addition to OSHA method 42, cites the use of an ORBO™-80 filter for sampling these compounds (1,2). The ORBO-80 filter is a 37mm glass fiber filter coated with 1mg of 1-(2-pyridyl)piperazine (1-2PP), which stabilizes the TDIs.

Figure A. Isocyanates by ASTM D5836



According to this new ASTM method, samples are collected on an ORBO-80 filter and extracted with acetonitrile/dimethylsulfoxide (9:1). The sample extracts are analyzed by reversed phase HPLC with UV or fluorescence detection. The validated range of the method is 1.4-5.6µg TDI or 9.8-39ppb, based on a 20L air volume. Figure A illustrates the ability to analyze TDIs, as well as 1,6-hexamethylene diisocyanate (HDI) and methylene bisphenyl isocyanate (MDI), in the same analysis.

ORBO-80 filters feature low background, as evidenced in the blank filter run in Figure A. They have been evaluated to demonstrate appropriate linearity, recovery, stability, and background levels. These filters are available in a kit, unassembled, to prolong stability under refrigeration. After 6 months of storage in a sealed jar at 4°C, there were no signs of degradation or loss of 1-2PP or contamination of the ORBO-80 filter.

Ordering Information:

Description	Cat. No.
ORBO-80 Kit Contains 25 each of coated filters, support pads, sealing bands, and cassettes (unassembled)	20812-U
ORBO-80 Glass Fiber Filters, pk. of 25	20811
SUPELCOTM LC-8 HPLC Column, 25cm x 4.6mm ID, 5µm particles	58297
Isocyanate 1-2PP Derivative Standards Each solution consists of 1000µg/mL in 1 mL dimethylsulfoxide.	
2,6-TDI Derivative: 2,6-bis(4-(2-Pyridyl)-1-piperazinylcarbonyl) toluene	48144
2,4-TDI Derivative: 2,4-bis(4-(2-Pyridyl)-1-piperazinylcarbonyl) toluene	48145
1,6-HDI Derivative: 1,6-bis(4-(2-Pyridyl)-1-piperazinylcarbonyl) hexane	48146
4,4'-MDI Derivative: 4,4'-bis(4-(2-Pyridyl)-1-piperazinylcarbonyl) diphenyl methane	48147

References

- Annual Book of ASTM Standards, Vol. 11.03, 1996.
- Method 42, OSHA Analytical Methods Manual, Occupational Safety & Health Administration, Salt Lake Technical Center, Salt Lake City, Utah.

References not available from Supelco.

Request publication 394031, *Monitor Airborne Diisocyanates Using ORBO-80 Coated Filters*, for more information.

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