

National Bureau of Standards

Report of Investigation

Research Material 8410

Asbestos Research Filter

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This Research Material (RM) can be used in developing and refining sample preparation and analysis procedures for determining asbestos in ambient air samples. RM 8410 is useful in training personnel in the preparation of polycarbonate filters as detailed in the Environmental Protection Agency's method for analysis of asbestos in air (1), and training personnel in the operation of the electron microscope for asbestos analysis.

RM 8410 consists of a strip of polycarbonate filter (16mm x 4mm) containing low loading of chrysotile asbestos, less than 20 fibers per 0.01mm^2 of filter area.

Material Preparation

The air particulate matter used in the preparation of RM 8410 was Standard Reference Material (SRM) 1648, Urban Air Particulate. SRM 1648 closely mimics, in appearance and composition, air samples collected in the field. It contains chrysotile asbestos as well as a trace amount of amphibole asbestos.

The Urban Air Particulate (SRM 1648) was dispersed in water and filtered through a $0.4\ \mu\text{m}$ polycarbonate filter. The filter was then coated by vapor deposition with approximately 30 nm of carbon. It was then divided into 16mm x 4mm strips.

Fiber Counts

The verified fiber counts for the 23 filter sections, as well as the area of the filter analyzed are listed in Table 1. The procedure for verified counting is described by E. B. Steel et al (2). The verified counts in Table 1 represent the best estimate of the number of fibers and are approximately 15% higher than the count from an average operator.

The average fiber loading for the 23 grid openings counted is 7.9 fibers per $0.01\ \text{mm}^2$ area of filter. The standard deviation of a single measurement for the 23 measurements is ± 3.7 fibers.

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TABLE 1
Counting Results for Research Material

<u>Filter Section</u>	<u>Verified Count</u>	<u>Filter Area Analyzed in (0.01mm²) units</u>
01	5.0	0.861
02	7.0	0.885
03	5.0	0.909
04	2.0	0.956
05	6.0	0.933
06	2.0	0.969
07	4.0	0.812
08	3.0	0.915
09	10.0	0.903
10	8.0	0.880
11	11.0	0.963
12	6.0	0.812
13	9.0	0.880
14	8.0	0.921
15	16.0	0.885
16	5.0	0.799
17	8.0	0.947
18	5.0	0.760
19	12.0	0.880
20	6.0	0.885
21	10.0	0.897
22	7.0	0.897
23	5.0	0.812

Instructions for Preparing and Counting Filter Section

The preparation of RM 8410 filter sections should follow the procedures outlined in the EPA publication Electron Microscopy Measurement of Airborne Asbestos Concentrations: A Provisional Methodology (1). Because the filter sections are already coated with carbon, the procedure should start with section 2.4 page 9.

Additional carbon may be deposited on the filter section if necessary. In this case, the procedure in reference 1 should be followed.

If the laboratory temperature is below 19 degrees Celsius a heat lamp placed approximately 30 cm from the Jaffe Wick container may aid in filter dissolution.

The counting and analysis of the asbestos fibers should follow the protocol in the reference 1.

When EPA issues a final method for the electron microscopy analysis of airborne asbestos, that document will supersede reference 1 for both preparation and analysis.

1. A.V. Samudra, C.F. Harwood, J.D. Stockman, Electron Microscope Measurement of Airborne Asbestos Concentrations: A Provisional Methodology Manual, EPA report 600/2-77-178, Environmental Protection Technology Series, available through NTIS Springfield, Va. 22161, 1978.
2. E.B. Steel, J.A. Small, P.W. Sheridan, Analytical Errors in Asbestos Analysis by Analytical Electron Microscopy, NBS Special Publication 619 Asbestos Standards: Methods and Materials, 1982, pp 171-178.