# New Instruments and Technics

## A MODIFIED AIR SAMPLER EMPLOYING FIBERGLAS®

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Although glass wool has previously been used as a filtering medium for air sampling to determine air-borne particulate matter, the equipment employed has not been entirely satisfactory for industrial use. The Crismon dust sampler [1] is used for a gravimetric determination of dust. It contains metal parts and would not be acid resistant. Keenan and Fairhall [2] developed a glass wool filter to establish the relative efficiency of the impinger and the electrostatic precipitator, but it is not practical for field work. Our modified sampler employs glass wool, with a controlled packing density. It is acid resistant, will retain fumes as well as dust, and is not cumbersome.

Several shapes of tubes were tried out. The one adopted gave the air flow desired and permitted easy recovery of the fumes, was rugged, yet light in weight, and could readily be connected to a vacuum pump. A definite weight of glass wool (fiberglas®), packed to a certain density, was found necessary to give the filtering efficiency desired and allow for a reasonable factor of safety.

The modified sampler is simple, inexpensive and can be assembled from equipment easily available. Two porcelain filter plates—size 4—are ground down to fit a filter tube–crucible holder, inside diameter 25 mm. A size 4 filter plate was chosen because the perforations are 1 mm. in diameter, which will permit the desired air flow. The filtering medium is pyrex® brand wool filtering fiber, catalogue no. 800, a product of the Owens-Corning Fiberglas Corporation and made for the Corning Glass Works at Corning, N. Y. The fibers are of near microscopic fineness (diameter, approximately 0.0002 in. to 0.0003 in.) and are strong, resilient, soft and pliable. They are manufactured from a borosilicate glass containing no heavy metals. This pyrex® wool is free from organic matter and can be tightly packed to offer excellent filtering efficiency. It is obtainable from chemical supply houses.

Three grams of this glass wool is tightly packed between two filter plates within the filter tube. The air inlet consists of a flared glass tube. A cork is so adjusted on this tubing that when it is seated in the filter tube, the flared end of the air inlet compresses the fiber to approximately 24 mm. This will give a packing density of about 0.26 cm. per cubic centimeter. When assembled in the above manner, illustrated in figures 1 and 2, the air flows through the sampler at a rate of approximately 1 cu. ft. per minute at a vacuum of 5 in. (127 cm.) of mercury.

The efficiency of the new sampler was determined by taking air samples of varying concentrations of freshly prepared ammonium chloride fumes. These fumes were produced in two ways—by heating the salt in a casserole on a hot plate and by mixing ammonia and hydrochloric acid gases. The air samples were taken in the laboratory hood directly in the path of the fumes. Sampling was accomplished within one or two seconds after the fumes were produced. The exhaust fan on the hood was operating continuously. The tests were run by placing the improved sampler in series with, and ahead of, a sampler employing no. 50 Whatman filter paper.[3] The chloride determinations were made by titration; using a 0.01 normal silver nitrate solution with a chromate indicator. The results of these tests are given in table 1.

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From the Aetna Casualty & Surety Company.

1. Farr, R. S.; Pauley, W. N., and Crismon, K. A.: An Improved Test Method for Rating Air Filters, Am. Soc. Heat. & Ventil. Engin., Journal Section, Transactions, Feb. 1948, p. 1.

2. Keenan, R. G., and Fairhall, L. T.: The Absolute Efficiency of the Impinger and of the Electrostatic Precipitator in the Sampling of Air Containing Metallic Lead Fume, J. Indust. Hyg. & Toxicol. **26**:241 (Sept.) 1944.

3. Silverman, L., and Ege, J. F., Jr.: A Filter Paper Method for Lead Fume Collection, J. Indust. Hyg. & Toxicol. **25**:185 (May) 1943.