

SIZE DISTRIBUTION OF MOLECULAR SIEVE PARTICLES

UOP Method 437-81

SCOPE

This method is for determining the size distribution of molecular sieve particles by screening through appropriate U.S.A. Standard Series testing sieves.

OUTLINE OF METHOD

A representative 50-mL sample is placed on the top of a nest of appropriate mesh size, 8-inch diameter sieves with a bottom pan. The nest is covered, placed in a sieve shaker and shaken for 15 minutes. The material retained on each sieve and in the pan is weighed to the nearest 0.1 g. The weight-percent of material retained on each sieve and in the pan is then calculated.

APPARATUS

Balance, triple-beam, 0.01 g sensitivity, available from Sargent-Welch Scientific Co., or equivalent

Brush, 2-inch wide, paint brush, with nylon or natural bristles cut to 1-inch length, or equivalent

Riffler, Sepor “Micro-Splitter”, designed for sample volumes of one liter or less, available from Sepor Laboratory Supply, or equivalent apparatus

Sieves, 8-inch diameter, U.S.A. Series Nos. 16, 20, 30, 40, 50 and 60 including top cover and two bottom pans (ASTM E-11 Specification), available from W.S. Tyler, Inc., or equivalent

Sieve-shaker, W.S. Tyler “Ro-Tap”, with timer, available from W.S. Tyler, Inc., or equivalent

PROCEDURE

Nest the six sieves according to mesh size with the finest mesh sieve on the bottom pan. Place approximately 50 mL of a carefully riffled sample on the top, No. 16, sieve. Place the covered sieves in the sieve shaker which should be firmly attached to the floor and adjust the shaker to hold them properly. Shake for 15 minutes and then remove the sieves from the shaker. Carefully dump the material retained on the No. 16 sieve into a spare bottom pan by inverting the sieve over the pan. Brush the underside of the sieve to remove material lodged in the mesh. Weigh the collected material to the nearest 0.1 g and record as the weight of material retained on the No. 16 sieve. Repeat this procedure for each of the other five sieves and then obtain the weight of the material in the bottom pan.

IT IS THE USER'S RESPONSIBILITY TO ESTABLISH APPROPRIATE PRECAUTIONARY PRACTICES AND TO DETERMINE THE APPLICABILITY OF REGULATORY LIMITATIONS PRIOR TO USE. EFFECTIVE HEALTH AND SAFETY PRACTICES ARE TO BE FOLLOWED WHEN UTILIZING THIS PROCEDURE. FAILURE TO UTILIZE THIS PROCEDURE IN THE MANNER PRESCRIBED HEREIN CAN BE HAZARDOUS. MATERIAL SAFETY DATA SHEETS (MSDS) OR EXPERIMENTAL MATERIAL SAFETY DATA SHEETS (EMSDS) FOR ALL OF THE MATERIALS USED IN THIS PROCEDURE SHOULD BE REVIEWED FOR SELECTION OF THE APPROPRIATE PERSONAL PROTECTION EQUIPMENT (PPE).

CALCULATIONS

Calculate the weight-percent retained on each sieve as follows:

$$\text{Amount on sieve, wt - \%} = \frac{A}{B} 100$$

where:

A = material on a given sieve, g

B = total material recovered, g

REPORTING RESULTS

Report results as follows:

Particle Size of molecular sieves, wt-%

Retained on U.S.A. No. 16

Through U.S.A. No. 16, on U.S.A. No. 20

Through U.S.A. No. 20, on U.S.A. No. 30

Through U.S.A. No. 30, on U.S.A. No. 40

Through U.S.A. No. 40, on U.S.A. No. 50

Through U.S.A. No. 50, on U.S.A. No. 60

Through U.S.A. No. 60

PRECISION

Based on five replicate determinations, the estimated standard deviations (esd) were calculated and are shown in the following table.

Duplicate results should not differ by more than the allowable difference indicated (95% probability).

Fraction Retained	wt-%	esd, wt-%	Allowable Difference, wt-%
On U.S.A. No. 20	8	0.72	2.82
On U.S.A. No. 30	51	1.63	6.39
On U.S.A. No. 40	29	1.08	4.23
On U.S.A. No. 50	10	0.77	3.02

TIME FOR ANALYSIS

The elapsed time for one analysis is 0.92 hour. The labor requirement is 0.75 hour.

SUGGESTED SUPPLIERS

Sargent-Welch Scientific Company, 7300 N. Linder Ave., Skokie, IL 60076
 Sepor Laboratory Supply, P.O. Box 1252, 718 N. Fries, Wilmington, CA 90744
 W.S. Tyler, Inc., 8200 Tyler Boulevard, Mentor, OH 44060