Pharmaceutical Development and Technology

ISSN: 1083-7450 (Print) 1097-9867 (Online) Journal homepage: informahealthcare.com/journals/iphd20

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To cite this article: Robert A. Nash (1997) A Relationship Between Screen Opening and Mesh Size for Standard Sieves, Pharmaceutical Development and Technology, 2:2, 185-186, DOI: 10.3109/10837459709022624

To link to this article: https://doi.org/10.3109/10837459709022624

Pharmaceutical Development and Technology, 2(2), 185–186 (1997)

LETTER TO THE EDITOR

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Received July 16, 1996; Accepted November 27, 1996

Sieving is the most widely used method for measuring particle size distribution because it is inexpensive, simple, and rapid, with little variation between operations. The normal lower limit is 0.050 mm but may be extended to 0.010 mm by wet sieve techniques.

A sieve consists of a pan with a bottom of wire cloth with square openings. In the United States there are two standards for sieves. In the Tyler Standard Scale, the ratio of the width of openings in successive sieves is related to the fourth root of 2. The Tyler Standard Scale is based on the size of opening (0.0029 in. or 0.074 mm) in a wire cloth having 200 openings per inch, that is, 200 mesh. The U.S. Standard Scale proposed by the National Bureau of Standards in general uses the ratio, square root of 2, but it is based on an opening of 1 mm, that is, 18 mesh [J. W. Mullin, Sieving of Pharmaceuticals, in *Encyclopedia of Pharmaceutical Technology,* Vol. 14 (J. Swarbrick and J. C. Boylan, eds.), Marcel Dekker, New York, 1996, pp. 63–85].

For most purposes, screens from two series may be used interchangeably, but the number designations are different in some cases. With respect to pharmaceutical

Table 1

The Relationship Between Screen Opening and Mesh Size for Various Standard Sieves

		Screen Opening[b] (mm)			
Mesh Size[a]	Equation	U.S. Stand.	Tyler	USP	Br. Stand.
2	9.95	9.52	—	9.50	—
4	4.75	4.76	4.70	4.75	4.00
8	2.27	2.38	2.36	2.36	2.00
12	1.47	1.68	1.40	1.70	1.40
16	1.08	1.19	0.991	1.18	1.00
20	0.855	0.840	0.833	0.850	—
30	0.555	0.590	—	0.600	0.500
40	0.408	0.420	—	0.425	—
60	0.265	0.250	0.246	0.250	0.250
80	0.195	0.177	0.175	0.180	—
100	0.154	0.149	0.147	0.150	0.150
200	0.073	0.074	0.074	0.075	0.075
325	0.044	0.044	0.043	0.045	—
400	0.035	0.037	0.038	0.038	0.038

[a]Number per inch.

[b]U.S. Stand., United States Bureau of Standards, Washington, DC; Tyler Screen Scale Equivalent and recognized by the American Society for Testing and Materials (ASTM), West Conshohocken, PA; USP, United States Pharmacopoeia 23, USP Convention, Rockville, MD, p. 1823 (also conforms to ASTM E11-70 and ISO 565 Standards); Br. Stand., British Standards Institution, London, U.K.

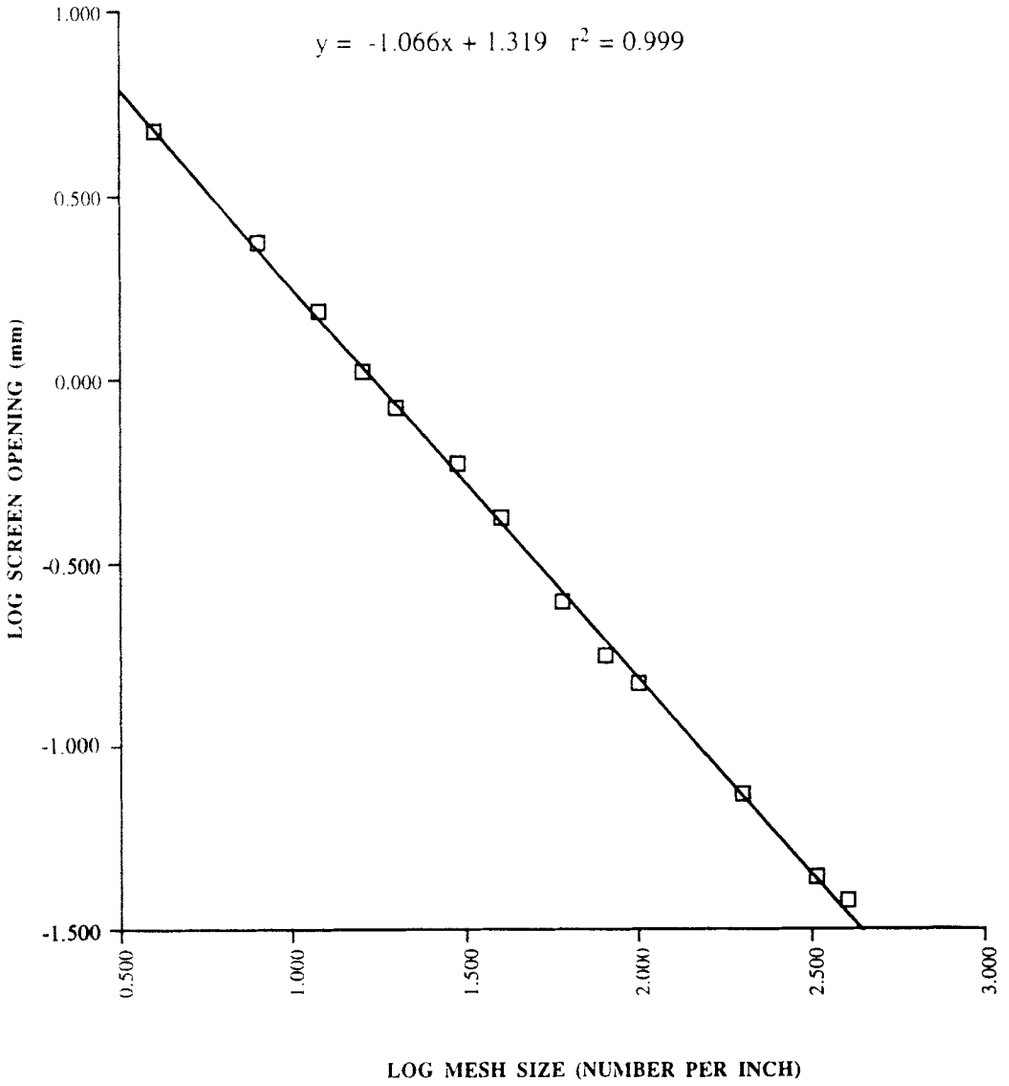

Figure 1. A log-log plot of the relationship between screen opening and mesh size for standard sieves.

solids, sieving is usually the method of choice for classifying granulations and coarse grades of excipients. It is used for particle size analysis and in most cases the analysis can be carried out in the dry state.

When one compares mesh size to screen opening in millimeters as listed in Table 1, there is a linear relationship between the two when a log-log plot is constructed (see Fig. 1) using the USP, Tyler, and U.S. Standard data reported in Table 1.

The following empirical equation was derived from such a plot:

$$\text{Screen opening (mm)} = \frac{20.84}{\text{mesh size}^{1.066}}$$

In the plot the y intercept equals 20.84 mm and the negative slope approximates -1.066. Thus a mesh size of unity (1 in.) would have an opening of 20.84 mm and a nominal wire diameter of 4.56 mm.

The difference in screen opening between the values calculated using the empirical equation and those reported in Table 1 are less than 10% with the exception of 12 mesh size where the difference approaches 15%.

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