

Tips

A quick and easy formula for mesh-micron particle size conversions

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This tip explains how you can use a simple formula to convert particle size from units of mesh to microns — or vice versa — without a conversion table. The formula provides very reasonable conversion accuracy for sizes from 45 to 400 mesh.

Have you ever been stuck without a mesh-micron conversion table when you needed to convert a particle size from one unit of measure to the other? Here's a simple formula I developed for converting between standard US mesh sizes and microns that provides high accuracy over a wide particle size range (45 to 400 mesh).

I came up with this equation by plotting particle size in microns versus standard US mesh sizes between 80 and 400 and then fitting various Microsoft Excel spreadsheet trendlines to the data. As you can see in Figure 1, there's an exceptional match between the plotted mesh sizes (in red) and the power function trendline (in black) that's produced by the following equation:

$$\text{microns} = 14,992 \times \text{mesh}^{(-1.0046)}$$

Rounding this off creates an easy-to-remember equation, which I call the Kirk Mesh Equation:

$$\text{microns} = 15,000/\text{mesh}$$

This can also be written as $\text{mesh} = 15,000/\text{microns}$.

Figure 1

Particle size in microns versus US mesh size

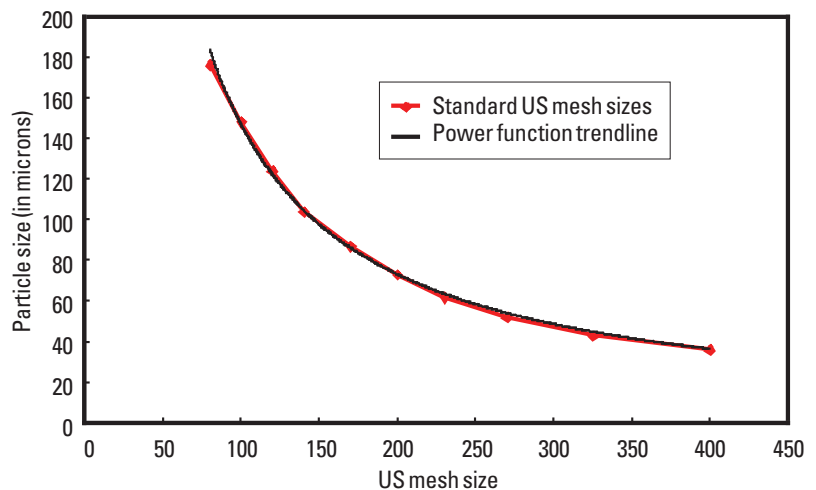


Table I

Accuracy of Kirk Mesh Equation

Standard US mesh size	Particle size (microns)		Difference (percent) between published and calculated values
	Value most often published in conversion charts	Value calculated with Kirk Mesh Equation	
10	2,000	1,500	-25.0
20	841	750	-10.8
30	595	500	-16.0
40	420	375	-10.7
45	354	333	-5.8
50	297	300	1.0
60	250	250	0.0
80	177	188	5.9
100	149	150	0.7
120	125	125	0.0
140	105	107	2.0
170	88	88	0.3
200	74	75	1.4
230	63	65	3.5
270	53	56	4.8
325	44	46	4.9
400	37	38	1.4

If this equation seems too simplistic, take a closer look at how accurate it is for converting mesh sizes between 45 and 400 to microns, as shown in Table I. While the conversion accuracy is poor for mesh sizes below 45, the equation provides very reasonable accuracy (5.9 percent or less error) for standard US mesh sizes from 45 to 400 when compared with typically published micron particle sizes for these mesh sizes.

Inch-mesh conversions

You can also convert between inches and mesh sizes using the equation:

$$\text{inches} = 0.6/\text{mesh} \text{ (or } \text{mesh} = 0.6/\text{inches})$$

This equation provides a conversion error of 7.6 percent or less over the 45- to 400-mesh range. **PBE**

For further reading

Find more information on particle sizing in articles listed under "Particle analysis" in *Powder and Bulk Engineering's* comprehensive article index (later in this issue and at *PBE's* Web site, www.powderbulk.com) and in books available on the Web site at the *PBE* Bookstore. You can also purchase copies of past *PBE* articles at www.powderbulk.com.

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