Application Note 130

Analysis of Terephthalic Acid Using the Saturn DigiSizer® 5200

Purified Terephthalic Acid (PTA) is used in the industrial fiber industry as one of the raw materials to make polyethylene terephthalate, more commonly known as polyester. End products produced from PTA include polyester fabrics, recording tapes, tire cord, food packaging, and soft drink bottles – just to name a few. Fabrication of the end product usually begins with the PTA as pellets or powders.

High-purity polyester demands high-purity ingredients and careful control of the physical properties of the end product. Control of the particle size distribution of PTA is critical in maintaining the quality of the final product. If the particle size of the terephthalic acid is too small, the reaction to produce the final product may proceed too rapidly and spoil the end product. If the particle size is too large, the reaction to polyester may not proceed to completion throughout the product.

Because of the Saturn DigiSizer's ability to see and record the entire size range of the particle size distribution of terephthalic acid without any distortion caused by using an inappropriate data reduction scheme, Research and Development personnel are able to select the best particle size of the terephthalic acid for production, and the production personnel are then able to closely monitor and maintain this "best particle size" selection. This means the results obtained by the Saturn DigiSizer in the R&D Department will match the results obtained by the Saturn DigiSizer in the Quality Assurance and Production Departments.

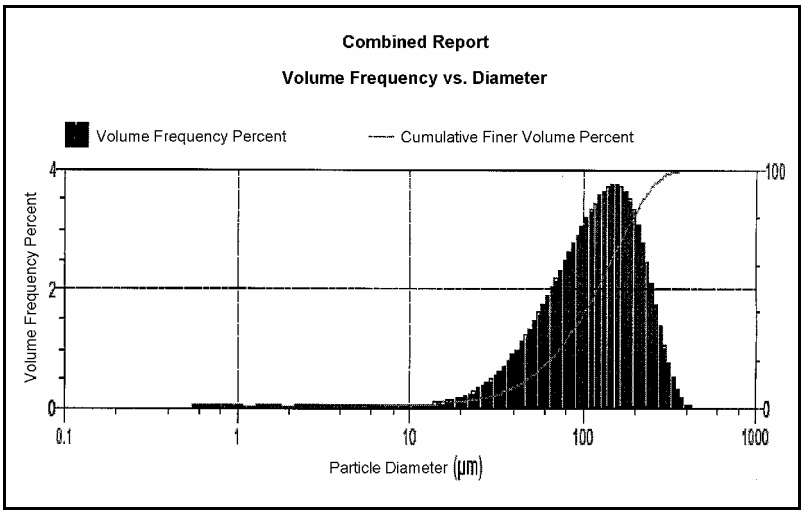

***Figure 1**. Combined report illustrating the Volume Frequency versus Diameter for terephthalic acid.*

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Figure 2 shows the "Goodness of Fit" plot for terephthalic acid in which it compares the light scattering curve measured by the Saturn DigiSizer to the light-scattering curve predicted by the Mie theory for the same size particles. This graph reveals how well the Saturn DigiSizer results match the actual particle size distribution and that no artificial or black-box manipulations are being performed on the collected data.

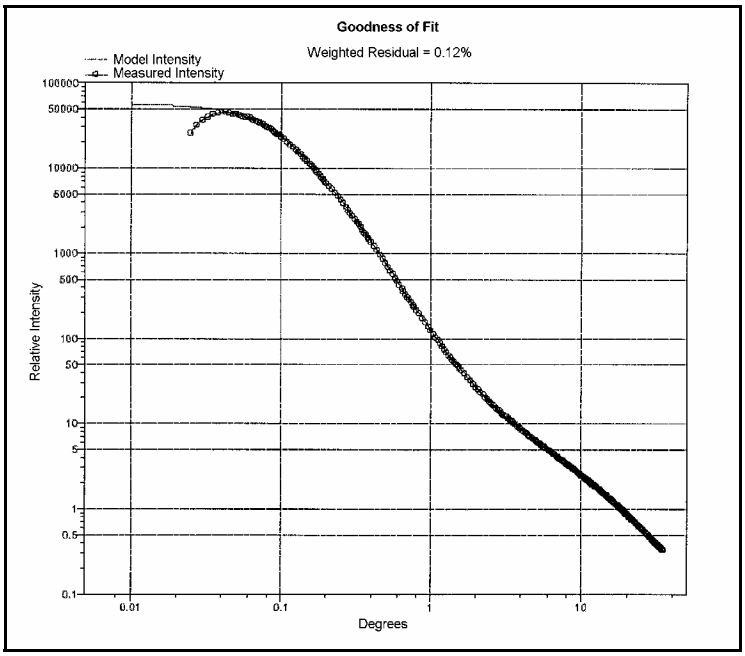

Figure 2. *Goodness of Fit plot showing a comparison of the light-scattering curve for the sample with Mie Theory for the same size particles.*