

Comparison of Wet and Dry Measurement of PLA (Polylactic Acid) Powder

Introduction

Polylactic acid (PLA) is a biodegradable polymer derived from lactic acid. It is a highly versatile material and is made from 100% renewable resources like corn, sugar beets, wheat and other starch-rich products. Polylactic acid exhibits many properties that are equivalent to or better than many petroleum-based plastics, which makes it suitable for a variety of applications. Properties include the ability to accept coatings, inks and adhesives, and being an effective flavor and aroma barrier.

PLA is produced as a powder and then melted to form thin plastic-like films and other disposable plastic-like items. Several companies have started mass-production facilities. There is also a significant amount of research underway to investigate further improvements in efficiency, broadening the range of applications by using copolymers, or in using different raw materials such as cheese whey, a major agricultural byproduct.

A set of samples were recently tested to evaluate the best method for analysis. The samples were evaluated using both wet and dry sampling systems. The excellent results showed that either wet or dry analysis gave equivalent results.

Analytical Test Method (Wet)

RI (particle): 1.51-0.10i

Dispersant fluid: Methanol

Sonication: For fine material, apply 1 minute of ultrasonic power at setting 7.

Coarse material does not need any sonication.

Circulation speed: 3

Agitation speed: 1

Analytical Test Method (Dry)

Fine material: High air, Auto vacuum

Coarse material: Free flow, No air, Auto vacuum

Example data

Diameter on Cumulative	D10, μm	D50, μm	D90, μm
Fine Grade, Wet	12.26	26.85	62.34
Fine Grade, Dry	11.97	26.65	58.83
Coarse Grade, Wet	890.88	1018.14	1148.76
Coarse Grade, Dry	906.16	1055.35	1168.32

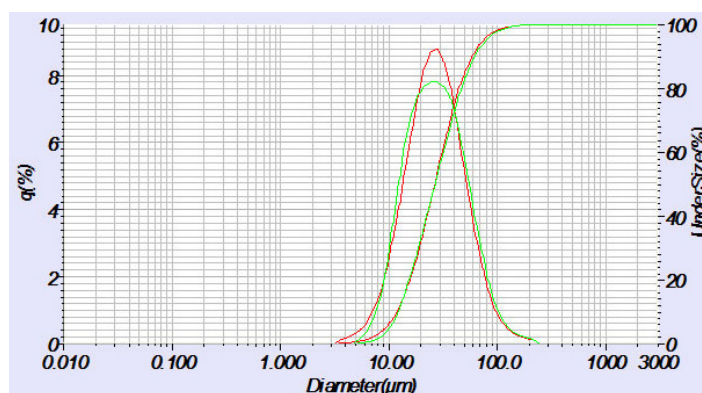


Figure 1. Particle size distribution of Fine Grade of PLA. Dry data is in red and wet data in green.

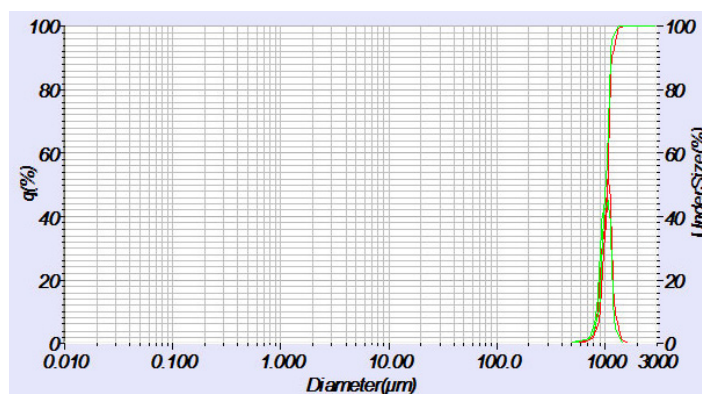


Figure 2. Particle size distribution of Coarse Grade of PLA. Dry data is in red and wet data in green.

Results

This example data shows the excellent repeatability of the LA-960 PowderJet Dry Feeder and the comparison to wet dispersion systems for this type of sample, allowing the user to choose the dispersion method that best suits their requirements.