

Density Determination of Plastic Film Using the AccuPyc 1330

The AccuPyc 1330 was used to determine the density of plastic film for a Micromeritics customer. This type of film is produced by extruding polyethylene beads through various types of machines. The quality of the extruded film greatly depends on the structure of the polyethylene beads and the amount of encapsulated air in them. Various polyethylene beads were analyzed, as were samples of extruded plastic film. Within ten minutes, the AccuPyc 1330 measured the true density of each sample, giving the customer a fast, accurate technique to predict processing properties and to guide the curing process.

Polyethylene Beads

The true densities of the polyethylene beads that were analyzed are shown in the following table.

Sample ID	Density (g/cc)
A	0.9097 ± 0.0001
B	0.9141 ± 0.0001
C	0.9356 ± 0.0001
D	0.8359 ± 0.0001
E	0.9174 ± 0.0000
F	0.9022 ± 0.0002
G	0.8566 ± 0.0002

The customer quickly determined that Sample D, with a density of 0.8359 g/cc, had the poorest processing properties due to structure or

encapsulated air, while Sample F, with a density of 0.9022 g/cc, had acceptable processing properties.

Extruded Film

Samples of extruded film were also evaluated. These types of materials cure with time and temperature and the density increases. With increasing density (higher degree of crystallinity), the film becomes more brittle and loses its impact strength. The data below were obtained on laboratory prepared samples:

Sample ID	Density (g/cc)
A	0.9437 ± 0.0003
B	0.9491 ± 0.0003
C	0.9070 ± 0.0002
D	0.9480 ± 0.0002

The measurements confirmed that Sample B, with a density of 0.9491 g/cc, was more brittle and subject to tearing than Sample C, with a density of 0.9070 g/cc. Such data give the customer a simple test to guide the curing process.

Conclusions

The AccuPyc 1330's ease of use and fast, reliable results make it the instrument of choice for measuring the density of polyethylene products.