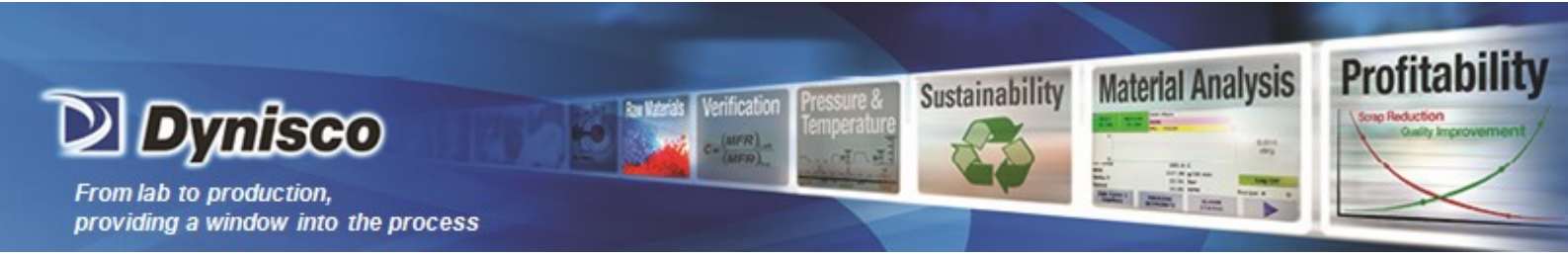

Detecting Polymers in Material Products

Sponsored by Dynisco Feb 14 2017

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Introduction

It can be very difficult, if not impossible, to achieve complete identification of most polymer products. However, in most cases, this is usually not needed; what is needed is the separation, or identification, of numerous molding materials whose identity has been lost, or an indication of the type of material used to create a component. In such cases, it is justified to use simple tests.

Simple Tests

Simple tests comprise of a preliminary examination, density, melting point and behavior on heating. The tests must be performed in the order shown; if the density value is high, for instance, more than 1.7 gcm^{-3} (SG greater than 1.7), then the material could well be a fluoropolymer, and heating tests must not be performed due to the danger from the fumes released.

In any heating test, only a small amount of sample should be used for the same reason, and the use of a fume cupboard is advised.

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Density

In most cases, a material's absolute density is not needed; an approximate value is what is needed. This may be obtained by seeing if the material swims or sinks in a limited range of liquids. These may include saturated magnesium chloride and water; the former

Preliminary Examination
The material, or component, has to be examined for color, transparency, its resistance to cutting, method of manufacture, etc. This is because, for example, such an examination can provide a strong hint as to the type of material used to create a particular component. A component's weight and dimensions must also be taken into consideration, along with any flash lines, ejection marks etc.

has a density of 1.34 gcm^{-3} and the latter has a density of 1 gcm^{-3} (When the density units are measured in gcm^{-3} then, the value is the same as the specific gravity value.)

If the material is filled, then the density will usually be higher than that of the unfilled material, because a lot of inorganic fillers - the most common fillers - possess a relatively high density. The inorganic filler content can be easily estimated if a weighed sample of the material is completely burnt.

Melting Point

Here, a very accurate value is often not needed. The most basic method to obtain an estimated value is by heating a small sample of the material on a metal hot plate and determining the rise in temperature as well as the temperature of the hot plate just below the plastics material. It is recommended to use a heating rate of approximately 50 °C/hour, or 90 °F/hour.

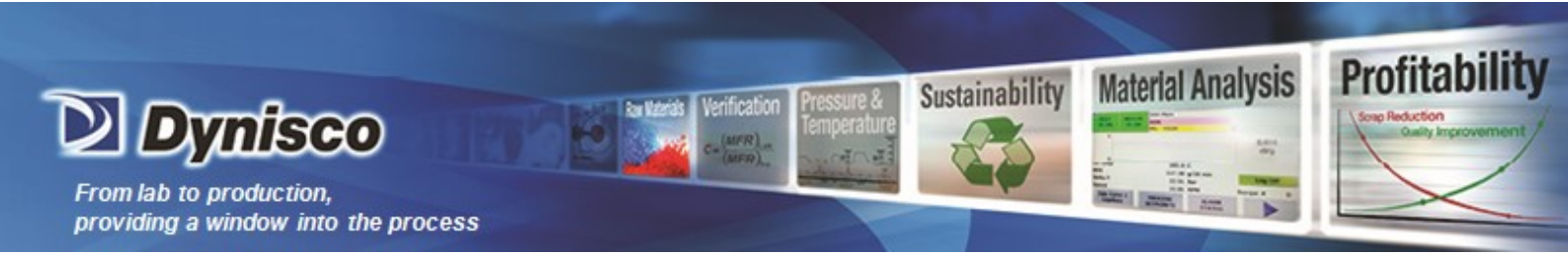
An amorphous, thermoplastics material does not have a sharp melting point, while a semi-crystalline, thermoplastics material typically has a sharp melting point. A glass rod is useful to move or prod the sample during heating.

Behavior on Heating

During heating, thermoplastics soften while thermosetting plastics (thermosets) do not -they decompose when the temperature reaches a certain point. An amorphous, thermoplastics material will soften over a broader temperature range compared to a semi-crystalline, thermoplastics material; these have sharp melting points. This test may be often be combined with the earlier one.

This information has been sourced, reviewed and adapted from materials provided by Dynisco.

For more information on this source, please visit Dynisco.



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