

CM-3500d CM-3700d

MINOLTA
INSTRUMENT
SYSTEMS
DIVISION

INTRODUCTION/OBJECTIVE

Our objective is to describe a method for measuring the cloudiness or hazy characteristics of transparent colored plastic samples using Minolta's CM-3500d or CM-3700d spectrophotometers. A sample with a hazy appearance changes the optical and/or chromatic attributes. Typically, a hazy sample appears lighter in color, versus one that does not exhibit haze. This is caused by the forward scattering of light from within the sample or its surface. As with many plastic applications, a transparent sample is often used to display an object behind it. An object seen behind a sample with too high a degree of transmission haze will have a blurred outline and a loss of contrast in color. By measuring transmission haze, quality control during the plastic manufacturing process becomes simple and precise. Other applications for this type of measurement include thin film, glass, and liquid.

The measurement is conducted in transmittance mode and may require a Transmittance Specimen Holder (CM-A96). Liquid samples are placed in cells for containment. The calculation used is percent transmission haze as defined by ASTM D1003. Both the CM-3500d and CM-3700d spectrophotometers conform to this specification. The SpectraMagic software package includes this index for display.



CM-3500d and CM-3700d Spectrophotometers

SAMPLE PRESENTATION

- Two sets of colored injection-molded chips are placed in the transmission compartment of the Spectrophotometer. The Transmittance Specimen Holder grasps the chip juxtaposition to the exit port of the sphere. The instrument is calibrated for transmission and haze calibration.
- For every haze measurement, the sample is measured with the white calibration plate (total luminous transmittance - Tt) and black calibration box (diffuse luminous transmittance - Td) on the reflectance port. This provides the ratio to calculate the percentage of haze.

$$\% \text{ Transmission Haze} = (T_d/T_t) \times 100$$

RESULTS

- A high haze value can be an indicator of poor pigment dispersion, poor processing conditions, incorrect additive blend, or surface imperfections. The haze values also correspond with a visual assessment.
- Haze provides an extra quality control measurement to further characterize the appearance quality of transparent samples.



DATA INTERPRETATION

As seen in Figure 1, there is a slight haze difference between the Phthalo green samples and a considerable haze difference between the brown samples, Figure 2.

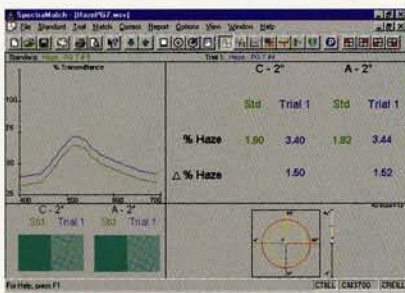


Figure 1

COLOR	HAZE VALUE
PG 7 (phthalo green) #5	1.9
PG 7 (phthalo green) #4	3.4

* As the value increases, the haze increases:
 0% haze ... 15% haze 30+% haze
 no haze moderate haze ... considerable haze

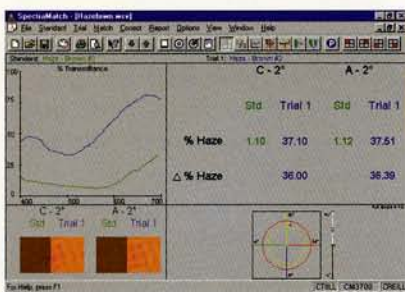


Figure 2

COLOR	HAZE VALUE
Brown #3	1.1
Brown #2	37.1

* As the value increases, the haze increases:
 0% haze ... 15% haze 30+% haze
 no haze moderate haze ... considerable haze



INSTRUMENTS USED



- CM-3500d

Spectrophotometer

The CM-3500d is a multi-function, top-port, benchtop spectrophotometer with computer control for easy operation. It is a highly accurate instrument designed for a broad range of reflectance and transmittance measurements, and is ideal for controlling the colors of solids, liquids, pastes, and powders. Control is performed via computer software to provide simple, efficient color control from the research laboratory to the factory floor. The CM-3500d is widely used in plastics and pharmaceutical applications.



- CM-3700d

Spectrophotometer

The CM-3700d offers repeatability and accuracy that equals or exceeds that of most high-end spectrophotometers. It is compact enough to be placed next to a computer, and is ideal for any industry where critical color and quality control is required, such as paint and coatings, plastics, paper, graphic arts, textiles, automotive, and ceramics. An RS-232C interface allows the CM-3700d to easily integrate into virtually any system.

- SpectraMagic

Quality Control Software

SpectraMagic is a quality control package that evaluates color and color differences, as well as provides statistical analysis of the data. The main screen provides a concise display of the absolute and difference data for the standard and current sample. Tolerance ellipses, accept/reject assessment, and spectral curves provide all the information needed for quality-control decisions. On-screen color simulation under three illuminants helps users visualize differences between standards and samples.

- CM-A96

Transmittance Specimen Holder

Holds specimens in place for transmission measurements. Maximum specimen thickness: 22.5mm

- CM-A100

Transmittance Zero Calibration Plate

For performing zero calibration for transmittance measurements.

APPLICATION Notes



Contact: **Minolta Corporation, Instrument Systems Division**

101 Williams Drive, Ramsey, NJ 07446, call (888) ISD-COLOR or (201) 818-3276, fax (201) 825-4374, or browse

Minolta's web site at www.minolta-usa.com

