Test Procedure 485-D
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Clarity of Carbopol®, Pemulen™ or Noveon® Polymer Mucilages

Scope

This procedure is for the determination of clarity, or percent light transmission, of Carbopol®, Pemulen™ or Noveon® polymer mucilages. Clarities are routinely measured at 0.5% concentrations, although the method is applicable to different polymer concentrations. Preparation of the mucilages for clarity determination is outside the scope of this procedure. Instructions for mucilage preparation can be found in Lubrizol Test Procedures 430-I, SA-003, SA-051 and other methods.

Abstract

The transmission of light through a Carbopol, Pemulen or Noveon polymer mucilage is measured by means of a Brinkmann Probe Colorimeter. The measurement is made at 420 nm after setting the instrument at 100% with demineralized water. The 420 nm setting gives maximum resolution.

Safety Precautions

1. Wear safety goggles and gloves.
2. Carbopol, Pemulen and Noveon polymer dusts are irritating to the respiratory passages and breathing of the dust should be avoided.
3. Carbopol, Pemulen and Noveon polymer dusts in the eyes should be thoroughly rinsed with 1% physiological saline solution or water for a minimum of 15 minutes. Saline solution is much preferred to water as water swells the polymer and removal is more difficult.

Interferences

The mucilage must be properly prepared to prevent agglomerated particles from interfering. Also, the mucilage must be properly neutralized to ensure an accurate clarity result. Air bubbles cause reflection and refraction of light. Thus, air bubbles must be minimized so that a bubble-free area can be found to obtain a reading.

Precision

Twenty Carbopol 940 polymer samples were analyzed in duplicate by a single chemist over a two week period. The standard deviation calculated from these data was 0.33%. The mucilage preparation was by Lubrizol Test Procedure 430-I and the standard deviation includes both the sample preparation and clarity measurement as described in this procedure. The data for these calculations are on file.

Apparatus

1. 50 mL centrifuge tube. Fisher Scientific, Catalog No. 05-538-49.
2. Centrifuge capable of holding 50 mL centrifuge tubes. Fisher Scientific, Catalog No. 05-101-7.
3. Brinkmann Probe Colorimeter – Model No. PC-801 with 420 nm filter and 2 cm probe tip. Brinkmann Instruments, Cantiague Road, Westbury, NY 11590.
4. Replacement lamps for the instrument are available from Brinkmann Instruments, Catalog No. 20-20-920-8.
5. Spatula. Fisher Scientific, Catalog No. 14-357.

Reagents

None.

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Procedure

1. The clarity measurement is performed on a properly prepared mucilage. Lubrizol Test Procedures 430-I, SA-003 and SA-051 (and others) define mucilage preparation.
2. Using a spatula, transfer a portion of the mucilage to a 50 mL centrifuge tube.
3. Place the tube in the centrifuge and spin for five minutes at the maximum speed setting. Centrifugation is for elimination of air bubbles that could influence the clarity measurement. REMEMBER: Balance the centrifuge with a tube filled with water.
4. Turn the Brinkmann colorimeter to %T and allow a five minute warm-up period. (To zero the instrument, see Special Instruction 1).
5. Immerse the probe in demineralized water and adjust the 100% T Coarse Control Knob until the reading indicates 100.0% or very close. Use the Fine Control to obtain an exact reading of 100.0%. (If 100.0% can not be achieved, see Special Instruction 2).
6. Remove the probe from the water, shake and/or blot to remove any remaining water.
7. Insert the probe into the mucilage. Move the probe to an area where there are no air bubbles in the light path of the probe tip.
8. The % Transmission (or Clarity) is read directly from the instrument.
9. Clean the mucilage from the probe and wash in a beaker of water.

Calculation

No calculations are necessary. The Brinkmann Colorimeter reads the % Transmission.

Special Instructions

1. Zeroing The Brinkmann Model PC801

a. Turn selector knob to % T.
b. Remove end of the fiber optic light guide from the left hand side of the socket.
c. Immerse the probe tip into a beaker of distilled water. Move probe from side to side to eliminate any air bubbles. CAUTION: Liquid must not reach the top of the probe tip but should at least cover the rectangular opening.
d. Adjust the % T screw on the back of the colorimeter until the readout shows 0.0.
e. Return the end of the fiber optic light guide into the left hand socket.

2. Increasing Lamp Voltage To Obtain 100% T

When 100% T is not attainable by adjusting the coarse and fine control knobs, the lamp voltage must be increased. When the lamps are new, a voltage of 7.5-8.0 is an appropriate value.

a. Turn Function Selector to VOLT and note the digital read-out.
b. Increase the voltage by approximately 1 volt by turning the Lamp Voltage screw on the back panel.
c. Turn Function Selector to % T.
d. Adjust the % T to 100 with the coarse and fine adjustments.
e. If 100% is still not attainable, return to step (a) and repeat the procedure.
f. If 100% is not attainable at maximum lamp voltage, the lamp must be replaced. This procedure is explained in Special Instruction 3.

3. Lamp Replacement

a. Remove the fiber optic light guide.
b. Remove the light guide block by loosening the four Phillips head screws holding it in place.
c. Remove the lamp by pulling it straight out.
d. Use replacement lamp obtainable from Brinkmann Instruments, Catalog No. 20-20-920-8.
e. Push the new lamp into place. Keep the contact pins vertically aligned and offset to the left of the instrument. The lamp should press in to the aluminum shoulder.

TIME

ATTENTION: 5 minutes
ELAPSED: 15 minutes