PROPYLENE OXIDE

PRINCIPLE

Residual propylene oxide in starches treated with propylene oxide is removed by extraction at room temperature with a mixture of 2-propanol and water. The propylene oxide in the extract is determined by gas chromatography.

SCOPE

The method is applicable to propylene oxide-treated starches.

SPECIAL APPARATUS

1. Gas Chromatograph: Equipped with flame ionization detector or equivalent
2. Mechanical Shaker: Burrell wrist-action or equivalent
3. Column: or equivalent

REAGENTS

1. 2-Propanol Solution: Nanograde or Pesticide Grade. Mix 500 mL 2-propanol with 100 mL purified water
2. Propylene Oxide, 99% Minimum

INSTRUMENT PARAMETERS

Run analysis per manufacturers’ instructions.

Column: Supel - Q PLOT, Fused silica capillary column (30m x 0.53mm id) p/n 2-5462

Oven temperature: 120°C; temp program at 4°C / min to 135°C; then Temp program at 20°C/min to 225°C; hold for 2 min.
Propylene oxide typically eludes at 5 min, depending on column flow rates.

**PROCEDURE**

**Standardization**: Weigh 1.000 g propylene oxide into a 100 mL volumetric flask containing 50 mL of the 2-propanol solution. Dilute to volume with the same solution and mix thoroughly. Pipet a 1 mL aliquot into a 100 mL volumetric flask and dilute to volume with the 2-propanol solution. Prepare a second successive (5 to 50 mL) dilution. This second dilution contains 10 µg propylene oxide per mL. Inject a 5 µL sample of the second dilution into the gas chromatograph for standardization. Prepare fresh daily both the stock and dilute standards.

**Sample Analysis**: Weigh accurately 4 g of starch into a 1 oz. screw-cap bottle and add 10 mL of the alcohol-water solution. Place on a mechanical shaker and shake for one hr. Remove from shaker, allow to stand until the supernatant is clear and inject a 5 µL sample into the gas chromatograph (Note 1). Alternately, the sample may be centrifuged.

**CALCULATIONS (Note 2)**

Determine areas under the signal peaks corresponding to propylene oxide in the diluted standard and sample extract.

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\text{Propylene Oxide} = \frac{(\text{Sample Signal Area})(\text{Propylene Oxide, Standard, µg/mL})(10 \text{ mL})}{(\text{Standard Signal Area})(\text{Sample Wt., g})}
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**NOTES AND PRECAUTIONS**

1. Sample extracts should be analyzed on the day of preparation.
2. Detection limit based on a 4 g sample is about 0.5 to 1.0 ppm.

**METHOD HISTORY**

Corn Starch, Propylene Oxide (C-50), Date of Acceptance 7-22-1977, Revised 12-08-2006.