

digitized chromatogram heights H_i by recording the vertical displacements between the chromatogram trace and the baseline at elution volume, V_i , over designated intervals. A minimum of 40 area segments or heights are required. Obtain the corresponding value of M_i for Chitosan based on its elution volume, V_i , from the molecular weight calibration curve obtained in *Molecular weight calibration*.

Calculate the number-, and weight-average molecular weights, M_n and M_w , in g/mol, respectively, using the following formulas.

$$M_n = \frac{\sum_{i=1}^N A_i}{\sum_{i=1}^N \left(\frac{A_i}{M_i} \right)}$$

$$M_w = \frac{\sum_{i=1}^N (A_i \cdot M_i)}{\sum_{i=1}^N A_i}$$

If the elution volume interval ΔV_i , for instance, $V_2 - V_1 = V_3 - V_2$, etc, is constant; parameters A_i and M_i are the chromatographic peak slice area and Chitosan molecular weight associated with the elution volume, V_i ; and N is the number of data points obtained from the chromatogram between V_a and V_b ($N \geq 40$). [NOTE—If N is sufficiently large, the use of area segments A_i or peak heights H_i will yield equivalent results.]

Calculate the molecular weight distribution or polydispersity for Chitosan using the following expression:

$$\text{Result} = M_w/M_n$$

Acceptance criteria: The values of apparent weight-average molecular weight and polydispersity are NLT 85% and NMT 115% of their respective values stated on the label.

- **LOSS ON DRYING** (731): Dry 1.0 g in an oven at 100°–105° for 7 h: it loses NMT 5.0% of its weight.

ADDITIONAL REQUIREMENTS

- **PACKAGING AND STORAGE:** Preserve in light-resistant and well-closed containers in a dry place, and store at a temperature below 30°.
- **LABELING:** Label it to indicate its apparent weight-average molecular weight, M_w , and polydispersity (M_w/M_n). Where Chitosan is intended for use in the manufacture of wound dressings, it is so labeled. Where Chitosan must be subjected to further processing during the preparation of wound dressings, it is so labeled. Label to indicate the natural source from which Chitosan is derived.
- **USP REFERENCE STANDARDS** (11)
 - USP Chitosan RS
 - USP Endotoxin RS

Chlorobutanol



$C_4H_7Cl_3O$ (anhydrous) 177.46
2-Propanol, 1,1,1-trichloro-2-methyl-
1,1,1-Trichloro-2-methyl-2-propanol [57-15-8].
Hemihydrate 186.46 [6001-64-5].

» Chlorobutanol is anhydrous or contains not more than one-half molecule of water of hydration. It contains not less than 98.0 percent and not more than 100.5 percent of $C_4H_7Cl_3O$, calculated on the anhydrous basis.

Packaging and storage—Preserve in tight containers.

Labeling—Label it to indicate whether it is anhydrous or hydrous.

USP Reference standards (11)—

USP Chlorobutanol RS

Identification

A: *Infrared Absorption* (197K).

B: To 5 mL of a freshly prepared solution (1 in 200) add 1 mL of 1 N sodium hydroxide, then slowly add 3 mL of iodine TS: a yellow precipitate of iodoform, recognizable by its odor, appears.

Reaction—Shake thoroughly 0.5 g with 25 mL of water: the water remains neutral to litmus.

Water, Method I (921): not more than 1.0% (anhydrous form) and not more than 6.0% (hydrous form).

Chloride—To a solution of 0.50 g in a mixture of 25 mL of diluted alcohol and 1 mL of nitric acid, add 2 mL of silver nitrate TS: any turbidity produced is not greater than that produced by a control solution containing 0.50 mL of 0.020 N hydrochloric acid in place of the Chlorobutanol (0.07%).

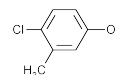
Assay

Denatured alcohol—Dilute 100 mL of isopropyl alcohol to 1000 mL with alcohol.

Potassium hydroxide solution—Transfer 58 g of potassium hydroxide to a 1000-mL volumetric flask. Add 100 mL of water to dissolve, then cool the solution. Dilute with *Denatured alcohol* to volume, and mix. Prepare fresh just prior to use.

Procedure—Transfer about 100 mg of Chlorobutanol, accurately weighed, to a glass-stoppered, flat-bottomed boiling flask. Add 50 mL of *Potassium hydroxide solution*, attach the flask to a reflux condenser, and reflux for 1 hour. Allow the flask to cool while still attached to the condenser, then add 100 mL of water, using a portion of the water to rinse the condenser and its tip. Add 15 mL of nitric acid while stirring. Titrate with 0.1 N silver nitrate VS, determining the endpoint potentiometrically, using a silver-billet combination electrode, consisting of a metallic silver indicator electrode and a double junction reference electrode that allows use of a nonchloride filling solution (such as ammonium nitrate solution) for determining chloride, or equivalent (see *Titrimetry* (541)). Perform a blank determination, and make any necessary correction. Each mL of 0.1 N silver nitrate is equivalent to 5.915 mg of $C_4H_7Cl_3O$.

Chlorocresol



C_7H_7ClO 142.58
Phenol, 4-chloro-3-methyl-
4-Chloro-*m*-cresol [59-50-7].

» Chlorocresol contains not less than 99.0 percent and not more than 101.0 percent of C_7H_7ClO (4-chloro-3-methylphenol).

Packaging and storage—Preserve in tight, light-resistant containers.