Packaging and storage—Preserve in tight, light-resistant containers. Avoid exposure to direct sunlight and excessive heat.

USP Reference standards ⟨11⟩**—**
USP Nitrofurazone RS

Identification—Dissolve 400 mg of potassium hydroxide in a mixture of 9.5 mL of alcohol and 0.5 mL of methanol. Immediately before use dilute with dimethylformamide to 100 mL. To 10 mL of this solution add 1 drop of Topical Solution: a purple solution results.

Assay—[NOTE—Protect from light all solutions that contain nitrofurazone.]

Triethylamine buffer, Mobile phase, Standard preparation, and *Chromatographic system*—Proceed as directed in the *Assay* under *Nitrofurazone Ointment*.

Assay preparation—Transfer an accurately measured portion of Topical Solution, equivalent to about 1 mg of nitrofurazone, to a 100-mL low actinic volumetric flask. Add 0.2 mL of dimethylformamide and about 25 mL of warm (between 40° and 50°) alcohol. Dilute with water to volume, and mix.

Procedure—Proceed as directed in the *Assay* under *Nitrofurazone Ointment*. Calculate the quantity, in mg, of $C_6H_6N_4O_4$ in the portion of Topical Solution taken by the formula:

$$100C(r_U / r_S)$$

in which C is the concentration, in mg per mL, of USP Nitrofurazone RS in the *Standard preparation*, and r_U and r_S are the nitrofurazone peak responses obtained from the *Assay preparation* and the *Standard preparation*, respectively.

Ammonia N 13 Injection

» Ammonia N 13 Injection is a sterile solution of $^{13}NH_3$ in Sodium Chloride Injection, suitable for intravenous administration, in which a portion of the molecules are labeled with radioactive ^{13}N (see *Radiopharmaceuticals for Positron Emission Tomography—Compounding* ⟨823⟩). It contains not less than 90.0 percent and not more than 110.0 percent of the labeled amount of ^{13}N expressed in MBq (or mCi) per mL at the time indicated in the labeling.

Specific activity: no carrier added.

Packaging and storage—Preserve in single-dose or multiple-dose containers that are adequately shielded.

Labeling—Label it to include the following, in addition to the information specified for *Labeling* under *Injections* ⟨1⟩: the time and date of calibration; the amount of ^{13}N as ammonia expressed as total MBq (mCi) per mL, at time of calibration; the expiration time and date; and the statement "Caution—Radioactive Material." The labeling indicates that in making dosage calculations correction is to be made for radioactive decay and also indicates that the radioactive half-life of ^{13}N is 9.96 minutes. The label also includes the statement "Do not use if cloudy or if it contains particulate matter."

USP Reference standards ⟨11⟩**—**
USP Ammonium Chloride RS
USP Endotoxin RS

Identification—

A: *Radionuclidic identity*—Its half-life, determined using a suitable detector system (see *Radioactivity* ⟨821⟩ is between 9.5 and 10.5 minutes.

B: *Radiochemical identity*—The retention time of the major peak in the chromatogram of the *Test solution* corresponds to that in the chromatogram of the *Standard solution,* as obtained in the *Radiochemical purity* test.

Bacterial endotoxins ⟨85⟩ (see *Sterilization and Sterility Assurance* under *Radiopharmaceuticals for Positron Emission Tomography—Compounding* ⟨823⟩)—It contains not more than $175/V$ USP Endotoxin Unit per mL of the Injection, in which V is the maximum administered total dose, in mL, at the expiration time.

pH ⟨791⟩**:** between 4.5 and 7.5.

Radiochemical purity—

Mobile phase—Add 0.25 mL of concentrated nitric acid to 1000 mL of a mixture of water and methanol (7:3), filter, and degas.

Standard solution—Dissolve an accurately weighed quantity of USP Ammonium Chloride RS in water, and dilute quantitatively, and stepwise if necessary, with water to obtain a solution having a known concentration of about 0.1 mg per mL.

Test solution—Use the Injection.

Chromatographic system (see *Chromatography* ⟨621⟩)—The liquid chromatograph is equipped with a 4.1-mm × 25-cm column that contains 10-µm packing L17. It is equipped with a gamma ray detector and a conductivity detector. The flow rate is about 2.0 mL per minute. Chromatograph the *Test solution,* and record the peak responses as directed for *Procedure:* the relative standard deviation for replicate injections is not more than 5%.

Procedure—Prepare a mixture of the *Standard solution* and the *Test solution* (1:1), and inject about 20 µL of the mixture into the chromatograph, record the chromatograms, and measure the peak areas. The areas of both the main radioactive and nonradioactive peaks are equal. [NOTE—The volume of Injection may be adjusted to obtain suitable detection system sensitivity.] The radioactivity of the major peak is not less than 95% of the total radioactivity measured. The retention time of the *Test solution* corresponds to the retention time of the *Standard solution.*

Radionuclidic purity—Using a suitable gamma-ray spectrometer (see *Selection of a Counting Assembly* under *Radioactivity* ⟨821⟩), count an appropriate aliquot of the Injection for a period of time sufficient to obtain a gamma spectrum. The resultant gamma spectrum should be analyzed for the presence of identifiable photopeaks which are not characteristic of ^{13}N emissions. Not less than 99.5% of the observed gamma emissions should correspond to the 0.511 MeV, 1.022 MeV, or Compton scatter peaks of ^{13}N.

Chemical purity—This article may be synthesized by different methods and processes and, therefore, contains different impurities. The presence of unlabeled ingredients, reagents, and by-products specific to the process must be controlled, and their potential for physiological or pharmacological effects must be considered.

ALUMINUM (to be determined if Devarda's alloy is used to reduce ^{13}N nitrate/nitrite)—

Aluminum standard solution—Transfer 35.17 mg of aluminum potassium sulfate dodecahydrate, accurately weighed, to a 1000-mL volumetric flask, and dilute with water to volume to obtain a solution having a known concentration of 2 µg of aluminum per mL.

Procedure—Pipet 10 mL of *Aluminum standard solution* into each of two 50-mL volumetric flasks. To each flask add 3 drops of methyl orange TS and 2 drops of 6 N ammonium hydroxide, then add 0.5 N hydrochloric acid, dropwise, until the solution turns red. To one flask add 25 mL of sodium thioglycolate TS, and to the other flask add 1 mL of edetate disodium TS. To each flask add 5 mL of eriochrome cyanine TS and 5 mL of acetate buffer TS, and add water to volume. Immediately determine the absorbance of the solution containing sodium thioglycolate TS at the wavelength of maximum absorbance at about 535 nm, with a suitable spectrophotometer, using the solution containing the edetate disodium TS as a blank. Repeat the procedure using two 1.0-mL aliquots of Injection. Calculate the

quantity, in µg per mL, of aluminum in the Injection taken by the formula:

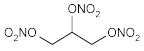
$$20(T_U / T_S)$$

in which T_U and T_S are the absorbances of the solutions from the Injection and the *Aluminum standard solution,* respectively. The concentration of aluminum ion in the Injection is not greater than 10 µg per mL.

Other requirements—It meets the requirements under *Injections* ⟨1⟩, except that the Injection may be distributed or dispensed prior to completion of the test for *Sterility* ⟨71⟩, the latter test being started within 24 hours of final manufacture, and except that it is not subject to the recommendation in *Volume in Container.*

Assay for radioactivity—Using a suitable calibrated system as directed under *Radioactivity* ⟨821⟩, determine the radioactivity, in MBq (or mCi) per mL, of the Injection.

Diluted Nitroglycerin



$C_3H_5N_3O_9$ 227.09
1,2,3-Propanetriol, trinitrate;
Nitroglycerin [55-63-0].

DEFINITION

Diluted Nitroglycerin is a mixture of nitroglycerin ($C_3H_5N_3O_9$) with lactose, dextrose, alcohol, propylene glycol, or other suitable inert excipient to permit safe handling. It contains NLT 90.0% and NMT 110.0% of the labeled amount of $C_3H_5N_3O_9$. It usually contains NMT 10% of nitroglycerin ($C_3H_5N_3O_9$). [**CAUTION—**Taking into consideration the concentration and amount of nitroglycerin ($C_3H_5N_3O_9$) in Diluted Nitroglycerin, exercise appropriate precautions when handling this material. Nitroglycerin is a powerful explosive and can be detonated by percussion or excessive heat. Do not isolate nitroglycerin ($C_3H_5N_3O_9$).]

IDENTIFICATION

- **A.** The R_F value of the principal spot of *Sample solution A* corresponds to that of the *Standard solution*, as obtained in the *Procedure* for *Organic Impurities*.
- **B.** The retention time of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the *Assay*.

ASSAY

- **PROCEDURE**

Mobile phase: Methanol and water (1:1)

Standard solution: 0.075 mg/mL of nitroglycerin from USP Diluted Nitroglycerin RS in *Mobile phase*

Sample solution: Transfer a portion of Diluted Nitroglycerin, equivalent to 7.5 mg of nitroglycerin, to a 100-mL volumetric flask, and dissolve in 75 mL of *Mobile phase*. If necessary, sonicate for 2 min or until the solid is totally dispersed, then shake by mechanical means for 30 min. Dilute with *Mobile phase* to volume, and filter.

Chromatographic system

(See *Chromatography* ⟨621⟩, *System Suitability*.)

Mode: LC

Detector: UV 220 nm

Column: 4.6-mm × 25-cm; packing L1. [NOTE—If necessary a short precolumn that contains packing L1 may be used.]

Flow rate: 1 mL/min

Injection size: 20 µL

System suitability

Sample: *Standard solution*

Suitability requirements

Column efficiency: NLT 3000 theoretical plates

Tailing factor: NMT 2.5 for the analyte peak

Relative standard deviation: NMT 3.0%

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of $C_3H_5N_3O_9$ in the portion of Diluted Nitroglycerin taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times 100$$

r_U = peak response from the *Sample solution*
r_S = peak response from the *Standard solution*
C_S = concentration of nitroglycerin in the *Standard solution* (mg/mL)
C_U = nominal concentration of the *Sample solution* (mg/mL)

Acceptance criteria: 90.0%–110.0%

IMPURITIES

Organic Impurities

- **PROCEDURE**

Standard solution: 400 µg/mL of nitroglycerin from USP Diluted Nitroglycerin RS in methanol

Sample solution A: Prepare a clear solution containing 400 µg/mL of nitroglycerin from Diluted Nitroglycerin in methanol.

Sample solution B: 20 mg/mL of nitroglycerin in methanol from Diluted Nitroglycerin. Centrifuge a portion, if necessary, to obtain a clear liquid phase.

Chromatographic system

(See *Chromatography* ⟨621⟩, *Thin-Layer Chromatography*.)

Adsorbent: 0.25-mm layer of chromatographic silica gel mixture

Application volume: 20 µL each of *Sample solution A* and *Sample solution B*; 5, 10, 15, and 20 µL of the *Standard solution*

Developing solvent system: Toluene and ethyl acetate (4:1)

Spray reagent: Diphenylamine in methanol (1 in 100)

Analysis

Samples: *Standard solution*, *Sample solution A*, and *Sample solution B*

Apply the *Samples* to a suitable thin-layer chromatographic plate. Develop the chromatograms in the *Developing solvent system* until the solvent front has moved three-fourths of the length of the plate. Remove the plate from the developing chamber, mark the solvent front, and allow the solvent to evaporate. Spray the plate with *Spray reagent*, and irradiate the plate with short- and long-wavelength UV light for 15 min.

Acceptance criteria: Any spot from *Sample solution B,* other than the principal spot, is not more intense than the spot from the 20-µL application of the *Standard solution.* Compare the intensities of any secondary spots observed from *Sample solution B* with those of the principal spots from the *Standard solution* (corresponding to 0.5%, 1.0%, 1.5%, and 2.0%, respectively): the sum of the intensities of the secondary spots from *Sample solution B* is NMT 3%. [NOTE—Nitrates of glycerin typically have R_F values of 0.21, 0.37, and 0.61 for mono-, di-, and tri-substituted glycerins, respectively.]

ADDITIONAL REQUIREMENTS

- **PACKAGING AND STORAGE:** Preserve in tight, light-resistant containers, and prevent exposure to excessive heat. Store at 25°, excursions permitted between 15° and 30°.