conditions: no peak is observed at the same retention time as that of carbon monoxide.

Operating conditions—

Detector: A thermal-conductivity detector.

Column: A column about 3 mm in inside diameter and about 3 m in length, packed with 300 to 500 μm zeolite for gas chromatography (0.5 nm in pore size).

Column temperature: A constant temperature of about 50°C.

Carrier gas: Hydrogen or helium.

Flow rate: Adjust the flow rate so that the retention time of carbon monoxide is about 20 minutes.

Selection of column: To 0.1 mL each of carbon monoxide and air in a gas mixer add carrier gas to make 100 mL, and mix well. Proceed with 5.0 mL of the mixed gas under the above operating conditions. Use a column giving well-resolved peaks of oxygen, nitrogen and carbon monoxide in this order.

Detection sensitivity: Adjust the sensitivity so that the peak height of carbon monoxide obtained from 5.0 mL of the mixed gas used in the selection of column is about 10 cm.

Assay Withdraw Nitrous Oxide as directed in the Purity.

Introduce 1.0 mL of Nitrous Oxide into a gas-measuring tube or syringe for gas chromatography from a metal cylinder under pressure through a pressure-reducing valve and a directly connected polyvinyl tube. Perform the test with this solution as directed under the Gas Chromatography according to the following conditions, and determine the peak area A_T of air. Separately, introduce 3.0 mL of nitrogen into a gas mixer, add carrier gas to make exactly 100 mL, mix thoroughly, and use this as the standard mixed gas. Proceed with 1.0 mL of this mixture as directed in the case of Nitrous Oxide, and determine the peak area A_S of nitrogen in the same manner.

$$\text{Amount (vol\%) of } N_2O = 100 - 3 \times \frac{A_T}{A_S}$$

Operating conditions—

Detector: A thermal-conductivity detector.

Column: A column about 3 mm in inside diameter and about 3 m in length, packed with silica gel for gas chromatography (300 to 500 μm in particle diameter).

Column temperature: A constant temperature of about 50°C.

Carrier gas: Hydrogen or helium.

Flow rate: Adjust the flow rate so that the retention time of nitrogen is about 2 minutes.

Selection of column: To 3.0 mL of nitrogen in a gas mixer add Nitrous Oxide to make 100 mL, and mix well. Proceed with 1.0 mL of the mixed gas under the above operating conditions. Use a column giving well-resolved peaks of nitrogen and nitrous oxide in this order.

System repeatability: Repeat the test five times with the standard mixed gas under the above operating conditions: the relative standard deviation of the peak area of nitrogen is not more than 2.0%.

Containers and storage Containers—Metal cylinders.

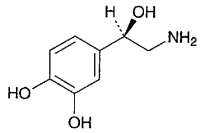
Storage—Not exceeding 40°C.

Norepinephrine

Noradrenaline

Norepirenamine

ノルエピネフリン



and enantiomer

$C_8H_{11}NO_3$: 169.18

(*RS*)-2-Amino-1-(3,4-dihydroxyphenyl)ethanol [*51-41-2*]

Norepinephrine, when dried, contains not less than 98.0% of *dl*-norepinephrine ($C_8H_{11}NO_3$).

Description Norepinephrine occurs as a white to light brown or slightly reddish brown, crystalline powder. It is odorless.

It is freely soluble in acetic acid (100), very slightly soluble in water, and practically insoluble in ethanol (95) and in diethyl ether.

It dissolves in dilute hydrochloric acid and in dilute acetic acid.

It gradually changes to brown by air and by light.

Identification **(1)** Dissolve 0.01 g of Norepinephrine in 10 mL of dilute acetic acid, and use this solution as the sample solution. To 5 mL of the sample solution add 1 drop of iron (III) chloride TS: a green color is produced.

(2) Transfer 1 mL each of the sample solution obtained in (1) to two test tubes, A and B, and add 1 mL of water to each tube. Add 10 mL of potassium hydrogen phthalate buffer solution, pH 3.5, to A, and 10 mL of phosphate buffer solution, pH 6.5, to B. To each of these solutions add 1.0 mL of iodine TS, allow to stand for 5 minutes, and add 2.0 mL of sodium thiosulfate TS: no color or a pale red color develops in test tube A, and a deep red-purple color develops in test tube B.

Purity **(1)** Clarity and color of solution—Dissolve 0.10 g of Norepinephrine in 10 mL of 0.1 mol/L hydrochloric acid TS, and add water to make 100 mL: the solution is clear and colorless.

(2) Arterenone—Dissolve 0.050 g of Norepinephrine in 0.01 mol/L hydrochloric acid TS to make exactly 100 mL. Determine the absorbance of the solution at 310 nm as directed under the Ultraviolet-visible Spectrophotometry: it is not more than 0.1.

(3) Epinephrine—Dissolve 10.0 mg of Norepinephrine in 2.0 mL of diluted acetic acid (100) (1 in 2). Pipet 1 mL of this solution, add water to make 10 mL, then mix with 0.3 mL of a solution of sodium nitrite (1 in 100), and allow to stand for 1 minute: the solution has no more color than the following control solution.

Control solution: Dissolve 2.0 mg of Epinephrine Bitartrate Reference Standard and 0.090 g of Norepinephrine Bitartrate Reference Standard in water to make exactly 10 mL. Measure exactly 1 mL of this solution, add 1.0 mL of diluted acetic acid (100) (1 in 2) and water to make 10 mL, and proceed in the same manner.

Loss on drying Not more than 1.0% (1 g, in vacuum, silica gel, 18 hours).

Residue on ignition Not more than 0.10% (1 g).

Assay Weigh accurately about 0.3 g of Norepinephrine, previously dried, dissolve in 50 mL of acetic acid for nonaqueous titration by warming, if necessary, and titrate with 0.1 mol/L perchloric acid VS until the color of the solution changes from blue-purple through blue to blue-green (indicator: 2 drops of crystal violet TS). Perform a blank determination, and make any necessary correction.

Each mL of 0.1 mol/L perchloric acid VS
= 16.918 mg of $C_8H_{11}NO_3$

Containers and storage Containers—Tight containers.
Storage—Light-resistant, under nitrogen atmosphere, and in a cold place.

Norepinephrine Injection

Noradrenaline Hydrochloride Injection
Norepirenamine Hydrochloride Injection

ノルエピネフリン注射液

Norepinephrine Injection is an aqueous solution for injection. It contains not less than 90% and not more than 110% of the labeled amount of *dl*-norepinephrine ($C_8H_{11}NO_3$: 169.18).

Method of preparation Dissolve Norepinephrine in 0.01 mol/L hydrochloric acid TS, and prepare as directed under Injections.

Description Norepinephrine Injection is a clear, colorless liquid.
It gradually becomes a pale red color by light and by air.
pH: 2.3 - 5.0

Identification **(1)** Measure a volume of Norepinephrine Injection, equivalent to 1 mg of Norepinephrine according to the labeled amount, and proceed as directed in the Identification (1) under Norepinephrine.

(2) Transfer a volume of Norepinephrine Injection, equivalent to 1 mg of Norepinephrine according to the labeled amount, to each of two test tubes A and B, and proceed as directed in the Identification (2) under Norepinephrine.

Purity **(1)** Arterenone—Measure a volume of Norepinephrine Injection, equivalent to 0.010 g of Norepinephrine according to the labeled amount, add water to make exactly 20 mL, and determine the absorbance of this solution at 310 nm: the absorbance is not more than 0.10.

(2) Epinephrine—Measure a volume of Norepinephrine Injection, equivalent to 5 mg of Norepinephrine according to the labeled amount, add 1 mL of diluted acetic acid (100) (1 in 2) and water to make exactly 10 mL, and proceed as directed in the Purity (3) under Norepinephrine.

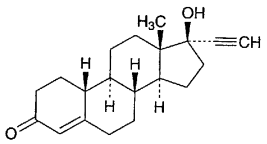
Assay Pipet a volume of Norepinephrine Injection, equivalent to about 5 mg of *dl*-norepinephrine ($C_8H_{11}NO_3$), add water to make exactly 25 mL, and use this solution as the sample solution. Separately, weigh accurately about 0.01 g of Norepinephrine Bitartrate Reference Standard, previously dried in a desiccator (in vacuum, silica gel) for 24 hours, dissolve in water to make exactly 25 mL, and use this solution as the standard solution. Piper 5 mL each of the sample solution and the standard solution, add 0.2 mL each of starch TS, then add iodine TS dropwise with swirling until a persistent blue color is produced. Add 2 mL of iodine TS, and shake. Adjust the pH of the solution to 6.5 with 0.05 mol/L disodium hydrogenphosphate TS, add 10 mL of phosphate buffer solution, pH 6.5, and shake. Immediately after allowing to stand for 3 minutes, add sodium thiosulfate TS dropwise until a red-purple color develops, then add water to make exactly 50 mL. Determine the absorbances, A_T and A_S, of the subsequent solutions of the sample solution and the standard solution at 515 nm within 5 minutes as directed under the Ultraviolet-visible Spectrophotometry.

Amount (mg) of *dl*-norepinephrine ($C_8H_{11}NO_3$)
= amount (mg) of Norepinephrine Bitartrate Reference Standard
$\times \frac{A_T}{A_S} \times 0.5016$

Containers and storage Containers—Hermetic containers, and colored containers may be used.
Storage—Light-resistant.

Norethisterone

ノルエチステロン



$C_{20}H_{26}O_2$: 298.42
17-Hydroxy-19-nor-17α-pregn-4-en-20-yn-3-one [*68-22-4*]

Norethisterone, when dried, contains not less than 97.0% and not more than 103.0% of $C_{20}H_{26}O_2$.

Description Norethisterone occurs as a white to pale yellowish white, crystalline powder. It is odorless.
It is soluble in chloroform, sparingly soluble in ethanol (95) and in tetrahydrofuran, slightly soluble in diethyl ether, and very slightly soluble in water.
It is affected by light.

Identification **(1)** To 2 mg of Norethisterone add 2 mL of sulfuric acid: the solution shows a red-brown color and a yellow-green fluorescence. Add 10 mL of water to this solution cautiously: a yellow color develops and a yellow-brown precipitate is formed.

(2) To 0.025 g of Norethisterone add 3.5 mL of a solution of 0.05 g of hydroxylammonium chloride and 0.05 g of anhydrous sodium acetate trihydrate in 25 mL of methanol. Heat under a reflux condenser on a water bath for 5 hours, cool, and add 15 mL of water. Collect the precipitate formed, wash with 1 to 2 mL of water, recrystallize from