



Product Information

GRAMICIDIN from *Bacillus brevis* Product No. G 5002

CAS NUMBER: 1393-88-0 for the mixture (or 1405-97-6)^{1a,1b,1c}
For each form²

gramicidin A: 11029-61-1
gramicidin B: 11041-38-6

gramicidin C: 9062-61-7
gramicidin D: 1393-88-0

PHYSICAL DESCRIPTION:

Appearance: White powder with faint yellow cast

Molecular weight: 1880³

Fluorescence: excitation at 286 nm, emission at 337 nm.²

STORAGE / STABILITY AS SUPPLIED:

Gramicidin should be stable for at least three years stored at 2-8 °C.⁴

SOLUBILITY / SOLUTION STABILITY:

Gramicidin is almost insoluble in water, tending to form colloidal suspensions in water. It is soluble in methanol, ethanol, isopropanol, ethylene glycol, acetone, formamide at > 20 mg/mL.^{2,3} Sigma tests the solubility in ethanol at 50 mg/mL, obtaining a clear, faint yellow solution with warming. The addition of quaternary ammonium compounds, alcohols, or polyvinylpyrrolidone may increase the solubility of gramicidin in aqueous solutions.²

Solutions of 1 mg/mL in ethanol should be suitable as a reference standard for 30 days, stored at 2-8 °C.⁴
Solutions are stable to autoclaving, particularly with the addition of propylene glycol or polyethylene glycol.²

GENERAL REMARKS:

The names "gramicidin" and "gramicidin D" are often used interchangeably for a linear polypeptide antibiotic complex isolated from *Bacillus brevis* by Dubos.³ The complex was first called gramicidin D- by Dubos- to contrast it from Gramicidin S, a cyclic peptide. The commercial gramicidin actually has several forms of gramicidin, the major component being gramicidin A (MW 1884). Distribution varies, but typically is 80-85% gramicidin A, 6-7% B, 5-14% C and <1% gramicidin D.^{5,6,7}

Gramicidin is capable of transporting ions through biological membranes; it is a channel-former, rather than an ionophore (ion carrier).^{7,8} The three-dimensional structure of the ion channel is a helical dimer with each monomer in a β -helix structure.^{5,9} Detailed information on preferential ion transport is reported.⁹

Gramicidin has been shown to be involved in the regulation of bacterial sporulation^{10,11}, and shown to be a specific inhibitor of RNA polymerase, affecting the binding of RNA polymerase to DNA.¹¹ Gramicidin also affects DNA-supercoiling *in vitro*.¹²

REFERENCES:

- 1a. *Dictionary of Organic Chemicals*, 5th Ed., Vol. 3, p. 2811-2812, #G-00649.
- 1b. *U.S. Pharmacopeia*, XXI, p. 470.
- 1c. *Martindale: The Extra Pharmacopoeia*, 30th Ed. (Pharmaceutical Press, 1993), p. 172.
2. Brewer, G.A., *Anal. Prof. Drug Substances*, Vol. 8 (Acad. Press, NY, 1979), pages 179-218.
3. *Merck Index*, 12th Ed., #4553 (1996). The major component is gramicidin A with MW 1884; 1880 represents a reasonable average.
4. *U.S. Pharmacopeia*, XXII, p. 1490.
5. Langs, D.A., *Science*, 241, 188-191 (1988).
6. Ovchinnikov, Y.A., *Eur. J. Biochem.*, 94, 321-336 (1979).
7. Gross, E. and Witkop, B., *Biochemistry*, 4, 2495-2501 (1965).
8. *Data for Biochemical Research*, 3rd Ed., Dawson et al. eds. (Oxford Press, 1989), p. 298-299.
9. Urry, D.W., *Topics in Current Chem.*, 128, 175-218 (1985).
10. Modest, B. et al., *J. Gen. Microbiology*, 130, 747-755 (1984).
11. Sarkar, N. et al., *Spores*, 7, 226-231 (1978).
12. Bohg, A. and Ristow, H., *Eur. J. Biochem.*, 160, 587-591 (1986).

Sigma warrants that its products conform to the information contained in this and other Sigma-Aldrich publications. Purchaser must determine the suitability of the product(s) for their particular use. Additional terms and conditions may apply. Please see reverse side of the invoice or packing slip.