

Product Name:	Nitrofurantoin
Product Number:	N006
CAS Number:	67-20-9
Molecular Formula:	C ₈ H ₆ N ₄ O ₅
Molecular Weight:	238.16
Form:	Powder
Appearance:	Yellow crystalline powder
Solubility:	soluble in DMF (80 mg/ml). Practically insoluble in aqueous solution at 0.0795 mg/mL
Source:	Synthetic
Water Content (Karl Fischer):	< 1.0%
Storage Conditions:	Ambient. Protect from light.
Description:	<p>Nitrofurantoin is broad-spectrum nitrofuran antibiotic that is used as a substrate of bacterial glycoprotein nitrofurane reductase. It is bacteriostatic against Gram-positive and Gram-negative bacteria. It has been found to have <i>in vitro</i> anti-cancer activities in bladder cancer cells. Nitrofurantoin is soluble in DMF. It is practically insoluble in aqueous solution.</p> <p>We also offer:</p> <ul style="list-style-type: none">• Nitrofurantoin Sodium (N061)
Mechanism of Action:	<p>Nitrofurantoin has a unique mode of action in that it does not require growth or active metabolism to exert its effect. Upon entering a susceptible cell, nitrofurantoin is activated by bacterial enzymes (nitrofurane reductase) and targets ribosomes and nucleic acids which inhibit bacterial growth and leads to death of the bacterial cells. Resistance to Nitrofurantoin may be chromosomal or plasmid-mediated.</p>
Spectrum:	<p>Nitrofurantoin is a broad spectrum antibiotic frequently used to treat bacterial infections of the urinary tract. Nitrofurantoin has been found to be effective against certain β-lactam resistant strains of VRE or vancomycin resistant <i>Enterococcus</i>; a glycopeptide antibiotic resistant "superbug." It is also used against Enterococci, Staphylococci, Streptococci, Corynebacteria, and <i>E. coli</i>. Most strains of <i>Proteus</i> spp. and <i>Pseudomonas aeruginosa</i> are resistant to Nitrofurantoin.</p>

Microbiology Applications Nitrofurantoin is commonly used in clinical *in vitro* microbiological antimicrobial susceptibility tests (panels, discs, and MIC strips) against Gram-positive and Gram-negative microbial isolates. Medical microbiologists use AST results to recommend antibiotic treatment options. Representative MIC values include:

- *E. coli* 32 µg/mL - 64 µg/mL
- For a representative list of nNitrofurantoin MIC values, [click here](#).

Nitrofurantoin can be used against *Listeria monocytogenes*-persisters *in vitro*, and was effective against both growing and dormant cells (Knudsen et al, 2013).

In general, organisms are said to be susceptible if the MIC is 32 µg/ml or less. The activity of this compound is pH dependent, and mean MIC rises sharply with pH >6.

Cancer Applications

Nitrofurantoin was evaluated for its cytotoxic activity against bladder cancer cells using three transitional cell carcinoma lines (HTB9 (grade 2); T24 (gr 3) and TccSup (gr. 4) at concentrations ranging from 0 to 2000 µg/ml. MTT assay. Significant, dose-dependent cytotoxicity was seen at 7.8 µg/ml conc. in all 3 cell lines. (Kamat and Lamm, 2004).

References:

Fitzpatrick PM and Charles C. McOsker CM (1994) Nitrofurantoin: Mechanism of action and implications for resistance development in common uropathogens. *J. Antimicrob. Chemother.* 33(Suppl A):23-30 PMID 7928834

Kamat AM and Lamm DL (2004) Antitumor activity of common antibiotics against superficial bladder cancer. *Urol.* 63(3):457-460 PMID 15028437

Knudsen GM, Ng Y and Gram L (2013) Survival of bactericidal antibiotic treatment by a persister subpopulation of *Listeria monocytogenes*. *App. Environ. Microbiol.* 79(23):7390-7397 PMID 24056460

Michiels C and Remacle J (1988) Quantitative study of natural antioxidant systems for cellular nitrofurantoin toxicity. *Biochim. Biophys. Acta* 967(3):341-347 PMID 3196753

Nickerson SC, Paape MJ, Dulin AM (1985) Effect of antibiotics and vehicles on bovine mammary polymorphonuclear leukocyte morphologic features, viability, and phagocytic activity *in vitro*. *Am J Vet Res.* 46(11):2259-2265 PMID 4073636

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