Rifampicin
PRODUCT DATA SHEET

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Product Name:	Rifampicin
Product Number:	R003
CAS Number:	13292-46-1
Molecular Formula:	$C_{43}H_{58}N_4O_{12}$
Molecular Weight:	822.94
Form:	Powder
Appearance:	Brownish-red crystalline powder
Source:	Semi-synthetic: *Amycolatopsis Rifamycinica*
pH:	4.5-6.5
Density:	≥ 0.7g/cc
Storage Conditions:	Protect from light at -20°C.
Description:	Rifampicin (rifampin) is a semisynthetic antimicrobial compound derived from rifamycin SV and originally developed by the Lepetit group in 1965. Rifampicin shows activity against gram-positive bacteria, particularly mycobacteria like tuberculosis, some gram-negative anaerobic bacteria, protozoa, fungi, and poxviruses. Rifampicin inhibits the assembly of DNA and protein into mature virus particles. It inhibits initiation of RNA synthesis by binding to β-subunit of RNA polymerase, which results in cell death. Rifampicin has been shown to inhibit α-synuclein fibrillation and disaggregate fibrils in a concentration-dependent manner. Rifampicin can activate pregnane X receptor (PXR), which affects cytochrome P450, and the activity of glucuronosyltransferases and P-glycoprotein. Rifampicin has been shown to enhance CYP2C-mediated metabolism, affect compounds that are transported by P-glycoprotein and metabolized by CYP3A4. Rifampicin is an immunosuppressive agent. For a safer, and easier to use Rifampicin, try TOKU-E's ready-made Rifampicin Solution (10 mg/mL in water). Synonyms: RFP, Rifampin, 3-(((4-Methyl-1-piperazinyl)imino)methyl)rifamycin SV, NIH 10782, NSC 113926
Mechanism of Action:	Rifampicin targets prokaryotic DNA dependent RNA polymerases which prevent subsequent RNA transcription and protein translation.

Spectrum:

Rifampicin is a broad-spectrum antibiotic with a wide range of activity including:

- Gram-positive aerobic bacteria, particularly *Staphylococcus spp* and *Rhodococcus equi*
- Brucella and some other fastidious organisms are susceptible but Gram-negative bacteria more generally are resistant
- Gram-positive and Gram-negative anaerobic bacteria are inhibited at low concentrations, including *Bacteroides fragilis*
- *Chlamydophila* and *Rickettsia* are susceptible
- *Mycobacterium tuberculosis*: activity is high against this organism but most other mycobacteria are resistant
- Some protozoa
- Some fungi and poxviruses

Microbiology Applications

Rifampicin is commonly used in bacterial recombinant protein expression to inhibit bacterial RNA polymerase activity and synthesis of host bacterial proteins. Rifampicin can also be used as a selective agent to isolate *Campylobacter jejuni*.

Rose et al. used rifampicin from TOKU-E in methacrylate-based copolymer films and studied its effects on biofilm formation: "Prevention of Biofilm Formation by Methacrylate-Based Copolymer Films Loaded With Rifampin, Clarithromycin, Doxycycline Aone or in Combination."

Media Supplements

Rifampicin can be used as a selective agent in several types of isolation media:

Campylobacter Agar - *Campylobacter* Selective Supplement (Preston)

Campylobacter Agar Base - Modified Preston *Campylobacter* Selective Supplement

Plant Biology Applications

Rifampicin has been tested in Jerusalem artichoke tuber explants by adding 10 to 50 µg/ml to the tissue culture medium. At 50 µg/ml no bacterial infection was detectable, without affecting cell division rates, cytodifferentiation and DNA synthesis. As a result Rifampicin was used as antibacterial in the following experiments of this university department (Philips, 1981).

Rifampicin is a selective inhibitor of chloroplast RNA polymerase and can be used to study chloroplast-level DNA transcription in plants.

References:

"Rifampin: Mechanisms of Action and Resistance." *Oxford Journals* (1983): n. pag. *Clinical Infectious Diseases*. Web. 21 Aug. 2012.

"Philips R., Arnott S.M. and K aplan S.E., 1981, Antibiotics in plant tissue culture: rifampicin effectively controls bacterial contaminants without affecting the growth of short-term explant cultures of *Helianthus tuberosus*. Plant Science Letters, 21 (1981) 235-240.

Li, T., & Chiang, J. Y. (2006). Rifampicin induction of CYP3A4 requires pregnane X receptor cross talk with hepatocyte nuclear factor 4alpha and coactivators, and suppression of small heterodimer partner gene expression. *Drug metabolism and disposition: the biological fate of chemicals*, *34*(5), 756-64.

Jill E Maddison, A David J Watson, Jonathan Elliott (2008) Chapter 8 - Antibacterial drugs, *Small Animal Clinical Pharmacology* (Second Edition), 148-185.

Bassi, L., Berardino, L., Arioli, V., Silvestri, L., & Lignière, E. (1973). Conditions for Immunosuppression by Rifampicin. *The Journal of Infectious Diseases, 128*(6), 736-744.