Vancomycin
PRODUCT DATA SHEET

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Product Name:	Vancomycin
Product Number:	V010
CAS Number:	1404-90-6
Molecular Formula:	$C_{66}H_{75}Cl_2N_9O_{24}$
Molecular Weight:	1449.25
Form:	Powder
Appearance:	White to off-white powder
Solubility:	Freely soluble in water
Source:	Streptomyces orientalis
Water Content (Karl Fischer):	Not more than 20.0%
Absorbance:	(465nm): Not more than 0.1
Storage Conditions:	-20°C
Description:	Vancomycin is a glycopeptide antibiotic derived from *Streptomyces orientalis* that was discovered in 1953 from a soil sample found in Borneo. It is effective against gram-positive bacteria such as S*taphylococcus aureus* and is used in studies of nanoparticle transport and antibiotic resistance studies. Vancomycin acts as a cell wall synthesis inhibitor in bacteria by preventing the transfer and addition of NAM/NAG-peptides that make up the peptidoglycan cell wall structure. Vancomycin has low cell toxicity in plant cells and has been used in conjunction with Cefotaxime or Carbenicillin to stop the growth of agrobacterium in plant cell culture and transformation. Click here for more vancomycin products.
Mechanism of Action:	Vancomycin prevents cell wall synthesis by two separate mechanisms. One mechanism prevents N-acetylmuramic acid (NAM) and N-acetylglucosamine (NAG) peptides from linking together forming the peptidoglycan backbone through the incorporation of the vancomycin molecule to the D-alanyl-D-alanine terminal. The second mechanism prevents crosslinking between amino acid residues in the peptidoglycan chain altering bacterial cell membrane permeability as well as RNA synthesis.

Spectrum:

Vancomycin inhibits growth of many gram-positive bacteria including the antibiotic resistant superbug, MRSA (Methicillin resistant *Staphylococcus aureus*). Vancomycin is effective for treating MRSA infections because it inhibits cell wall synthesis through a different mechanism than β-lactam antibiotics.

Over the years gram-positive bacteria have emerged that are resistant to vancomycin, such as vancomycin resistant *staphylococcus aureus* (VRSA) and vancomycin-resistant *enterococci* (VRE).

Microbiology Applications

Vancomycin inhibits the growth of most gram-positive bacteria including the MRSA. It is usually only indicated for the treatment of serious or life-threatening bacterial infections like those caused by β-lactam-resistant staphylococci bacterial infections. There are now vancomycin resistant bacteria, primarily, vancomycin resistant staph aureus (VRSA), and vancomycin resistant enterococci (VRE).

Vancomycin (V010) and Vancomycin HCl, USP (V001) are commonly used in selective media for isolation of Gram-negative pathogens including *Campylobacter jejuni*, *Escherichia coli*, *Haemophilus influenzae*, *Helicobacter pylori*, and *Neisseria gonorrhoeae*. superbug vancomycin resistant *enterococcus* (VRE) detection.

Representative MIC values include:

- Methicillin resistant *Staphylococcus aureus* (MRSA) 0.25 µg/mL - 2 µg/mL
- *Clostridium difficile* 0.06 µg/mL - 4 µg/mL
- For a complete list of vancomycin HCl MIC values, click here.

Pryjma et al. used TOKU-E vancomycin in Mueller Hinton (MH) medium to isolate *Campylobacter jejuni*: "FdhTU-Modulated Formate Dehydrogenase Expression and Electron Donor Availability Enhance Recovery of *Campylobacter jejuni* following Host Cell Infection"

Plant Biology Applications

Vancomycin has low toxicity to Plant cells and is often used in *Agrobacterium tumefaciens* mediated transformations as a method to control its growth in plant cell culture media. Vancomycin is also suitable for bacterial contamination control in plant cell culture media and is sometimes used in combination with cefotaxime due to greater synergistic effects. Most studies do not describe any negative effects to the plant by using vancomycin, however, in a study done by Silva and Fukai (2001), lower efficiency of transformation was found at concentrations of 500 µg/ml.

References:

Courvalin, Patrice. "Vancomycin Resistance in Gram-Positive Cocci." *Oxford Journals*(2006): 25-34. *Clinical Infectious Diseaes*. Web. 21 Aug. 2012.

Pollock, H.M., Holt J., and Murray C., Comparison of susceptibilities of anaerobic bacteria to cefemenoxime, ceftriaxone and other antimicrobial compounds, Antimicrob. Agents Chemother., Vol. 23, pp.780-783, 1983

Silva J.A. and Fukai S., The impact of carbenicillin, cefotaxime and vancomycin on chrysanthemum and tobacco TCL morphogenesis and Agrobacterium growth, J. Appl. Hort., Vol. 3(1), pp. 3-12, 2001.

Joshi, S., Ray, P., Manchanda, V., Bajaj, J., Chitnis, D. S., Gautam, V., &...Balaji, V. (2013). Methicillin resistant *Staphylococcus aureus* (MRSA) in India: Prevalence & susceptibility pattern. *Indian Journal Of Medical Research*, 137(2), 363-369