

Product Name:	Oligomycin B
Product Number:	O018
CAS Number:	11050-94-5
Molecular Formula:	C ₄₅ H ₇₂ O ₁₂
Molecular Weight:	805.1
Appearance:	White Lyophilisate
Solubility:	soluble in ethanol, methanol, DMF or DMSO. Poor water solubility.
Source:	<i>Streptomyces diastatochromogenes</i>
Storage Conditions:	-20°C
Description:	<p>Oligomycin B is a minor analog of a class of macrocyclic lactones isolated from selected strains of <i>Streptomyces</i> spp. It is a non-selective inhibitor of mitochondrial F₁F₀ ATP synthase in eukaryotes. Oligomycins exhibit apoptotic cytotoxicity and mitochondrial toxicity. It can induce apoptosis in a variety of cell types. It is practically free of homologs.</p> <p>Oligomycin is a macrolide antibiotic complex from <i>Streptomyces</i>. It is an inhibitor of mitochondrial F₁F₀ ATP synthase. The Oligomycin complex was first reported in 1954, from a strain of <i>Streptomyces diastatochromogenes</i> from soil and highly active against fungi. The Oligomycin class includes the analogs/isomers A through G. Different isomers are highly specific for the disruption of mitochondrial metabolism.</p> <p>Oligomycin B is soluble in ethanol, methanol, DMSO and DMF. Practically insoluble in water.</p> <p>Additional Oligomycin products can be found here.</p>
Mechanism of Action:	<p>Oligomycin inhibits phosphoryl group transfer in mitochondrial membrane-bound ATP synthase (F₁F₀ ATPase), blocking proton translocation and leading to hyperpolarization of inner mitochondrial membrane. The result is that mitochondrial ATP is not synthesized, as this enzyme is responsible for ATP production in mammals via a rotary catalytic mechanism.</p> <p>After more than 50 years of studies on the binding site of Oligomycin, a team at the Rosalind Franklin University (North Chicago, IL) discovered that it binds to the subunit-c of the F₀ portion of the ATP synthase. The residues involved in the binding site are conserved from yeast to humans (Symersky et al, 2012).</p>
Spectrum:	Oligomycin is active against <i>Rhodotorula glutinis</i> , <i>Aspergillus niger</i> and other molds.

Microbiology Applications	A number of mutations in yeast have been shown to confer resistance to Oligomycin.
Plant Biology Applications	Oligomycin B can impair motility and induce lysis of grapevine downy mildew zoospores (<i>Plasmopara viticola</i>) in a dose- and time-dependent manner, with IC50 of 0.15 ug/ml. (Dame et al, 2016).
Cancer Applications	<p>Mitochondria are regulators in apoptosis, thus are a target for cancer research. Oligomycin was found to bypass doxorubicin resistance and block P-glycoprotein activity. P-glycoprotein causes multidrug resistance, and extrudes anticancer drugs to the extracellular environment using ATP. The result was that it triggered apoptosis in drug-resistant HepG2 cells (Li et al, 2002).</p> <p>Oligomycin can be used to measure oxygen consumption rate and extracellular acidification rates in breast cancer cell lines, contributing to our understanding of molecular pathways that contribute to breast cancer progression (Furth et al, 2018).</p>
References:	<p>Fitch ME, Chang CM and Parslow (2000) The BH3 domain is required for caspase-independent cell death induced by Bax and oligomycin. <i>Cell Death Differ.</i> 7(4):338-349 PMID 10773818</p> <p>Miyoshi N, Oubrahim H, Chock PB And Stadtman ER (2006) Age-dependent cell death and the role of ATP in hydrogen peroxide-induced apoptosis and necrosis. <i>Proc. Natl. Acad. Sci. USA</i> 103(6):1727-1731 PMID 16443681</p> <p>Peachman KK, Lyles DS and Bass DA (2001) Mitochondria in eosinophils: functional role in apoptosis but not respiration. <i>Proc. Natl Acad. Sci. USA</i> 98(4):1717-1722 PMID 11172017</p> <p>Atzmon A et al (2018) Drug screening identifies sigma-1-receptor as a target for the therapy of VWM leukodystrophy. <i>Front. Mol. Neurosci</i> 11. 336 pp. doi 10.3389</p> <p>Dame ZT, Islam MT, Helmke E, von Tiedemann A, and Laatsch H(2016). Oligomycins and pamamycin homologs impair motility and induce lysis of zoospores of the grapevine downy mildew pathogen, <i>Plasmopara viticola</i>. <i>FEMS Microbiol Lett.</i> 2016 363(16) pii: fnw167. PMID 27354061</p> <p>Furth N et al (2018) LATS1 and LATS2 suppress breast cancer progression by maintaining cell identity and metabolic state. <i>Life Sci. Alliance.</i> 1(5):e201800171 PMID 30456386</p> <p>Jastroch M (2010) Mitochondrial proton and electron leaks. <i>Essays in biochemistry</i> 47:53-67 doi:10.1042/bse0470053</p> <p>Li YC et al (2002) Mitochondria-targeting drug Oligomycin blocked P-glycoprotein activity and triggered apoptosis in doxorubicin-resistant HepG2 cells. <i>Pharmacol.</i> 50:55-62</p> <p>Raini G et al (2017) Mutant eIF2B leads to impaired mitochondrial oxidative phosphorylation in vanishing white matter disease. <i>J. Neurochem.</i> 141(5):694-707</p> <p>Smith RM, Peterson WH and McCoy E (1954) Oligomycin, a new antifungal antibiotic. <i>Antibiotics and Chemother.</i> 4(9):962-970</p> <p>Symersky J et al (2012) Oligomycin frames a common drug-binding site in the ATP synthase." <i>Proc. Natl. Acad. Sci. of the USA</i> 109(35):13961-5</p>