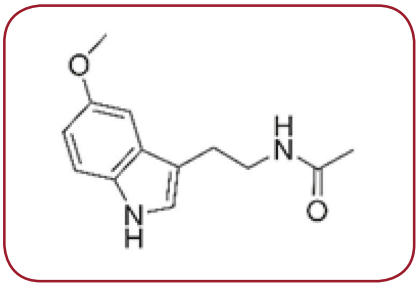
Innaxon
United Kingdom
Email: info@innaxon.com
Website: www.innaxon.co.uk



Worldwide distributed by www.adipogen.com
AdipoGen® LIFE SCIENCES

PRODUCT DATA SHEET

Melatonin powered by Lipodisq™ Sterile Solution

Nano-formulated aqueous solution: Ready-to-use

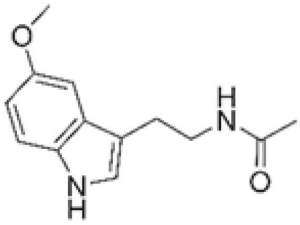
Cat. No.: IAX-700-102 **Lot. No.:**

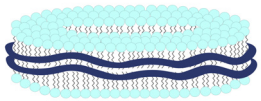
Synonyms	N-(2-(5-methoxyindol-3-yl)ethyl)acetamide, NSC 56423, NSC 113928, regulin in a detergent-free nano-formulation made of styrene-maleic acid lipid particles (SMALP)
Empirical Formula	$C_{13}H_{16}N_2O_2$
Concentration	1mg/ml (0.1% w/vol)
Size	1ml
MW	232.28
CAS	73-31-4
Purity	≥ 95% (HPLC)
Solution pH	7.00 - 7.50
Solubility	Soluble in water, PBS, Tris and other physiological solutions as formulated in a proprietary, thermostable, aqueous lipid nanoparticulate formulation (Lipodisq™, Malvern Cosmeceutics Ltd., Malvern UK). Avoid the use of buffers with divalent ions such as Ca or Mg or pH <6.5 or >8.0, which can cause particle instability. Unformulated melatonin is soluble in DMF, DMSO or ethanol.
Formulation	Lipodisq™ are nanosized lipid-based discoidal particles that can be manufactured to incorporate hydrophobic, poorly water-soluble compounds, such as lipids, lipoproteins and glycolipids.
Appearance	Colourless clear aqueous solution
Handling	Keep sterile. Avoid skin and eye contact.
Activity	Cell culture tested (human macrophage cell line) (MTT). Recommended starting dilution: 1:200 or higher. Optimal working concentrations depend on the applications and need to be determined. Published procedures using Lipodisq™ formulations (Curcumin and IAXO TLR4 antagonists) *in vivo* rodent models at 3-10mg/kg. Recommended route of administration is subcutaneous (s.c.) with oral or nasal application as a possible alternative, which needs to be optimised. Carrier only control: Lipodisq™ Control Sterile Solution (Cat. No.: IAX-700-100).
Shipping	Ambient
Storage	2-8°C
Stability	12 months after receipt (unopened and as supplied)
MSDS	Available on request

Document No.: IAX-700-102-TDS | **Version:** 1.2 | **Issue Date:** 16/09/2022

DISCLAIMER: THIS PRODUCT IS NOT INTENDED OR APPROVED FOR HUMAN, DIAGNOSTICS, OR VETERINARY USE. THIS PRODUCT IS FOR RESEARCH USE ONLY (RUO).
MATERIAL SAFETY DATA: This material should be considered hazardous until information to the contrary becomes available. Do not ingest, swallow, inhale or allow to enter the bloodstream. Avoid contact with the eyes, or the skin, or clothing. Wash thoroughly after handling. Access to this material must be restricted to personnel, who are appropriately experienced, qualified, competent, and properly trained to use it.

Innaxon
United Kingdom
Email: info@innaxon.com
Website: www.innaxon.co.uk





Melatonin powered by Lipodisq™ Sterile Solution

Nano-formulated aqueous solution: Ready-to-use

Cat. No.: IAX-700-102 **Lot. No.:**

General Information

- Melatonin, an evolutionarily ancient derivative of serotonin with hormonal properties, is the main neuroendocrine secretory product of the pineal gland. It regulates circadian rhythmicity and also exerts anti-oxidative, anti-inflammatory, immunomodulatory, and anti-tumor capacities.
- Melatonin levels in individuals increase from birth and peak around puberty. Its synthesis and levels decline in middle-aged and most elderly individuals along with a simultaneous reduction in the urinary excretion of its metabolites.
- Moreover, it stimulates antioxidant defense systems in the brain. The decline in melatonin production in aged individuals is itself a significant factor that may contribute to age-related neurodegenerative disease processes and has been suggested as one of the primary reasons for the development of Alzheimer Disease (AD).
- Melatonin exerts antibacterial activities not only on classic gram-negative and -positive bacteria, but also on members of other bacterial groups, such as Mycobacterium tuberculosis.
- In recent years, an increasing number of studies have described the anticancer effects of melatonin.
- Melatonin is also a mitophagy regulator. It may exert an essential effect on mitochondrial physiology and facilitates mitochondrial function. A central mechanism by which melatonin protects mitochondria is by restoring the mitochondrial membrane potential (MMP) through blocking mitochondrial permeability transition pore (mPTP) opening under stress and activating uncoupling proteins (UCPs) to marginally decrease MMP under normal conditions.

Melatonin References

[1] *Mechanisms of Melatonin in Obesity: A Review.* Guan Q, Int. J. Mol. Sci. (2022); 23:218

[2] *Protective Role of Melatonin and Its Metabolites in Skin Aging.* Georgeta Bocheva G, et al. Int. J. Mol. Sci. (2022); 23:1238

[3] *Melatonin and Phytomelatonin: Chemistry, Biosynthesis, Metabolism, Distribution and Bioactivity in Plants and Animals—An Overview.* Mannino G, et al. Int. J. Mol. Sci. (2021); 22:9996

[4] *Membrane Melatonin Receptors Activated Cell Signaling in Physiology and Disease.* Nikolaev G, et al. Int. J. Mol. Sci. (2022); 23:471

[5] *New insights into the role of melatonin in diabetic cardiomyopathy.* Huang K, et al. Pharmacol Res. Perspect. (2022); 10:e00904

[6] *Mechanisms of Melatonin in Alleviating Alzheimer's Disease.* Shukla M, et al. Curr. Neuropharmacol. (2017); 15:1010

[7] *Cellular Mechanisms of Melatonin: Insight from Neurodegenerative Diseases.* Chen D, et al. Biomolecules (2020); 10:1158

[8] *Melatonin and Pathological Cell Interactions: Mitochondrial Glucose Processing in Cancer Cells.* Reiter RF, et al. Int. J. Mol. Sci. (2021); 2212494

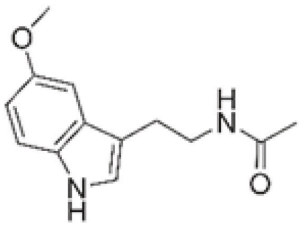
[9] *Use of Melatonin in Cancer Treatment: Where Are We?* Wang L, et al. Int. J. Mol. Sci. (2022); 23:3779

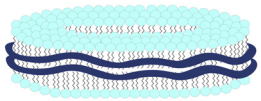
[10] *Bacteriostatic Potential of Melatonin: Therapeutic Standing and Mechanistic Insights.* He F, et al. Front. Immunol. (2021); 12:683879

[11] *Melatonin: From Pharmacokinetics to Clinical Use in Autism Spectrum Disorder.* Sébastien Lalanne S, et al. Int. J. Mol. Sci. (2021); 22:1490

DISCLAIMER: THIS PRODUCT IS NOT INTENDED OR APPROVED FOR HUMAN, DIAGNOSTICS, OR VETERINARY USE. THIS PRODUCT IS FOR RESEARCH USE ONLY (RUO).
MATERIAL SAFETY DATA: This material should be considered hazardous until information to the contrary becomes available. Do not ingest, swallow, inhale or allow to enter the bloodstream. Avoid contact with the eyes, or the skin, or clothing. Wash thoroughly after handling. Access to this material must be restricted to personnel, who are appropriately experienced, qualified, competent, and properly trained to use it.

Innaxon
United Kingdom
Email: info@innaxon.com
Website: www.innaxon.co.uk





Melatonin powered by Lipodisq™ Sterile Solution

Nano-formulated aqueous solution: Ready-to-use

Cat. No.: IAX-700-102 **Lot. No.:**

Lipodisq™ Technology

- A nanoparticle (11-40nm) drug delivery system comprising a discoidal phospholipid bilayer membrane stabilised by a chaperone molecule annulus.
- Internal properties of the phospholipid membrane support the disposition and stabilisation of drug molecule candidates and preserve the native conformation of membrane molecules.
- The resulting encapsulated actives are rendered water-soluble and specialised for intra-cellular penetration/delivery via endosomal uptake mechanisms.
- Lipodisq™ solutions show a good safety profile and are suitable for *in vitro* and *in vivo* investigations.
- For a customizable biodegradable Lipodisq™ version with a higher concentration of actives or an alternative lipid option, contact Innaxon.

Component	Concentration	CAS #	EC #
Water (sterile)	QS	7732-18-5	231-791-2
Poly(styrene maleic acid)	25mg/ml	26762-29-8	607-996-1
Lecithin	9mg/ml	92128-87-5	295-786-7
Melatonin	1mg/ml	73-31-4	200-797-7

Lipodisq™ References

[1] *Mechanisms of Formation, Structure, and Dynamics of Lipoprotein Discs Stabilized by Amphiphilic Copolymers: A Comprehensive Review.* Orekhov PS, et al. Nanomaterials (2022); 12:361

[2] *Applications of Synthetic Polymer Discoidal Lipid Nanoparticles to Biomedical Research.* Tanaka M. Chem. Pharm. Bull. (2022); 70:507

[3] *Understanding the Structural Pathways for Lipid Nanodisc Formation: How Styrene Maleic Acid Copolymers Induce Membrane Fracture and Disc Formation.* Bjørnestad VA, et al. Langmuir (2021); 37:6178

[4] *Physicochemical Characterization, Toxicity and In Vivo Biodistribution Studies of a Discoidal, Lipid-Based Drug Delivery Vehicle: Lipodisq Nanoparticles Containing Doxorubicin.* Torgersen ML, et al. J. Biomed. Nanotechnol. (2020); 16:41

[5] *Effects of charged lipids on the physicochemical and biological properties of lipid–styrene maleic acid copolymer discoidal particles.* Tanakaa M, et al. Biochim. Biophys. Acta. Biomembr. (2020); 1862:183209

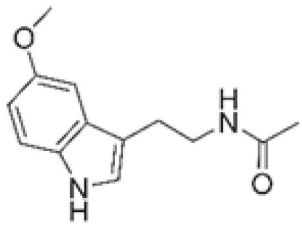
[6] *From polymer chemistry to structural biology: The development of SMA and related amphipathic polymers for membrane protein extraction and solubilization.* Bada Juarez JF, et al. Chem. Phys. Lipids. (2019); 221:167

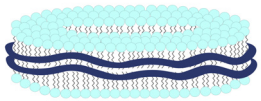
[7] *The styrene–maleic acid copolymer: a versatile tool in membrane research.* Dörr JM, et al. Eur. Biophys. J. (2016); 45:3

[8] *Reconstitution of membrane proteins: a GPCR as an example.* Goddard AD, et al. Methods Enzymol. (2015); 556:405

DISCLAIMER: THIS PRODUCT IS NOT INTENDED OR APPROVED FOR HUMAN, DIAGNOSTICS, OR VETERINARY USE. THIS PRODUCT IS FOR RESEARCH USE ONLY (RUO).
MATERIAL SAFETY DATA: This material should be considered hazardous until information to the contrary becomes available. Do not ingest, swallow, inhale or allow to enter the bloodstream. Avoid contact with the eyes, or the skin, or clothing. Wash thoroughly after handling. Access to this material must be restricted to personnel, who are appropriately experienced, qualified, competent, and properly trained to use it.

Innaxon
United Kingdom
Email: info@innaxon.com
Website: www.innaxon.co.uk





Melatonin powered by Lipodisq™ Sterile Solution

Nano-formulated aqueous solution: Ready-to-use

Cat. No.: IAX-700-102 **Lot. No.:**

Lipodisq™ References

[9] *Nano-size uni-lamellar lipodisq improved in situ auto-phosphorylation analysis of E. coli tyrosine kinase using (19)F nuclear magnetic resonance.* Li D, et al. Protein Cell (2015); 6:229

[10] *Characterizing the structure of lipodisq nanoparticles for membrane protein spectroscopic studies.* Zhang R, et al. Biochim. Biophys. Acta. (2015); 1848:329

[11] *Advances in the use of nanoscale bilayers to study membrane protein structure and function.* Malhotra K and Alder NN. Biotechnol. Genet. Eng. Rev. (2014); 30:79

[12] *DEER EPR measurements for membrane protein structures via bifunctional spin labels and lipodisq nanoparticles.* Sahu ID, et al. Biochemistry (2013); 52:6627

[13] *Detergent-free formation and physicochemical characterization of nanosized lipidpolymer complexes: lipodisq.* Orwick MC, et al. Angew. Chem. (2012); 51:4653

[14] *Detergent-free incorporation of a seven-transmembrane receptor protein into nanosized bilayer lipodisq particles for functional and biophysical studies.* Orwick-Rydmark M, et al. Nano Lett. (2012); 12:4687

[15] *In vitro and in vivo evaluation of tumor targeting styrene-maleic acid copolymer-pirarubicin micelles: survival improvement and inhibition of liver metastases.* Daruwalla, J, et al. Cancer Sci. (2010); 101:1866

[16] *Poly(styrene-alt-maleic anhydride) derivatives as potent anti-HIV microbicide candidates.* Fang W, et al. Bioorg. Med. Chem. Lett. (2009); 19:1903

[17] *SMA–doxorubicin, a new polymeric micellar drug for effective targeting to solid tumours.* Greish K, et al. J. Control. Release (2004); 97:219

[18] *Responsive Hydrophobically Associating Polymers: A Review of Structure and Properties.* Tonge, SR and Tighe, BJ. Adv. Drug Deliv. Rev. (2001): 53:109

Lipodisq™ technology is covered by one or more of the following patents owned by Malvern Cosmeceutics Limited: AU2006253886, CA2611144, CN101184473B, EP1890675, GB2426703, IN261468, JP5142898, US8623414 and WO/2021/005340A1 pending.
The purchaser is licensed under those patents to use these assemblies for the purpose of research and development only but not for the purpose of delivery of agents for clinical use to humans or veterinary use to animals for therapeutic, diagnostic or prophylactic purposes, which uses are specifically prohibited.

Authorized Uses & Restrictions

The purchase of Innaxon product(s) conveys to the buyer the non-transferable right to use the purchased amount of the product and all replicates and derivatives for, internal, non-profit research purposes. The buyer cannot sell, resale or otherwise transfer (a) the product (b) its components or (c) materials made using this product or its components to a third party. The buyer agrees that any activity undertaken with the product and replicates or derivatives will be conducted in compliance with all applicable guidelines, laws, and regulations. The buyer agrees that the product and replicates or derivatives will not be used for any animal or human therapeutic or diagnostic use.

Limited Use License

Purchase does not include any other right or license to use, develop or otherwise exploit our products. Any use of Innaxon products outside of the Authorized Uses requires additional rights from the Licensor.

DISCLAIMER: THIS PRODUCT IS NOT INTENDED OR APPROVED FOR HUMAN, DIAGNOSTICS, OR VETERINARY USE. THIS PRODUCT IS FOR RESEARCH USE ONLY (RUO).
MATERIAL SAFETY DATA: This material should be considered hazardous until information to the contrary becomes available. Do not ingest, swallow, inhale or allow to enter the bloodstream. Avoid contact with the eyes, or the skin, or clothing. Wash thoroughly after handling. Access to this material must be restricted to personnel, who are appropriately experienced, qualified, competent, and properly trained to use it.