

# Product data sheet



MedKoo Cat#: 100621 Name: Methylene blue CAS: 61-73-4 Chemical Formula: C <sub>16</sub> H <sub>18</sub> ClN <sub>3</sub> S Molecular Weight: 319.8522	
Product supplied as: Powder	
Purity (by HPLC): ≥ 98%	
Shipping conditions: Ambient temperature	
Storage conditions: Powder: -20°C 3 years; 4°C 2 years. In solvent: -80°C 3 months; -20°C 2 weeks.	

## 1. Product description:

Methylene blue is a synthetic basic dye. Methylene blue stains to negatively charged cell components like nucleic acids; when administered in the lymphatic bed of a tumor during oncologic surgery, methylene blue may stain lymph nodes draining from the tumor, thereby aiding in the visual localization of tumor sentinel lymph nodes. When administered intravenously in low doses, this agent may convert methemoglobin to hemoglobin.

## 2. CoA, QC data, SDS, and handling instruction

SDS and handling instruction, CoA with copies of QC data (NMR, HPLC and MS analytical spectra) can be downloaded from the product web page under “QC And Documents” section. Note: copies of analytical spectra may not be available if the product is being supplied by MedKoo partners. Whether the product was made by MedKoo or provided by its partners, the quality is 100% guaranteed.

## 3. Solubility data

Solvent	Max Conc. mg/mL	Max Conc. mM
DMSO	3.2	10.00
Water	26.6	83.16

## 4. Stock solution preparation table:

Concentration / Solvent Volume / Mass	1 mg	5 mg	10 mg
1 mM	3.13 mL	15.63 mL	31.26 mL
5 mM	0.63 mL	3.13 mL	6.25 mL
10 mM	0.31 mL	1.56 mL	3.13 mL
50 mM	0.06 mL	0.31 mL	0.63 mL

## 5. Molarity Calculator, Reconstitution Calculator, Dilution Calculator

Please refer the product web page under section of “Calculator”

## 6. Recommended literature which reported protocols for in vitro and in vivo study

### In vitro study

1. Poteet E, Winters A, Yan LJ, Shufelt K, Green KN, Simpkins JW, Wen Y, Yang SH. Neuroprotective actions of methylene blue and its derivatives. *PLoS One*. 2012;7(10):e48279. doi: 10.1371/journal.pone.0048279. Epub 2012 Oct 31. PMID: 23118969; PMCID: PMC3485214.
2. Wen Y, Li W, Poteet EC, Xie L, Tan C, Yan LJ, Ju X, Liu R, Qian H, Marvin MA, Goldberg MS, She H, Mao Z, Simpkins JW, Yang SH. Alternative mitochondrial electron transfer as a novel strategy for neuroprotection. *J Biol Chem*. 2011 May 6;286(18):16504-15. doi: 10.1074/jbc.M110.208447. Epub 2011 Mar 18. PMID: 21454572; PMCID: PMC3091255.

### In vivo study

1. Hochgräfe K, Sydow A, Matenia D, Cadinu D, Könen S, Petrova O, Pickhardt M, Goll P, Morellini F, Mandelkow E, Mandelkow EM. Preventive methylene blue treatment preserves cognition in mice expressing full-length pro-aggregant human Tau. *Acta Neuropathol Commun*. 2015 May 10;3:25. doi: 10.1186/s40478-015-0204-4. PMID: 25958115; PMCID: PMC4425867.
2. Fenn AM, Skendelas JP, Moussa DN, Muccigrosso MM, Popovich PG, Lifshitz J, Eiferman DS, Godbout JP. Methylene blue attenuates traumatic brain injury-associated neuroinflammation and acute depressive-like behavior in mice. *J Neurotrauma*. 2015 Jan 15;32(2):127-38. doi: 10.1089/neu.2014.3514. Epub 2014 Nov 13. PMID: 25070744; PMCID: PMC4291210.

# Product data sheet



## 7. Bioactivity

### Biological target:

---

Methylene blue (Basic Blue 9) is a guanylyl cyclase (sGC), monoamine oxidase A (MAO-A) and NO synthase (NOS) inhibitor. Methylene blue is a vasopressor and is often used as a dye in several medical procedures.

### In vitro activity

---

MB (methylene blue) reduces mitochondrial superoxide production via alternative electron transfer that bypasses mitochondrial complexes I-III. MB mitigates reactive free radical production and provides neuroprotection in HT-22 cells against glutamate, IAA and rotenone toxicity.

Reference: PLoS One. 2012;7(10):e48279. <https://pubmed.ncbi.nlm.nih.gov/23118969/>

### In vivo activity

---

Preventive MB (methylene blue) application starting before onset of functional deficits preserved cognition of Tau( $\Delta$ K) mice. Beside improved learning and memory, MB-treated Tau( $\Delta$ K) mice showed a strong decrease of insoluble Tau, a reduction of conformationally changed (MC1) and phosphorylated Tau species (AT180, PHF1) as well as an upregulation of protein degradation systems (autophagy and proteasome).

Reference: Acta Neuropathol Commun. 2015 May 10;3:25. <https://pubmed.ncbi.nlm.nih.gov/25958115/>

*Note: The information listed here was extracted from literature. MedKoo has not independently retested and confirmed the accuracy of these methods. Customer should use it just for a reference only.*