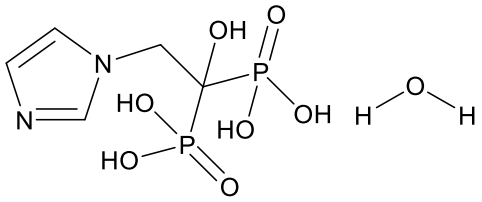
Product data sheet

MedKoo Cat#: 100950 Name: Zoledronic acid CAS#: 165800-06-6 (hydrate) Chemical Formula: $C_5H_{12}N_2O_8P_2$ Exact Mass: 271.99632 Molecular Weight: 290.1	
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:
Zoledronic acid is a synthetic imidazole bisphosphonate analog of pyrophosphate with anti-bone-resorption activity. A third-generation bisphosphonate, zoledronic acid binds to hydroxyapatite crystals in the bone matrix, slowing their dissolution and inhibiting the formation and aggregation of these crystals. This agent also inhibits farnesyl pyrophosphate synthase, an enzyme involved in terpenoid biosynthesis. Inhibition of this enzyme prevents the biosynthesis of isoprenoid lipids, donor substrates of farnesylation and geranylgeranylation during the post-translational modification of small GTPase signalling proteins, which are important in the process of osteoclast turnover.

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	0.01	0.03
PBS (pH 7.2)	1.6	5.52
Water	1.0	3.45

4. Stock solution preparation table:

Concentration / Solvent Volume / Mass	**1 mg**	**5 mg**	**10 mg**
1 mM	3.45 mL	17.24 mL	34.47 mL
5 mM	0.69 mL	3.45 mL	6.89 mL
10 mM	0.34 mL	1.72 mL	3.45 mL
50 mM	0.07 mL	0.34 mL	0.69 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. Chiarella E, Codispoti B, Aloisio A, Cosentino EG, Scicchitano S, Montalcini Y, Lico D, Morrone G, Mesuraca M, Bond HM. Zoledronic acid inhibits the growth of leukemic MLL-AF9 transformed hematopoietic cells. Heliyon. 2020 Jun 5;6(6):e04020. doi: 10.1016/j.heliyon.2020.e04020. PMID: 32529062; PMCID: PMC7283156.
2. Huang XL, Huang LY, Cheng YT, Li F, Zhou Q, Wu C, Shi QH, Guan ZZ, Liao J, Hong W. Zoledronic acid inhibits osteoclast differentiation and function through the regulation of NF-κB and JNK signalling pathways. Int J Mol Med. 2019 Aug;44(2):582-592. doi: 10.3892/ijmm.2019.4207. Epub 2019 May 23. PMID: 31173157; PMCID: PMC6605660.

In vivo study

1. Colon-Echevarria CB, Ortiz T, Maldonado L, Hidalgo-Vargas MJ, Pérez-Morales J, Aquino-Acevedo AN, Herrera-Noriega R, Bonilla-Claudio M, Castro EM, Armaiz-Pena GN. Zoledronic Acid Abrogates Restraint Stress-Induced Macrophage Infiltration,

PDGF-AA Expression, and Ovarian Cancer Growth. Cancers (Basel). 2020 Sep 18;12(9):2671. doi: 10.3390/cancers12092671. PMID: 32962103; PMCID: PMC7563308.
2. Yang X, Xu X, Chen J, Wang Q, Wang G, Ai X, Wang X, Pan J. Zoledronic acid regulates the synthesis and secretion of IL-1β through Histone methylation in macrophages. Cell Death Discov. 2020 Jun 11;6:47. doi: 10.1038/s41420-020-0273-4. PMID: 32566254; PMCID: PMC7289826.

7. Bioactivity

Biological target:

Zoledronic acid monohydrate (Zoledronate monohydrate) is a third-generation bisphosphonate (BP), with potent anti-resorptive activity.

In vitro activity

In the present paper this study shows that by using ZOL (Zoledronic acid) that inhibition of the mevalonate pathway at the stage of farnesylation (FDP synthase) compromises the growth of the CB-MA9 cells, particularly when the cells require membrane dependent cell-cell interactions in 3D colony culture. ZOL was also found to effectively inhibit the formation and size of cobblestone like structures which form when HSCs or MA9 cells migrate burrowing underneath the stromal layer.

Reference: Heliyon. 2020 Jun; 6(6): e04020. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7283156/

In vivo activity

In the SKOV3ip1 mouse model, restraint stress increased tumor growth by 4.07-fold (mean difference 0.834 g) and nodule counts by 3.54-fold (mean difference 14.14), while ZA (Zoledronic acid) significantly abrogated this effect (Figure 5b; $p < 0.001$). In the HeyT30 model, stress significantly increased tumor growth by 2.0-fold (mean difference 1.769 g), and nodule counts by 2.5-fold (mean difference 4.5). Similarly to the SKOV3ip1 model, ZA treatment prevented the effects of stress on tumor growth and nodule development in the HeyT30 model (Figure 5c; $p < 0.05$).

Reference: Cancers (Basel). 2020 Sep; 12(9): 2671. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7563308/

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.