SIGMA-ALDRICH®

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Product Information

Betaine monohydrate

Catalog Number **B2754**
Storage Temperature 2–8 °C

CAS RN 0590-47-6
Synonyms: (Carboxymethyl)trimethylammonium hydroxide, trimethylglycine hydroxide

Product Description
Molecular Formula: $C_5H_{11}NO_2 \cdot H_2O$
Formula Weight: 135.16

Betaine compounds occur naturally in plants and animals, such as in sugar beets and marine algae. A review of the role of glycine betaine in protecting plants from environmental stress has been published.[1] The role of betaine and other organic osmolytes in maintaining osmolarity in mammalian cells has been reviewed.[2]

Betaine has been reported to diminish the base pair composition dependence of DNA thermal melting transitions, with a betaine concentration of 5.2 M being the value at which AT and GC base pairs are equally stable.[3] Betaine has subsequently found application in the polymerase chain reaction (PCR).[4,5] The usefulness of betaine in PCR resulted from its ability to enhance DNA amplification by diminishing the formation of secondary structure in GC-rich DNA regions.[6] A protocol for the production of long-chain cDNAs that uses betaine and trehalose has been published.[7]

The permanent positive charge on betaine makes it a target of study for mass spectrometry (MS) analysis by such methods as electrospray ionization (ESI) MS.[8] A protocol for the analysis of betaine and other choline related compounds from tissues that combines HPLC with isotope dilution ESI-MS has been described.[9]

Betaine is a reagent that is used in soldering, resin curing fluxes, and organic synthesis.[10]

Precautions and Disclaimer
This product is for R&D use only, not for drug, household, or other uses. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

Preparation Instructions
This product is soluble in water (50 mg/ml), yielding a clear, colorless solution. This product is also soluble in methanol (55 g/100 g) and ethanol (8.7 g/100 g).[10]

A 5 M solution of betaine in water is available (Catalog Number B0300).

Storage/Stability
Store the product at 2–8 °C. It remains active for at least two years.

References
1. Sakamoto, A., and Murata, N., The role of glycine betaine in the protection of plants from stress: clues from transgenic plants. Plant Cell. Environ., **25(2)**, 163-171 (2002).
2. Lang, F., et al., The diversity of volume regulatory mechanisms. Cell. Physiol. Biochem., **8(1-2)**, 1-45 (1998).
3. Rees, W.A., et al., Betaine can eliminate the base pair composition dependence of DNA melting. Biochemistry, **32(1)**, 137-144 (1993).
4. Papp, A.C., et al., Strategies for amplification of trinucleotide repeats: Optimization of fragile X and androgen receptor PCR. Mol. Diagn., **1(1)**, 59-64 (1996).
5. Weissensteiner, T., and Lanchbury, J.S., Strategy for controlling preferential amplification and avoiding false negatives in PCR typing. Biotechniques, **21(6)**, 1102-1108 (1996).
6. Henke, W., et al., Betaine improves the PCR amplification of GC-rich DNA sequences. Nucleic Acids Res., **25(19)**, 3957-3958 (1997).
7. Spiess, A.N., and Ivell, R., A highly efficient method for long-chain cDNA synthesis using trehalose and betaine. Anal. Biochem., **301(2)**, 168-174 (2002).
8. Wood, K.V., et al., Characterization of betaines using electrospray MS/MS. Phytochemistry, **59(7)**, 759-765 (2002).

9. Koc, H., et al., Quantitation of choline and its metabolites in tissues and foods by liquid chromatography/electrospray ionization-isotope dilution mass spectrometry. Anal. Chem., **74(18)**, 4734-4740 (2002).
10. Data for Biochemical Research, 3rd ed., Dawson, R. M. C., et al., Oxford University Press (New York, NY: 1986), pp. 8-9.

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