User Guide

Betaine Solution

5 M, PCR Reagent

B0300

Product Description

Betaine, also called trimethylglycine or N,N,N-triethylammonium acetate, is an analog of glycine with three methyl groups.[1] Betaine is a PCR enhancing reagent that is widely used for improving the yield and specificity of PCR products, especially for the amplification of targets rich in GC content or those that form secondary structures resulting in poor yield. Betaine facilitates DNA strand separation and decreases secondary structure of GC-rich regions.[2] Betaine has been broadly used to optimize multiplex and 'long and accurate' polymerase chain reaction (LA-PCR). The addition of 1.0-1.7 M aqueous betaine to a PCR mixture has been reported to reduce the base pair composition dependence on DNA strand melting.[3]

Quality Specifications

- Suitable for molecular biology applications with high GC content. Upon addition of Betaine Solution to 1.2 M, a 994 bp human gene target with 64% GC content is amplified via PCR with JumpStart™ Taq DNA Polymerase, while no amplification is detected in the absence of Betaine Solution.
- DNase free: No degradation of HindIII-digested lambda phage DNA detected after incubation with 1.2 M Betaine Solution for 16 hours at 37 °C.
- RNase free: No degradation of tRNA detected after incubation with 1.2 M Betaine Solution for 16 hours at 37 °C.
- Endonuclease free: No nicking or linearization of pBR322 plasmid DNA detected after incubation with 1.2 M Betaine Solution for 16 hours at 37 °C.

Applications

- Loop-mediated isothermal amplification (LAMP)[4]
- PCR for genomic DNA amplification[5]
- Quantitative PCR (qPCR)[6] and RT-qPCR
- PCR amplification of CGG repeats in genomic DNA[7]
- Reverse transcription for single cell cDNA library preparation via Smart-seq-total[8]

Intended Use

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

Storage

Store at 2-8 °C.

Directions for Use

Add Betaine to a final concentration of 1.0 – 1.7 M in a nucleic acid amplification mixture prior to initiation of thermocycling/heating.

References

1. Day CR and Kempton SA. Biochim biophys acta., 1860(6):1098-106 (2016).
2. Jensen MA, et al. PLoS ONE, 5(6):e11024. (2010).
3. Rees WA, et al. Biochem., 32(1):137-44. (1993).
4. Kostic T, et al. Appl Microbiol Biotechnol., 99(18): 7711–7722. (2015).
5. Azaiez H, et al. Hum Mutat., 24(4):305-11. (2004).
6. Milte CM, et al. Eur J Nutr., 57(1):363-372. (2018).
7. Saulto A, et al. J Mol Diagn., 7(5):605-12. (2005).
8. Isakova A, et al. Proc Natl Acad Sci USA., 118(51):e2113568118. (2021).

Product Ordering

Order products online at SigmaAldrich.com.

Description	Catalogue Number
JumpStart™ *Taq* DNA Polymerase	D4184
Deoxynucleotide (dNTP) Mix, containing 10 mM each of dATP, dCTP, dGTP, and dTTP sodium salts	D7295
Nuclease-free water	W1754
Custom ordered primers specific to gene target	OLIGO
GenElute™-E Single Spin DNA Cleanup Kit	EC600
GenElute™ PCR Clean-Up Kit	NA1020
GenElute™ Gel Extraction Kit	NA1111
Precast Agarose Gels	P6222 P5472 P6097 P5972 P5722
1 kb DNA Ladder	D0428
Water, Microbial DNA-free	MBD0025
Nuclease-Free Water, for Molecular Biology	W4502
JumpStart™ *Taq* Ready Mix	P2893
RED*Taq*® Ready Mix	P0982
Glycerol-free JumpStart™ *Taq* DNA Polymerase	D9310
DMSO	D8418
Single strand binding protein	S3917
BST Max DNA Polymerase	SRE0113

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