

Product Information

Taq DNA Polymerase, from *Thermus aquaticus* recombinant, expressed in *Escherichia coli*

Catalog Number **D1806**
Storage Temperature $-20\text{ }^{\circ}\text{C}$

TECHNICAL BULLETIN

Introduction

Taq DNA Polymerase is a thermostable enzyme derived from the thermophilic bacterium *Thermus aquaticus*. The enzyme is in a recombinant form, expressed in *E. coli*. It is able to withstand repeated heating to $95\text{ }^{\circ}\text{C}$ without significant loss of activity. The enzyme is approximately 94 kDa by SDS-PAGE with no detectable endonuclease or exonuclease activity. It has $5'\rightarrow 3'$ DNA polymerase activity and $5'\rightarrow 3'$ exonuclease activity. Each lot of *Taq* DNA Polymerase is tested for PCR⁺ amplification and double-stranded sequencing. The enzyme is supplied at 5 units/ μL and comes with an optimized 10 \times reaction buffer.

Unit Definition: One unit incorporates 10 nmol of total deoxyribonucleoside triphosphates into acid precipitable DNA in 30 minutes at $74\text{ }^{\circ}\text{C}$.

Reagents Provided

- *Taq* DNA Polymerase, Catalog No. D6677
5 units/ μL in 20 mM Tris-HCl, pH 8.0, 100 mM KCl, 0.1 mM EDTA, 1 mM DTT, stabilizers, 0.5% IGEPAL[®] CA-630, 50% glycerol
- 10 \times PCR Buffer, Catalog No. P2192
100 mM Tris-HCl, pH 8.3, 500 mM KCl, 15 mM MgCl_2 and 0.01% gelatin

Reagents required, but not provided

- 10 mM dATP, Catalog No. D6920
- 10 mM dCTP, Catalog No. D7045
- 10 mM dGTP, Catalog No. D7170
- 10 mM TTP, Catalog No. T7791
or (in place of individual nucleotides)
- Deoxynucleotide Mix, Catalog No. D7295
containing 10 mM dATP, 10 mM dCTP, 10 mM dGTP, 10 mM TTP
- Water, PCR Reagent, Catalog No. W1754
- Mineral Oil, Catalog No. M8662 (optional)
- Thermal cycler
- Primers
- DNA to be amplified
- 0.2 ml or 0.5 ml Thin-Walled PCR Tubes, Catalog Nos. P3114 and P 3364

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.

Storage

Store at $-20\text{ }^{\circ}\text{C}$

Amplification Procedure

The optimal conditions for the concentration of *Taq* DNA polymerase, template DNA, primers, and MgCl_2 will depend on the system being utilized. It may be necessary to determine the optimal conditions for each individual component. This is especially true for the *Taq* DNA polymerase, cycling parameters, and the MgCl_2 concentration. It is recommended the enzyme and the MgCl_2 be titrated to determine the optimal efficiency. PCR Optimization Kit, Catalog No. OPT2, contains a variety of buffers and adjuncts for optimizing the specificity, fidelity and yield of a PCR product.

1. Add the following reagents to a 0.2 or 0.5 ml microcentrifuge tube in the following order:

Amount	Component	Final Concentration
w μL	Water	
5 μL	10 \times PCR Buffer	1 \times
1 μL^*	10 mM dATP	200 μM
1 μL^*	10 mM dCTP	200 μM
1 μL^*	10 mM dGTP	200 μM
1 μL^*	10 mM TTP	200 μM
x μL	Forward primer (typically 15-30 bases in length)	0.1-0.5 μM
y μL	Reverse primer (typically 15-30 bases in length)	0.1-0.5 μM
0.5 μL	<i>Taq</i> DNA Polymerase	0.05 units/ μL
z μL	Template DNA (typically 10 ng)	200 pg/ μL
50 μL	Total reaction volume	

*Note: The individual nucleotides (4 μ L total) may be substituted by 1 μ L of Deoxynucleotide Mix, Catalog No. D7295.

2. Mix gently by vortex and briefly centrifuge to collect all components to the bottom of the tube.
3. Add 50 μ L of mineral oil to the top of each tube to prevent evaporation if using a thermal cycler without a heated lid.
4. The amplification parameters will vary depending on the primers and the thermal cycler used. It may be necessary to optimize the system for individual primers, template, and thermal cycler.

Typical cycling parameters:

25-30 cycles of amplification are recommended		
Denature template	94 °C	1 min
Anneal primers	55 °C	2 min
Extension	72 °C	3 min

5. The amplified DNA can be evaluated by agarose gel electrophoresis and subsequent ethidium bromide staining. Mineral oil overlay may be removed by a single chloroform extraction (1:1), recovering the aqueous phase.

*The PCR process is covered by patents owned by Hoffman-LaRoche, Inc.

References

1. Cheng, S., et al., *Proc. Natl. Acad. Sci. USA*, **91**, 5695-5699 (1994).
2. Chou, Q., *Nucleic Acids Res.* **20**, 4371 (1992).
3. Innis, M.A., et al. (Eds.) *PCR Strategies*, Academic Press, New York (1995). Catalog No. Z364452.
4. Innis, M., et al. (Eds.) *PCR Protocols: A Guide to Methods and Applications*, Academic Press, San Diego, California (1990). Catalog No. P8177.
5. Innis, M., et al., *Proc. Natl. Acad. Sci. USA* **85**, 9436-9440 (1988).
6. Newton, C.R. (Ed.) *PCR: Essential Data*, John Wiley & Sons, New York (1995). Catalog No. Z364916.
7. Olive, D., et al., *J. Clin. Microbiol. USA* **27**, 1238 (1989).
8. Paabo, S., et al., *Nucleic Acids Res.* **16**, 9775-9787 (1988).
9. Saiki, R., *PCR Technology: Principles and Applications for DNA Amplification*, Stockton, New York (1989).
10. Sambrook, J, et al. *Molecular Cloning: A Laboratory Manual*, Third Edition, Cold Spring Harbor Laboratory Press, New York (2000) . Catalog No. M8265.
11. Sarkar, G., et al., *Nucleic Acids Res.* **18**, 7465 (1990).
12. Winship, P.R., et al., *Nucleic Acids Res.* **17**, 1266 (1989).

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