

# Taq DNA Polymerase

## POLYMERASE CHAIN REACTION (PCR)

### Description

*Taq* DNA Polymerase is a single-subunit enzyme purified from the thermophilic bacterium *Thermus aquaticus*. It polymerizes DNA from a primer annealed to a DNA template in the presence of deoxyribonucleoside triphosphates. *Taq* DNA Polymerase has a temperature optimum around 75°C and can survive repeated incubations at 95°C. It also lacks intrinsic nuclease activity (1, 2). The recombinant form of the native enzyme is expressed in *E. coli* and provides excellent reproducibility between lots.

### Applications

#### Amplification of template molecules for PCR

*Taq* DNA Polymerase, licensed for use in PCR, is extensively tested for contaminating nickase, single- and double-stranded exonuclease and endonuclease activities. When used with the supplied 10X PCR Buffer, the enzyme can successfully amplify single-copy genes from genomic DNA and can yield specific PCR products exceeding 2 kb in length (Fig 1).

#### DNA sequencing by the dideoxynucleotide method

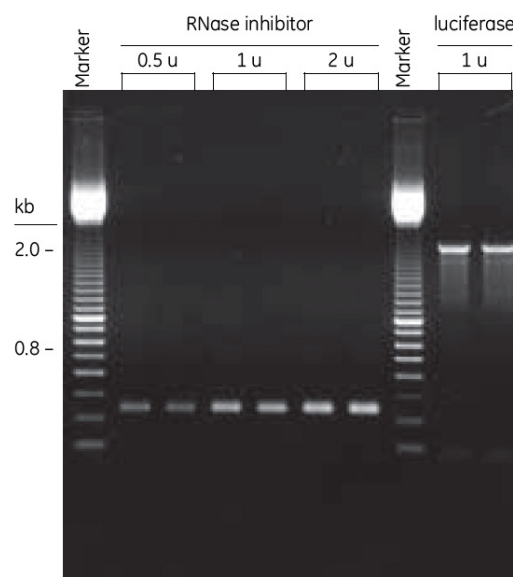
*Taq* DNA Polymerase is ideal for sequencing templates that have a high degree of secondary structure. Due to its high temperature optimum, sequencing reactions can be performed at 70°C, where templates show minimal secondary structure and the stringency of primer hybridization is high (3). *Taq* DNA Polymerase also lacks intrinsic nuclease activity and therefore gives uniform bands in autoradiograms.

### Properties

**Unit Definition:** One unit catalyzes the incorporation of 10 nmol of total nucleotide into acid-insoluble product in 30 min at 70°C utilizing M13mp18 DNA as a template.

**Molecular Weight:** 86 to 90 kDa.

**Activators:** Requires divalent cations, with Mg<sup>2+</sup> preferred over Mn<sup>2+</sup>.



**Fig 1.** Amplification of a single-copy gene (RNase inhibitor; ~250 bp PCR product) from 5 ng human genomic DNA and a 2.2 kb PCR product (luciferase gene) from 10 pg plasmid. Amplifications were performed using the recommended conditions and the amounts of *Taq* DNA Polymerase shown. Marker = 100 Base-Pair Ladder (27-4001-01).

### Components

***Taq* DNA Polymerase:** Enzyme is supplied at a concentration of 5 units/μL in 50 mM Tris-HCl pH 7.5, 5 mM DTT, 0.1 M EDTA, 50% glycerol and stabilizers.

**10X PCR Buffer:** 100 mM Tris-HCl (pH 9.0), 15 mM MgCl<sub>2</sub>, 500 mM KCl.

**25 mM MgCl<sub>2</sub> solution:** included with 27-0798-04/5/6

## Quality Control

**PCR:** Functionally tested for PCR by amplification of a PCR product from human genomic DNA using primers for the p53 gene.

**Nickase:** At least 90% of  $\phi$ X-174 DNA remains as Form I when 2  $\mu$ g DNA is incubated with at least 10 units of *Taq* DNA Polymerase in a 30  $\mu$ L reaction mixture for 1 h at 65°C.

**DNase:** Less than 1% of [3H]-DNA is hydrolyzed when 100 ng [3H]-DNA (HphI/AluI restricted M13 DNA) is incubated with 10 units of *Taq* DNA Polymerase in a 40  $\mu$ L reaction mixture for 1 h at 65°C.

**Restriction endonuclease:** No contaminating restriction endonuclease is detected by agarose gel electrophoresis when 1  $\mu$ g  $\lambda$  DNA is incubated with at least 10 units of *Taq* DNA Polymerase in a 50  $\mu$ L reaction mixture for 18 h at 65°C under mineral oil.

## Storage

Store at -20°C.

## References

1. Chien, A. et al., *J. Bacteriol.* **127**, 1550 (1976).
2. Kaledin, A. S. et al., *Biokhimiya* (English translation) **45**, 494 (1980).
3. Innis, M. A. et al., *Proc. Natl. Acad. Sci. USA* **85**, 9436 (1988).

## Ordering information

Product	Code Number
<i>Taq</i> DNA Polymerase (cloned) 250 units	27-0798-04*
<i>Taq</i> DNA Polymerase (cloned) 4 × 250 units	27-0798-05*
<i>Taq</i> DNA Polymerase (cloned) 10 × 250 units	27-0798-06*

\*Supplied with 10 × PCR Buffer containing 100 mM Tris-HCl, pH 9.0, 15 mM MgCl<sub>2</sub> and 500 mM KCl.

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CY17825-21Dec20-DF

## Related products

### PCR

Product	Code Number
PuReTaq™ Ready-To-Go™ PCR Beads	see catalog for full range
FideliTaq™ DNA Polymerase	see catalog for full range
FideliTaq PCR Master Mix (2X)	E71182
FideliTaq PCR Master Mix Plus	E71183
Amersham™ Hot Start Master Mix	25-1500-01
Amersham Hot Start Mix RTG	see catalog for full range

### RT-PCR

Ready-To-Go RT-PCR Beads	see catalog for full range
RT-PCR Master Mix (2X)	E78370
FideliTaq RT-PCR Master Mix (2X)	E71185

### First-strand synthesis

First-Strand cDNA Synthesis Kit	27-9261-01
Ready-To-Go You-Prime First-Strand Beads	27-9264-01
Ready-To-Go T-Primed First-Strand Kit	27-9263-01
TimeSaver™ cDNA Synthesis Kit	27-9262-01

### Nucleotides

Amersham dNTPs	see catalog for full range
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### mRNA and total RNA Purification

mRNA Purification Kit	27-9258-01
mRNA Purification Kit	27-9258-02
Amersham RNAspin Isolation Kits	see catalog for full range
QuickPrep Micro mRNA Purification Kit	27-9255-01
QuickPrep mRNA Purification Kit	27-9254-01

### DNA purification

ExoSAP-IT™	see catalog for full range
GFX™ PCR DNA and Gel Band Purification Kit	28-9034-70
MicroSpin™ S-400 HR Columns	27-5140-01
100 Base-Pair Ladder	27-4007-01

