



TEMPase Hot Start DNA Polymerase

With 10x Ammonium Buffer, 10x Standard Buffer, 10x Combination Buffer (15 mM MgCl₂) and 5x PCR Buffer RED (7.5 mM MgCl₂)

Concentration and amount: 5 units/μl, 50 units

Cat. No.: A226199 – SAMPLE

-	TEMPase Polymerase 5 U/μl	10x Ammonium	10x Standard	10x Combination	5x PCR Buffer RED	MgCl ₂ 25 mM
		Buffer, 15 mM MgCl ₂			7.5 mM MgCl ₂	
ID No.	5101650	5100950	5100510	5600400	5100100	5575801
Cap colour	Red	White	Blue	Green	Black	Clear
Content	10 μl	1.5 ml	1.5 ml	1.5 ml	1.5 ml	1.5 ml

MADE IN DENMARK

Key Features

TEMPase Hot Start DNA Polymerase is a modified form of Ampliqon Taq DNA Polymerase. A chemical moiety is attached to the enzyme at the active site, which renders the enzyme inactive at room temperature. Thus, during setup and the first ramp of thermal cycling, the enzyme is not active and misprimed primers are not extended. Once the reaction reaches optimal activating temperature, the chemical moiety is cleaved during a 15 minutes' heat activation step, releasing the active TEMPase Hot Start DNA Polymerase into the reaction.

Kit Components

TEMPase Hot Start DNA Polymerase in Storage Buffer

5 U/μl TEMPase Hot Start DNA Polymerase, 20 mM Tris-HCl pH 8.9, 100 mM KCl, 0.1 mM EDTA, 1 mM DTT, 0.5% Tween® 20, 50% glycerol.

10x Ammonium Buffer

Tris-HCl pH 8.5, (NH₄)₂SO₄, 15 mM MgCl₂, 1% Tween® 20.

Ammonium in the buffer minimizes the need for optimization of the MgCl₂ concentration or the annealing temperature for most primer-template systems.

10x Standard Buffer

Tris-HCl pH 8.5, KCl, 15 mM MgCl₂, 1% Tween® 20.

Standard Buffer is the traditional potassium (K⁺) buffer. Standard Buffer promotes high specificity and careful optimization of primer annealing temperatures and Mg²⁺ concentrations may be required.

10x Combination Buffer

Tris-HCl, pH 8.7, KCl, (NH₄)₂SO₄, 15 mM MgCl₂, 1% Tween® 20.

Combination Buffer is a proprietary mixture of K⁺ and NH₄⁺. This buffer combines high specificity with good product yield and high tolerance to optimization of primer annealing temperatures and Mg²⁺ concentrations.

5x PCR Buffer RED

Tris-HCl pH 8.5, (NH₄)₂SO₄, 7.5 mM MgCl₂, 0.5% Tween® 20, red tracking dye, density agent.

Recommended Storage and Stability

Long term storage at -20 °C. Product expiry at -20 °C is stated on the label.

Option: Store at +4 °C for up to 6 months.

Quality Control

Taq DNA Polymerase is tested for contaminating activities, with no traces of endonuclease activity, nicking activity or exonuclease activity.

Unit Definition

One unit is defined as the amount of polymerase that incorporates 10 nmol of dNTPs into acid-precipitable DNA in 30 minutes at 72 °C under standard assay conditions.

Protocol

This protocol serves as a guideline to ensure optimal PCR results when using TEMPase Hot Start DNA Polymerase. Optimal reaction conditions such as incubation times, temperatures and amount of template DNA may vary and must be determined individually.

1. Thaw 10x Buffer, dNTP mix and primer solutions. **It is important to thaw the solutions completely (some buffers need to reach room temperature) and mix thoroughly before use to avoid localized concentrations of salts.** Keep all components on ice. The polymerase is provided in glycerol and does not need thawing. Keep it at -20 °C at all times.
2. Set up reaction mixtures in an area separate from that used for DNA preparation or product analysis. Work on ice at all times.
3. Prepare a master mix according to Table 1. The master mix typically contains all the components needed for extension except the template DNA.

Table 1. Reaction mix and template DNA

Component	Vol./reaction*	Final concentration*
10x Buffer <i>or</i> 5x Buffer	5 μl 10 μl	1x
25 mM MgCl ₂	0 μl (0 – 6 μl)	1.5 mM (1.5 – 4.5 mM)
dNTP mix (10 mM each)	1 μl	0.2 mM of each dNTP
Primer A (10 μM)	1 μl (0.5 – 5 μl)	0.2 μM (0.1 – 1.0 μM)
Primer B (10 μM)	1 μl (0.5 – 5 μl)	0.2 μM (0.1 – 1.0 μM)
TEMPase DNA Pol.	0.4 μl (0.2 – 1 μl)	2 units (1 – 5 units)
PCR-grade H ₂ O	X μl	-
Template DNA	X μl	genomic DNA: 20 ng (1 – 200 ng) plasmid DNA: 0.5 ng (0.1 – 1 ng) bacterial DNA: 5 ng (1 – 10 ng)
TOTAL volume	50 μl	-

* Suggested starting conditions; theoretically used conditions in brackets. The final volume can be reduced to 25 μl by using half of the volumes suggested in Vol./reaction, eg. 0.2 μl TEMPase instead of 0.4 μl TEMPase.

4. Mix the master mix thoroughly and dispense appropriate volumes into reaction tubes. Mix gently, e.g. by pipetting the master mix up and down a few times.
5. Add template DNA to the individual tubes containing the master mix.
6. Program the thermal cycler according to the manufacturer's instructions. **Each program must start with an initial heat activation step at 95°C for 15 minutes.**

For maximum yield and specificity, temperatures and cycling times should be optimized for each new template or primer pair.

- Place the tubes in the thermal cycler and start the reaction.

Three-step PCR program

Cycles	Duration of cycle	Temperature
1	15 minutes ^a	95 °C
25 – 35	20 – 30 seconds ^b 20 – 40 seconds ^c 30 – 90 seconds ^d	95 °C 50 – 65 °C 72 °C
1	5 minutes ^e	72 °C

^a For activation of the TEMPase hot start enzyme.

^b Denaturation step: This step is the first regular cycling event and consists of heating the reaction to 95 °C for 20 – 30 seconds. It causes melting of the DNA template by disrupting the hydrogen bonds between complementary bases, yielding single-stranded DNA molecules.

^c Annealing step: The reaction temperature is lowered to 50 – 65 °C for 20 – 40 seconds allowing annealing of the primers to the single-stranded DNA template. Typically, the annealing temperature is about 3 – 5 °C below the T_m (melting temperature) of the primers used.

^d Extension/elongation step: TEMPase polymerase has its optimum activity temperature at 72 °C. At this step the DNA polymerase synthesizes a new DNA strand complementary to the DNA template strand. The extension time depends on the length of the DNA fragment to be amplified. As a rule of thumb, at its optimum temperature the DNA polymerase will polymerize a thousand bases per minute.

^e Final elongation: This single step is occasionally performed at a temperature of 72 °C for 5 minutes after the last PCR cycle to ensure that any remaining single-stranded DNA is fully extended.

Notes:

- 15 mM MgCl₂ is present in 10x PCR Buffers (7.5 mM is present in the 5x PCR Buffer RED). The 1x concentration is 1.5 mM MgCl₂. In some applications, more than 1.5 mM MgCl₂ is required for best results. For this reason, 25 mM MgCl₂ is included in the kit. Table 2 provides the volume of 25 mM MgCl₂ to be added to the master mix if a higher MgCl₂ concentration is required.

Table 2. Additional volume (µl) of MgCl₂ per 50 µl reaction

Final MgCl ₂ conc. in reaction (mM)	1.5	2.0	2.5	3.0	3.5	4.0	4.5
Volume of 25 mM MgCl ₂	0	1	2	3	4	5	6

- For longer DNA targets more DNA polymerase could be added to the PCR master mix.

Related Products

TEMPase DNA Polymerase (500 units) *	Cat. No.
TEMPase Hot Start DNA Polymerase 5 U/µl	A220003
• with 10x Ammonium Buffer	A221103
• with 5x PCR Buffer RED	A221803
TEMPase Hot Start DNA Polymerase 5 U/µl, glycerol free	A240003
• with 10x Ammonium Buffer	A241103

Taq DNA Polymerase (500 units) *	Cat. No.
Taq DNA Polymerase, 5 U/µl	A110003
• with 10x Ammonium Buffer	A111103

*Available in kits including one or two buffers (Ammonium Buffer, Standard Buffer or Combination Buffer). All kits include extra 25 mM MgCl₂.

Buffers for DNA polymerases *	Cat. No.
10x Ammonium Buffer, 3 x 1.5 ml	A301103
10x Standard Buffer, 3 x 1.5 ml	A302103
10x Combination Buffer, 3 x 1.5 ml	A303103
5x PCR Buffer RED, 6 x 1.5 ml **	A301810

*Ammonium Buffer, Standard Buffer and Combination Buffer are also available as Mg²⁺ free buffers, detergent free buffers and Mg²⁺ and detergent free buffers.

**For direct gel loading and visualisation.

TEMPase Hot Start Master Mixes (500 x 50 µl reactions) *	Cat. No.
2x Master Mix A**, 1.5 mM MgCl ₂ final concentration	A230303
2x Master Mix A**BLUE, 1.5 mM MgCl ₂ final concentration	A290403

*Master mixes available also in 1.1x variants as well as 2 mM MgCl₂ variants, **Mix A is Ammonium Buffer based, also available as Mix C based on Combination Buffer.

Special Master Mixes (500 x 50 µl reactions)	Cat. No.
Multiplex 2x Master Mix, 3 mM MgCl ₂ final concentration	A260303
GC TEMPase 2x Master Mix I – for GC-rich templates	A331703
GC TEMPase 2x Master Mix II – for GC-rich templates	A332703

Ultrapure dNTPs*	Cat. No.
dNTP Mix 40 mM (2 x 500 µl): 10 mM each dA, dC, dG, dT	A502004
dNTP Set, 100 mM each: 250 µl of each dA, dC, dG and dT	A511104

*Other concentrations and Single dNTPs are available.

Loading Buffers, PCR water and Ladders	Cat. No.
5x Loading Buffer Red *, 5 x 1 ml	A608104
Iqon PCR Ladder **, 100 – 3000 bp, 1 x 0.5 ml	A610341
PCR Grade Water, 6 x 5 ml	A360056

* Also available with Blue, Orange or Cyan. ** Available in different size ranges.

For Research Use Only. Not for use in diagnostics procedures.

Other product sizes, combinations and customized solutions are available. Please look at www.ampliqon.com or ask for our complete product list for PCR Enzymes. For customized solutions please contact us.

Made in Denmark

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