Vent$_R$® DNA Polymerase

NEW ENGLAND BioLabs Inc.
1-800-632-7799
info@neb.com
www.neb.com

M0254S 034120614061

M0254S

200 units 2,000 U/ml Lot: 0341206

RECOMBINANT Store at –20°C Exp: 6/14

Description: Vent$_R$ DNA Polymerase is a high-fidelity thermophilic DNA polymerase. The fidelity of Vent$_R$ DNA Polymerase is 5–15-fold higher than that observed for *Taq* DNA Polymerase (1,2). This high fidelity derives in part from an integral 3´→ 5´ proofreading exonuclease activity in Vent$_R$ DNA Polymerase (1,3). Greater than 90% of the polymerase activity remains following a 1 hour incubation at 95°C.

Source: An *E. coli* strain that carries the Vent DNA Polymerase gene from *Thermococcus litoralis* (4). The native organism is capable of growth at up to 98°C and was isolated from a submarine thermal vent (5).

Applications:
- PCR
- Primer extension

Supplied in: 100 mM KCl, 0.1 mM EDTA, 10 mM Tris-HCl (pH 7.4), 1 mM dithiothreitol, 0.1% Triton® X-100 and 50% glycerol.

Reagents Supplied with Enzyme:
10X ThermoPol™ Reaction Buffer
100 mM $MgSO_4$.

Reaction Conditions: 1X ThermoPol Reaction Buffer, with or without additional $MgSO_4$, DNA template, primer, dNTPs and 1–2 units polymerase in a final volume of 100 µl.

1X ThermoPol Reaction Buffer:
20 mM Tris-HCl
10 mM $(NH_4)_2SO_4$
10 mM KCl
2 mM $MgSO_4$
0.1% Triton X-100
pH 8.8 @ 25°C

Unit Definition: One unit is defined as the amount of enzyme that will incorporate 10 nmol of dNTP into acid-insoluble material in 30 minutes at 75°C.

Unit Assay Conditions: 1X ThermoPol Buffer, 200 µM each dNTP including [^{3}H]-dTTP, 200 µg/ml activated calf thymus DNA.

Heat Inactivation: No

Quality Control Assays

Endonuclease Activity: Incubation of a 50 µl reaction in ThermoPol Reaction Buffer supplemented with 400 µM each dNTP containing a minimum of 20 units of Vent DNA Polymerase with 1 µg of supercoiled pUC19 DNA for 4 hours at 37°C results in < 10% conversion to the nicked form as determined by agarose gel electrophoresis.

Physical Purity: Purified to > 95% homogeneity as determined by SDS-PAGE analysis using Coomassie Blue detection.

Calculated Half-lives at 95°C:

Deep Vent$_R$™ DNA Polymerase	23 hours
Vent$_R$ DNA Polymerase	6.7 hours
Taq DNA Polymerase	1.6 hours

References:

1. Mattila, P. et al. (1991) *NAR* 19, 4967–4973.
2. Eckert, K.A. and Kunkel, T.A. (1991) *PCR Methods and Applications* 1, 17–24.
3. Kong, H.M., Kucera, R.B. and Jack, W.E. (1993) *J. Biol. Chem.*, 268, 1965–1975.
4. Perler, F. et al. (1992) *PNAS USA* 89, 5577.
5. Belkin, S., Wirsen, C.O. and Jannasch, H.W. (1985) *Arch. Microbiol.* 141, 181–186.

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CERTIFICATE OF ANALYSIS

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CERTIFICATE OF ANALYSIS

Companion Products Sold Separately:

Magnesium Sulfate ($MgSO_4$) Solution
#B1003S 6.0 ml

Diluent D
#B8004S 4.0 ml

BSA
#B9001S 6.0 ml

ThermoPol Reaction Buffer Pack
#B9004S 6.0 ml

ThermoPol II (Mg-free) Reaction Buffer Pack
#B9005S 6.0 ml

ThermoPol DF (Detergent-free) Reaction Buffer Pack
#B9013S 6.0 ml

Deoxynucleotide Solution Set
#N0446S 25 µmol each

Deoxynucleotide Solution Mix
#N0447S 8 µmol each
#N0447L 40 µmol each

Using NEB Thermophilic DNA Polymerases to Extend a Primer

General Approach–Setting up a Primer Extension Reaction or a PCR Reaction: Basic reaction conditions are 1X ThermoPol reaction buffer, DNA template, DNA polymerase, 1–6 mM $MgSO_4$, 200–400 µM each dNTP and 0.4 µM primer.

The three most important variables to optimize are the amount of polymerase, the annealing temperature for the primer and the magnesium level. Each new primer: template may require reoptimization.

Enzyme Amount: It is important to use the optimal amount of enzyme, especially with the proofreading DNA polymerases. Start with 1 unit/100 µl reaction volume for proofreading DNA polymerases or 4 units/100 µl reaction volume for exo⁻ derivatives (for different reaction volumes adjust this ratio accordingly). In general, lower DNA template concentrations in a primer extension reaction necessitate using the lower amount of DNA polymerase within the recommended range.

Recommended ranges are 1–2 units per 100 µl reaction volume for the Vent$_R$, and Deep Vent$_R$ DNA polymerases, and 2–4 units for the Vent$_R$ (exo⁻) and Deep Vent$_R$ (exo⁻) DNA Polymerases.

Annealing Temperature: The optimal annealing temperature for the primer can usually be predicted from any of several standard methods of calculation. If this temperature does not give satisfactory results, the annealing temperature should be examined in 3°C increments.

In general, the Vent$_R$ and Deep Vent$_R$ DNA polymerases use annealing temperatures that tend to be the same, or higher, than annealing temperatures used by other DNA polymerases. (Different annealing temperatures may be required by different polymerases, perhaps due to differences in the K_m for binding DNA).

Magnesium Concentration: The optimal magnesium concentration is usually 2, 4 or 6 mM. If EDTA is present at significant levels in DNA added to your reaction, the test range may need to be extended higher. For Vent$_R$ and Deep Vent$_R$ DNA Polymerases, primer extensions longer than 2 kb almost always require magnesium levels higher than 2 mM, while for primer extensions shorter than 2 kb, there is no correlation between length and optimum magnesium concentration.

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Magnesium Sulfate ($MgSO_4$) Solution
#B1003S 6.0 ml

Diluent D
#B8004S 4.0 ml

BSA
#B9001S 6.0 ml

ThermoPol Reaction Buffer Pack
#B9004S 6.0 ml

ThermoPol II (Mg-free) Reaction Buffer Pack
#B9005S 6.0 ml

ThermoPol DF (Detergent-free) Reaction Buffer Pack
#B9013S 6.0 ml

Deoxynucleotide Solution Set
#N0446S 25 µmol each

Deoxynucleotide Solution Mix
#N0447S 8 µmol each
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nqa ISO 14001 Registered Environmental Management
nqa ISO 13485 Registered Medical Devices