



Catalog #

Aliquot Size

TQ01-E311-1000

1000 U

Taq DNA polymerase

Recombinant protein expressed in *E. coli*

Catalog # TQ01-E311

Lot # Y4280-13

Product Description

Recombinant *Thermus aquaticus* Taq DNA polymerase protein expressed in *E. coli* cells.

Components

	Component Name	200µl
	Taq DNA polymerase (5U/µl)	1 x 200µl
b	10X Taq buffer (Mg2+ plus)	4 x 4 ml

Formulation

10 mM Tris-HCl pH 7.4, 100 mM KCl, 1 mM DTT, 0.1 mM EDTA, 0.5% Tween 20, 0.5% IGEPAL CA-630, 50% Glycerol

Storage and Stability

Store product at -30°C to -15°C. For optimal performance aliquot product into smaller quantities after centrifugation and store at recommended temperature. Avoid repeated handling and multiple freeze/thaw cycles.

Scientific Background

Taq DNA polymerase is a highly thermostable DNA polymerase of *Thermus aquaticus*. The enzyme exhibits 5'→3' polymerase activity and possesses 5'→3' exonuclease activity but has no detectable 3'→5' exonuclease activity. In addition, Taq DNA polymerase generates PCR products containing extra adenines at the 3'-ends. The resulting products can be used for TA cloning. Applications of this product include: routine PCR amplification of DNA fragments, generation of PCR products for TA cloning, DNA labelling and DNA sequencing.

References

1. Innis M A, et al: PCR protocols and applications: A laboratory manual, academic, New York, 1989.
2. Innis M A, et al: DNA sequencing with *Thermus aquaticus* DNA polymerase and direct sequencing of polymerase chain reaction-amplified DNA, Proc. Natl. Acad. Sci. USA. 1988, 85:9436-9440.
3. Weyant R S, et al: Effect of ionic and nonionic detergents on the Taq polymerase. Biotechniques. 1990, 9:308-309.

Quality Control

Exonuclease Activity: The product is tested in a reaction containing 10 U of Taq DNA Polymerase and 0.6 µg of λ-Hind II DNA. After incubation at 37°C for 16 hours, there is no visually detectable change of pattern of DNA bands determined by agarose gel electrophoresis.

Endonuclease Activity: The product is tested in a reaction containing 10 U of Taq DNA Polymerase and 0.6 µg of supercoiled pBR322. After incubation at 37°C for 4 hours, there is no visually detectable change of pattern of DNA bands determined by agarose gel electrophoresis.

Functional Assay: The human α-1-antitrypsin gene is amplified for 30 cycles in a 50 µl system using 1.25 U of Taq DNA Polymerase and 100 ng of human genomic DNA as template. A single DNA band of 360 bp is detected by 1% agarose gel electrophoresis.

Specific Activity

The specific activity of Taq DNA polymerase was determined to be **5 Units/µl**.

Unit Definition:

One unit (U) is defined as the amount of enzyme that incorporates 10 nmol of dNTPs into acid-insoluble products in 30 minutes at 74°C with activated salmon sperm DNA as template/primer.

This product is manufactured in an ISO 9001 and ISO 13485 certified facility

Taq DNA polymerase

Recombinant protein expressed in *E. coli*

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Specific Activity 5 U/ml

Lot # Y4280-13

Concentration 5 U/µl

Stability 1 yr at -30°C~-15°C from date of shipment

Storage & Shipping Store product at -30°C~-15°C. For optimal storage and performance aliquot product into smaller quantities after centrifugation and store at recommended temperature. Avoid repeated handling and multiple freeze/thaw cycles. Product shipped on ice pack.

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PCR Protocol

1. General reaction mixture for PCR:

Component	50 µl system
10x Taq Buffer (Mg ²⁺ plus)	5 µl
dNTP Mix (10 mM each)	1 µl
Template DNA ^a	Variable
Primer 1 (10 µM)	2 µl
Primer 2 (10 µM)	2 µl
Taq DNA polymerase (5 U/µl) ^b	0.5 µl
ddH ₂ O	to 50 µl

Note: When the GC content of the amplified fragment is >60% PCR Enhancer is recommended to optimize the PCR reaction.

^a The optimal reaction concentration is different for different templates. The recommended amount of DNA template for a 50µl reaction system is as follows:

DNA template	Amount
Genomic DNA of animals and plants	0.1-1µg
Escherichia coli genomic DNA	10-100ng
λDNA	0.5-10ng
cDNA	1 - 5 µl (≤ 1/10 of the total volume of the PCR reaction)
Plasmid DNA	0.1-10ng

^b The amount of Taq DNA Polymerase can be adjusted between 0.25 - 1µl. Increasing the amount of Taq DNA polymerase can improve the amplification yield under normal circumstances but may decrease the specificity of PCR amplification.

2. Thermocycling conditions for a routine PCR:

Temperature	Time	Cycle number
95°C	3 min (Initial denaturation) ^a	
95°C	15 sec	} 30-35 cycles
60°C ^b	15 sec	
72°C	60 sec / kb	
72°C	5 min (final extension)	

- ^a The initial denaturation condition is suitable for most amplification reactions and can be modified according to the complexity of the template structure. If the template structure is complex, the initial denaturation time can be extended to 5 - 10 min to improve the initial denaturation effect.
- ^b The annealing temperature needs to be adjusted according to the T_m value of the primer, generally set to be 3 to 5°C lower than the T_m value of the primer; For complex templates, it is necessary to adjust the annealing temperature and extend the extension time to achieve efficient amplification.

Handling Notes:

Taq DNA Polymerase also shows polymerase activity at room temperature. Therefore, it is recommended to set up reaction systems on ice and then immediately start the reaction in a PCR amplifier, so as to reduce nonspecific amplification during preparation and get better PCR results.

Guidelines for primer design:

1. PCR primers are generally 15-30 nucleotides long.
2. If possible, the primer should terminate with a G or C at the 3'-end.
3. Avoid continuous mismatching nucleotides among last 8 bases at the 3'-end of the primers.
4. Avoid hairpin structure at the 3'-end of the primers.
5. T_m of the primers should be within the range of 55°C-65°C.
6. Non-complementary sequence should not be included when calculating T_m of the primers.
7. Optimal GC content of the primer is 40-60%. Ideally, G and C nucleotides should be distributed uniformly along the primer.
8. T_m and GC content of forward and reverse primers should be as similar as possible.

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SAFETY DATA SHEET

Article 1 - Product Identification

Product Name: Taq DNA polymerase

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This product is sold only for research use by qualified laboratory personnel, and is not to be used as a drug, medical device, food additive, cosmetic, nor household chemical. It is not to be used in diagnostic, therapeutic, consumer, agricultural, nor pesticidal applications.

Manufacturer's Name: SignalChem Biotech Inc.
 Street Address: 110-13120 Vanier Place
 City, Prov. Postal Code: Richmond, BC, V6V 2J2
 Country: Canada
 Fax: 604-232-4601
 EMERGENCY PHONE: 604-232-4600

Article 2 - Hazard Identification

- **WHMIS Classification:** Not WHMIS controlled.
- **GHS classification:** Skin irritation (Category 3); Eye irritation (Category 2B).
- **Hazard Pictograms:** none.
- **Signal words:** Warning.
- **Hazard statements:** Causes mild skin irritation (H316); Causes eye irritation (H320).
- **Precautionary statements:** IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. (P305 + P351 + P338).
- **Other hazards:** none known.

Article 3 - Composition/Information on Ingredients

Chemical Characterization: Mixture.

Description: This product consists of the substances listed below.

Component: Taq DNA polymerase

Common name	Chemical name	CAS-No.	Concentration
Glycerol	Glycerol	56-81-5	50%
Tween 20	Polyoxyethylene (20) sorbitan monolaurate	9005-64-5	0.5%
IGEPAL CA-630	Octylphenoxy poly(ethyleneoxy)ethanol, branched	9002-93-1	0.5%
KCl	Potassium Chloride	7447-40-7	0.7455%
Tris-HCl	2 - Amino - 2 - (hydroxymethyl) propane - 1, 3 - diol hydrochloride	1185-53-1	0.1576%
DTT	1,4-Dithio-DL-threitol	3483-12-3	0.0154%
EDTA	Ethylenediaminetetraacetic Acid	23411-34-9	0.0029%
Protein	N/A	N/A	Not determined

Component: 10X Taq buffer (Mg²⁺ plus)

Not a hazardous substance or mixture

Article 4 - First-aid Measures

- **General information:** Consult a physician by providing the SDS.
- **After inhalation:** Breathe in fresh air. If cannot breathe, give artificial respiration and consult a physician.
- **After skin contact:** Immediately wash with soap and plenty of water and rinse thoroughly. Consult a physician.
- **After eye contact:** Rinse opened eyes with plenty of water for at least 15 minutes. Consult a physician.
- **After swallowing:** rinse the mouth with plenty of water and consult a physician.

Article 5 - Fire-fighting Measures

- **Suitable extinguishing media:** Use water spray, extinguishing powder, carbon dioxide, or other appropriate measure that is suitable to the environment.
- **Specific hazards arising from the substance or mixture:** None known.
- **Special protective equipment and precautions for fire-fighters:** Self-contained breathing apparatus if necessary.

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Article 6 – Accidental Release Measures

- **Personal precautions, protective equipment and emergency procedures:** Apply standard laboratory practices and personal protective equipment. Avoid breathing vapors, mist, or gas. Ensure adequate ventilation.
- **Environmental precautions:** Do not allow to enter drains.
- **Methods and materials for containment and cleaning up:** Absorb on sand or vermiculite and place in closed containers for disposal.

Article 7 - Handling and Storage

- **Precautions for safe handling:** Wear chemical safety goggles and compatible chemical-resistant gloves. Avoid inhalation, contact with eyes, skin or clothing.
- **Conditions for safe storage:** Store in a dry and well-ventilated place in -30 °C~-15 °C. Keep container upright and tightly closed.

Article 8 - Exposure Controls/Personal Protection

- **Components with limit monitoring values at workplace:**
Glycerol (CAS-No: 56-81-5)

Values	Control parameters	Regulations
TWA	10 mg/m ³ for mist	British Columbia, Canada
TWA	3 mg/m ³ for respirable mist	British Columbia, Canada
TWA	10 mg/m ³	Alberta, Canada
TWAEV	10 mg/m ³	Ontario, Canada
TWAEV	10 mg/m ³	Quebec, Canada
TWA	10 mg/m ³	USA

- **Appropriate engineering controls:**
Apply adequate ventilation including mechanical exhaust or laboratory fume hood. Follow standard laboratory practices.
- **Individual protection measures:**
Respiratory protection:
Use appropriate respirator if there is inadequate ventilation by following the government standards.
Hand protection:
Wear gloves and use proper glove removal technique to avoid skin contact. Discard gloves after use by following the applicable laboratory regulations. Wash and dry hands.
Eye/face protection:
Safety goggles with side-shields approved under appropriate government standards.
Skin/body protection:
Use appropriate clothing, footwear and any additional protection measures to protect from splashing or contamination.

Article 9 – Physical and Chemical Properties

Appearance: Colorless fluid.	Danger of explosion: Product does not present an explosion hazard.
Odour/Odour Threshold: Not determined.	Explosion limits: Not determined.
pH: ~7.2.	Decomposition temperature: Not available.
Melting point/freezing point: Not determined.	Vapor pressure at 20 °C: 0.1 hPa
Boiling point/Boiling range: 106 °C.	Density: ~1.12g/cm ³ .
Flash point: Not determined.	Relative density: Not determined.
Flammability (solid, gaseous): Not determined.	Vapor density: Not determined.
Ignition temperature: Not determined.	Evaporation rate: Not determined.
Auto-igniting: Product is not self-igniting.	Solubility in / Miscibility with Water: Fully miscible.

Article 10 - Stability and Reactivity

- **Reactivity:** Stable under recommended transport and storage conditions.
- **Chemical stability:** Stable under recommended transport and storage conditions.
- **Possible hazardous reactions:** No dangerous reactions known.
- **Conditions to avoid:** Heat and moisture.
- **Incompatible materials:** Strong acids/bases, strong oxidizing/reducing agents.
- **Hazardous decomposition products:** Carbon oxides may form under fire conditions; no known decomposition information for other decomposition products.

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Article 11 - Toxicological Information

- **Acute toxicity:** Not available.
- **LD/LC50:** Not available.
- **Skin corrosion/irritation:** Not available.
- **Serious eye damage/eye irritation:** Not available.
- **Respiratory or skin sensitization:** Not available.
- **Germ cell mutagenicity:** Not available.
- **Carcinogenicity:** No components are listed in IARC, or NTP, or OSHA, or ACGIH.
- **Reproductive toxicity:** Not available.
- **Teratogenicity:** Not available.
- **Specific target organ toxicity - single exposure/ - repeated exposure (GHS):** Not available.
- **Aspiration hazard:** Not available.
- **Potential health effects:**
 - Inhalation:** May be harmful if inhaled. May cause respiratory tract irritation.
 - Ingestion:** May be harmful if swallowed.
 - Skin:** May be harmful if absorbed through skin. May cause skin irritation.
 - Eyes:** May cause eye irritation.
- **Signs and Symptoms of Exposure:**
 - Prolonged or repeated exposure can cause: Nausea, Dizziness.
- **Synergistic effects:** Not available.

Article 12 - Ecological Information

- **Eco-toxicity:** No data available.
- **Biodegradability:** Not applicable.
- **Bio-accumulative potential:** Not applicable.
- **Mobility in soil:** Not applicable.
- **PBT and vPvB assessment:** Not applicable.
- **Other adverse effects:** Not applicable.

Article 13 - Disposal Considerations

- **Disposal methods:** In accordance to applicable national, regional, or local laws and regulations. For additional handling information and protection of employees please refer to Article 7 and 8.
- **Contaminated packaging:** Disposal should be made in accordance to official regulations. Use water or cleansing agents to clean the area.

Article 14 - Transport Information

- **DOT:** Not dangerous goods.
- **IMDG:** Not dangerous goods.
- **IATA:** Not dangerous goods.

Article 15 - Regulatory Information

- **WHMIS Classification:** Non-hazardous.
- **GHS label elements:** Not applicable.
- **Signal word:** Not applicable.
- **Hazard statements:** Not applicable.

Article 16 - Other Information

The above information is believed to be correct but does not purport to be all-inclusive and shall be used only as a guide. SignalChem shall not be held liable for any damage resulting from handling or from contact with the above product. See the Technical Specification, Packing Slip, Invoice, and Product Catalog for additional terms and conditions of sale.

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